

A Comparison of Early Career Agricultural Teacher Training Received, Current Practices and Perceptions of Instructional Methods

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Abstract

The purpose of this study was to determine early career agricultural teachers' preparation and practice of various instructional methods in agricultural education. Training received in instructional methods and percentage of time spent using instructional methods were examined. Two-thirds of the participants of this study reported receiving training in all 10 of the identified instructional methods through their teacher certification program. Cooperative learning, demonstration, and lecture emerged as the most frequently used instructional methods while field trips, role play, and guest speakers were reported as the least used instructional methods. Participants only reported high confidence in using two instructional methods, demonstration and cooperative learning. Teachers identified only demonstration and cooperative learning as effective instructional methods for their classrooms. All other methods were reported as moderately effective. It was recommended that teacher preparation programs teach pre-service teachers how to select the appropriate instructional method for the environmental factors at hand.

Keywords: Teaching Methods; Early Career Agriculture Teachers; Alternative Certification

Introduction

Instructional methods are a key component in the process of planning and delivering classroom instruction (Newcomb et al., 2004). Instructional methods can be defined as the techniques a teacher uses to deliver content and facilitate student learning (Phipps et al., 2008; Talbert et al., 2014). There are multiple instructional methods teachers should have knowledge of to include in the delivery of content (Phipps et al., 2008, Talbert et al., 2014).

Smith, Rayfield, and McKim (2015) suggested teacher preparation programs should include exposure to effective instructional methods for student teachers to become confident in using a variety of methods. It is an expectation of the Council for Accreditation of Educator Preparation (CAEP) for teacher candidates to develop the foundational knowledge needed to deliver content to students in the

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best manner. This includes a knowledge of instructional methods (CAEP, 2013). Various levels of preparation exist among agricultural education teachers, so there is a need to examine instructional methods being covered in teacher preparation programs (Smith et al., 2015).

Newcomb et al. (2004) stated that instructional methods are the tools teachers use to deliver content or guide students in their learning experience. Instructional methods can be categorized as group teaching techniques or individualized teaching techniques. Phipps et al. (2008) explained when teachers use a variety of instructional methods, both group and individualized student success increases. High levels of achievement are a result of the use of group and individual instructional methods (Newcomb et al., 2004).

Rayfield et al. (2011) reported that teachers use a variety of instructional methods in their classroom. This included whole group methods, small group methods, labs, and individual methods (Rayfield et al., 2011). Boyle (2011) reported teachers in today's science classrooms use a variety of methods, but lecturing continues to be the main method used. Similarly, Smith et al. (2015) reported lecture is the most frequently used instructional method for experienced agricultural education teachers. Additionally, teachers reported having the most confidence in using both lecture and demonstration methods while being least confident in using role play and guest speakers. Smith et al.'s (2015) study also found that teachers perceived demonstration and experiments to be the most effective instructional methods and role play and guest speakers to be the least effective.

Theoretical Framework

Teachers must consider many things when choosing the appropriate instructional method. This includes the teaching style and ability of instructor, class size and structure, time, facilities, and available equipment and supplies (Talbert et al., 2014). Agricultural education courses, much like many secondary education courses, are filled with students of different academic levels (Parsons et al., 2013). Learning styles of students, developmental and educational levels of students, as well as the interests of the students are also considerations when choosing instructional methods (Newcomb et al., 2004, Talbert et al., 2014). Instructors must also consider the structure and content of the subject matter (Newcomb et al., 2004).

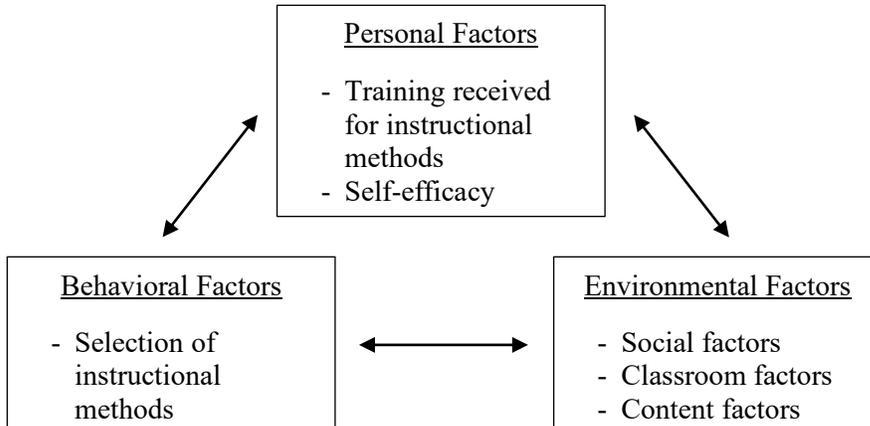
Many factors come in to play when determining why a teacher selects a specific instructional method in their courses (Newcomb et al., 2004, Phipps et al., 2008, Talbert et al., 2014). Having knowledge of how teachers relate to the subject matter being taught and their teaching environment is key to determining factors that may influence their choice of instructional methods (Smith et al., 2015). Social cognitive theory focuses on the mental factors that contribute to learning (Connolly, 2017). Social cognitive theory is the interaction between three factors: personal, behavioral, and environmental (Bandura, 2002). Human functioning is the interaction between these three factors (Bandura, 1986). In the context of this study, personal and environmental factors both play a role in the behavior of selecting instructional methods.

Personal factors influencing teacher behavior include training received in instructional methods and self-efficacy. Teachers are generally trained on the post-secondary level either traditionally through in-person courses and student teaching or alternatively through an online program with a one-year internship. This can influence the type of training received and modeled in regard to instructional teaching methods, directly influencing self-efficacy in using different instructional methods. Based on social cognitive theory, early-career teachers with higher self-efficacy related to instructional methods are better able to successfully implement a variety of instructional methods in their agricultural education courses which can lead to greater student learning (Bandura, 1986). Environmental factors influence cognition and outcome behaviors (Bandura, 1997). Environmental factors contributing to the selection of instructional methods include social, classroom, and content factors.

Demographic variables such as certification type, gender, and teaching tenure can influence the social environment of a teacher (Smith et al., 2015). Varying levels of students, resources, and time all affect the classroom environment. Content taught differs from course to course and lesson to lesson. This plays a role in the overall behavior outcome. Figure 1 depicts the relationship between personal, behavioral, and environmental factors of the social cognitive theory related to instructional method selection in agricultural education.

Figure 1

Adapted Model of Social Cognitive Theory as Related to Instructional Method Selection



Note. Model adapted from Bandura (2002).

In the study conducted by Smith et al. (2015), information was gathered on experienced agricultural education teacher instructional method preference in three different states across the nation. However, this study did not examine early career teachers or training received for certification. These are both factors that can influence teacher choice of instructional method and was suggested as a topic for further research (Smith et al., 2015). Data from this perspective would be helpful in determining the effectiveness of secondary agricultural education teacher preparation programs, an area of study highlighted in research priority five in the American Association for Agricultural Education's national research agenda (Roberts et al., 2016). This study will examine early career agricultural education teacher instructional method selection through the lens of social cognitive theory. Early career teacher status and certification type, either traditional or alternative, are personal factors of interest in this study due to their influence on environmental and behavioral factors. Results of the study may shed light on the effectiveness of teacher preparation programs in training teachers efficacious in multiple instructional methods.

Purpose/Objectives

The purpose of this study was to determine early career teacher instructional method preparation received, instruction methods being practiced, and perceptions of various instructional methods in agricultural education. The following objectives guided this study:

1. Determine if early career agricultural education teachers received training in the identified instructional methods.
2. Describe the percentage of time early career agricultural education teachers spend using the identified instructional methods.
3. Determine early career agricultural education teachers' confidence in using the identified instructional methods.

4. Determine early career agricultural education teachers' perceptions of effectiveness of the identified instructional methods.

Methods/Procedures

This was a descriptive study with a cross-sectional design. The dependent variables were the percentage of time spent using instructional methods, confidence in using teaching methods, and perceived effectiveness of teaching methods. The independent variables were training received by teachers in instructional methods and demographic characteristics including gender, age, teaching tenure, and certification type. An online survey was developed in Qualtrics™ and utilized for data collection to address the research objectives of this study. Dillman et al.'s (2014) Tailored Design Method was followed for data collection.

The population of this study included all early career teachers ($N = 304$) who participated in the new teacher workshop at the state professional development conference in the summers of 2014, 2015, and 2016. Early career teacher was operationally defined as someone who had completed one, two, or three years of teaching upon the start of data collection for this study. Since there are several different universities and alternative certification programs in the state that prepare secondary agricultural education teachers, it would be difficult to compile a complete list of early career teachers. All first-year teachers are encouraged to attend the new teacher workshop at the state professional development conference in the summer. Therefore, this population of early career teachers was the most accessible for developing a sampling frame. All participants were members of Agricultural Education Teachers Association in Texas. The director of the organization provided a list of all teachers who attended the new teacher workshop in 2014, 2015, and 2016.

The instrument used in this study was replicated from a previous study that examined teacher perceptions and instructional method use in science, technology, engineering, and math (STEM) integration in agricultural education (Smith et al., 2015). The instrument consisted of five sections. The first section consisted of four demographic questions (gender, age, first year teaching and certification type). The next section asked participants if they received instruction in the 10 identified instructional methods through their certification program. The 10 identified instructional methods were selected from the *Methods of Teaching Agriculture* book by Newcomb et al. (2004) because it is a textbook commonly used by teacher preparation programs in the state with a standardized list of instructional techniques. Definitions were provided on each question that asked about the instructional methods. Table 1 outlines the 10 instructional methods used in this study along with definitions.

Table 1
Definitions of Instructional Methods

Instructional Method	Definition
Cooperative Learning	Learner-centered instruction in which groups of 3-5 students work together on a well-defined learning task
Demonstration	Teacher-led instruction of hands-on skills or activities
Discussion	Two-way communication about a pre-defined topic conducted with entire class or smaller groups of students
Experiments	Students using the scientific method to form hypothesis, test theory, and formulate conclusions on a given topic

Table 1
Definitions of Instructional Methods, Continued...

Field Trips	Students taken away from traditional classroom setting for real-world experience in a content area
Guest Speakers	Guests with particular expertise are brought in to instruct about a specific concept or topic
Independent Study	Students are engaged in self-directed learning of a topic specific to their interests
Lecture	Teacher led instruction for disseminating information, may be guided through multimedia presentation
Role Play (Skits)	Class participants play or portray a given role to illustrate a concept
Supervised Study	Given a well-defined question or prompt, students use resource materials to find answers themselves

Smith et al., (2015). Definitions adapted from Newcomb et al., (2004).

The third section of the instrument asked participants to identify the estimated percentage of time they spend using each of the 10 instructional methods in the classes they teach during a school year. A sliding scale from 0-100% was available for each method. The fourth section asked participants to rate their level of confidence in using the identified instructional methods. There was a total of 10 Likert scale items for respondents to rate their level of confidence, one for each instructional method. A scale of one (very low) to five (very high) was used. The last section asked participants to identify the level of effectiveness for each instructional method. This consisted of a Likert scale for respondents to rate the level of effectiveness for each method from one (very ineffective) to five (very effective).

Once the instrument was obtained and adapted, it was reviewed by a panel of experts in agricultural education for content and face validity. The survey was pilot tested with the spring 2017 student teaching cohort (N = 23) at Texas Tech University to establish reliability. Cronbach's alpha of .80 was calculated on all scale items on the instrument. According to Fraenkel et al. (2019) a reliability of .70 is acceptable. For the main survey, early career teachers from the 2014, 2015, and 2016 new teacher workshop contact list were all contacted at the same time. Six points of email contact in the spring of 2017 were used to solicit response following Dillman's tailored design (Dillman et al., 2014). After the initial contact, all follow-up contacts were sent one week apart to those who had not responded. Each contact varied in content and was personalized with the name of the participant.

One hundred eleven of the 304 members of the sample completed the survey for a 36.51% response rate. A comparison of early to late responders was used to control for non-response error (Linder et al., 2001). Respondents who replied within the first three email waves were classified as early responders while respondents who replied during the last three waves were classified as late responders. No statistically significant differences were found when comparing the mean scores from early and late responders, therefore, non-response error was not considered a threat to internal validity. All data were analyzed using the Statistical Package for Social Sciences (SPSS). Means, standard deviations, frequencies, and percentages were calculated where appropriate.

Results/Findings

When examining demographic characteristics of the sample used in this study, the average age reported was ($M = 27$, $SD = 5.27$) years, with a minimum age reported of 22 years and a maximum early career teacher age of 48 years. Members of the sample began teaching between 2013 and 2016 with the fewest participants beginning teaching in 2013 ($n = 15$, 13.89%) and the most beginning in 2016 ($n = 38$, 35.19%). While this study only contacted participants from the 2014, 2015, and 2016 new teacher workshops, it should be noted that some individuals started teaching in 2013 prior to attending the new teacher workshop. They were most likely hired after the 2013 state professional development conference and attended the new teacher workshop the following year in 2014. Most respondents reported being traditionally certified to teach ($n = 86$, 77.48%). Over half of the participants were female for both first year teaching status and certification type. Table 2 displays a complete demographic breakdown of participant characteristics from this study including gender, first year teaching, and certification type.

Table 2

Demographic Characteristics by Gender of Early-Career Agriculture Teachers (N = 111)

Characteristic	Male		Female		Combined Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
First Year Teaching						
2013	7	6.54	8	7.48	15	14.02
2014	12	11.21	13	12.15	25	23.36
2015	11	10.28	18	16.82	29	27.10
2016	14	13.08	24	22.43	38	35.51
Totals	44	41.12	63	58.88	107	100.00
Certification Type						
Traditional	31	27.93	55	49.55	86	77.48
Alternative	17	15.31	8	7.21	25	22.52
Totals	48	43.24	63	56.76	111	100.00

Note. Frequencies may not total to 111 because of item nonresponse.

Research objective one sought to determine if early career agricultural education teachers received training in the identified instructional methods. Two-thirds of participants reported they received instruction in each of the 10 instructional methods. Teachers reported receiving training for demonstration ($n = 107$, 96.40%), lecture ($n = 105$, 95.45%), discussion ($n = 104$, 93.69%), and cooperative learning ($n = 103$, 92.79%) the most frequently while guest speakers ($n = 83$, 76.15%), experiments ($n = 78$, 71.56%), role-play ($n = 73$, 68.22%), and field trips ($n = 73$, 66.97%) were the least frequent. Traditionally trained teachers reported receiving instruction in demonstration, lecture, discussion, and cooperative learning more frequently than teachers completing alternative certification. Complete results for training received is presented in Table 3 by certification type.

Table 3

Training Received for Instructional Methods by Certification Type (N = 111)

Instructional Method	Traditional		Alternative		Combined Total	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Demonstration	86	100.00	21	84.00	107	96.40
Lecture	84	98.82	21	84.00	105	95.45
Discussion	82	95.35	22	88.00	104	93.69
Cooperative Learning	83	96.51	20	80.00	103	92.79

Table 3*Training Received for Instructional Methods by Certification Type (N = 111), Continued...*

Independent Study	69	82.14	22	88.00	91	83.49
Supervised Study	72	84.71	19	79.17	91	83.49
Guest Speakers	68	80.00	15	62.50	83	76.15
Experiments	66	76.74	12	52.17	78	71.56
Role Play	63	75.90	10	41.67	73	68.22
Field Trips	63	75.00	10	40.00	73	66.97

Note. Some instructional methods were missing responses and may not total $N = 111$.

Research objective two determined the estimated percentage of time early career agricultural education teachers spend using the identified instructional methods during a school year. The most frequently used instructional methods were cooperative learning ($M = 37.56$, $SD = 24.38$), demonstration ($M = 32.83$, $SD = 26.94$), and lecture ($M = 32.70$, $SD = 26.66$). Participants reported using role play ($M = 14.73$, $SD = 20.90$), field trips ($M = 14.82$, $SD = 20.83$), and guest speakers ($M = 12.01$, $SD = 17.95$) the least. These findings are reported in Table 4 along with a comparison of traditional and alternative certification methods. Those who were alternatively certified reported using each method for a greater percentage of time on average than those completing traditional certification.

Table 4*Estimated Percentage of Time Using Instructional Methods During a School Year (N = 111)*

Instructional Method	Traditional ^a		Alternative ^b		Total Combined ^c	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Cooperative Learning	37.18	23.69	39.05	27.43	37.56	24.38
Demonstration	31.80	26.55	36.65	28.64	32.83	26.94
Lecture	30.07	24.38	42.04	32.50	32.70	26.66
Supervised Study	26.16	25.72	35.47	30.25	27.92	26.70
Discussion	25.32	25.13	34.22	29.08	27.29	26.17
Independent Study	24.36	23.96	34.29	31.55	26.51	25.94
Experiments	19.10	20.37	29.06	28.97	21.09	22.52
Role Play	13.25	18.15	21.73	31.01	14.73	20.90
Field Trips	14.64	19.58	15.67	27.21	14.82	20.83
Guest Speakers	10.85	15.81	16.20	24.38	12.01	17.95

Note. ^a $n = 86$. ^b $n = 24$. ^c $n = 110$. Due to item nonresponse, total N may not equal 111.

Research objective three sought to determine early career agricultural education teachers' confidence in using the identified instructional methods. Scores for this portion of the instrument ranged from one (very low confidence) to five (very high confidence). Participants reported having high confidence using demonstration ($M = 4.15$, $SD = 0.74$) and cooperative learning ($M = 4.00$, $SD = 0.79$). Respondents reported moderate confidence in using seven out of the ten instructional methods. Lecture and discussion are considered moderate but approaching high confidence. Participants identified having low confidence in using role play as an instructional method, but it is approaching moderate confidence ($M = 2.86$, $SD = 1.14$). Traditionally certified teachers were more confident in using demonstration, cooperative learning, lecture, supervised study, independent study, and field trips than alternatively certified teachers. On the other hand, alternatively certified teachers were more confident in using discussion, experiments, guest speakers, and role play on average. These findings are outlined in Table 5.

Table 5*Comparison of Confidence in Using Instructional Methods by Certification (N = 111)*

Instructional Method	Traditional			Alternative			Total Combined		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Demonstration	85	4.18	0.74	25	4.08	0.76	110	4.15	0.74
Cooperative Learning	85	4.04	0.79	25	3.88	0.78	110	4.00	0.79
Lecture	84	4.00	0.84	25	3.96	0.79	109	3.99	0.82
Discussion	84	3.85	0.88	25	4.04	0.84	109	3.89	0.87
Supervised Study	84	3.67	0.96	24	3.58	0.78	108	3.65	0.92
Independent Study	83	3.65	0.97	24	3.54	0.93	107	3.63	0.96
Experiments	84	3.32	1.00	24	3.54	0.98	108	3.37	0.99
Field Trips	83	3.34	1.15	24	3.21	1.14	107	3.31	1.14
Guest Speakers	84	3.19	1.07	24	3.38	1.21	108	3.23	1.10
Role Play	84	2.85	1.14	25	2.92	1.19	109	2.86	1.14

Note. *n* shows the number of respondents who reported a confidence rating using each method, not the total number of respondents in the study. Scale: 1 = Very Ineffective, 2 = Ineffective, 3 = Moderately Effective, 4 = Effective, 5 = Highly Effective.

The final research objective sought to determine early career agricultural education teachers' perceptions of the effectiveness on learning of the identified instructional methods. Respondents reported scores from one (very ineffective) to five (very effective) for each instructional method. Demonstration ($M = 4.34$, $SD = 0.69$) and cooperative learning ($M = 4.06$, $SD = 0.78$) were identified as being effective instructional methods. The remaining eight instructional methods were reported as being moderately effective. These findings are outlined in Table 6. Additionally, with the exceptions of demonstration, cooperative learning, and supervised study, alternatively certified teachers viewed each instruction method as more effective than traditionally certified teachers.

Table 6*Comparison of Perceived Effectiveness of Instructional Methods by Certification (N=111)*

Instructional Method	Traditional			Alternative			Total Combined		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Demonstration	85	4.38	0.71	25	4.20	0.65	110	4.34	0.69
Cooperative Learning	85	4.08	0.79	25	4.00	0.76	110	4.06	0.78
Experiments	83	3.75	1.01	22	3.91	0.87	105	3.78	0.98
Discussion	84	3.71	0.82	25	3.88	0.53	109	3.75	0.76
Supervised Study	84	3.62	0.92	23	3.52	0.59	107	3.60	0.86
Field Trips	82	3.54	1.14	23	3.57	0.79	105	3.54	1.07
Lecture	84	3.35	0.84	24	3.63	0.65	108	3.41	0.81
Guest Speakers	83	3.25	1.00	24	3.39	0.72	107	3.28	0.94
Independent Study	85	3.18	0.77	24	3.25	0.79	109	3.19	0.78
Role Play	83	3.04	1.06	23	3.17	1.07	106	3.07	1.06

Note. *n* shows the number of respondents who reported perceived effectiveness of each method, not the total number of respondents to the study. Scale: 1 = Very Low, 2 = Low, 3 = Moderate, 4 = High, 5 = Very High.

Conclusions, Implications, and Recommendations

From the findings of the first objective, it can be concluded that early career teachers received training in all 10 of the identified instructional areas. It is no surprise that most received training in demonstration, lecture, and discussion while less received training in instructional methods such as

role-play and field trips. However, when you compare training received by certification type, traditional or alternative, there are several differences. With the exception of independent study, alternatively certified teachers reported receiving training less often in all other instructional methods. This is an area for potential improvement with alternative certification programs. It was surprising that so few were receiving training in using experiments as a teaching method, especially with alternative certification. In an educational environment increasingly calling for inquiry-based instruction, experiments can be used to address this need. With only half of those who were alternatively certified reporting being trained in experiments, this highlights another area of needed improvement.

When we examined the estimated percentage of time early career teachers spent using different instructional methods, it was no surprise that demonstration and lecture were near the top of the list. These instructional methods lend themselves well to transferring agricultural content to students. For traditionally certified teachers, cooperative learning was ranked first and second for alternatively certified teachers. Participants in the survey were provided a definition of cooperative learning, however, it is possible teachers do not know the difference between simple group work and cooperative learning. With experienced agricultural education teachers, lecture was by far the most used teaching method followed by demonstration and cooperative learning (Smith et al., 2015). Do early career teachers fail to distinguish between group work and cooperative learning or are they more likely to use it as a teaching method due to their lack of experience?

Another area of interest when comparing traditionally certified teachers to alternatively certified teachers is that alternatively certified teachers reported spending more time in all 10 instructional areas. While this study did not track actual time spent and instead asked for an estimate, are alternatively certified teachers spending more time teaching in the classroom than traditionally certified teachers? What impact does that have on their participation in other areas of an agricultural education program such as FFA and supervised agricultural experience participation?

Overall, early career teachers seem to be spending more time using instructional methods in areas they received the most training. There are small differences in ranking when comparing traditional and alternatively certified teachers, however, with such a small group size of alternative teachers, little can be said about significance of those differences. It is expected that early career teachers would be more likely to have higher confidence in using instructional methods they saw modeled in their teacher preparations program (Darling-Hammond & Bransford, 2005). This would in theory influence selection of instructional methods used by early career teachers as shown in Bandura's (2002) social cognitive theory. Data from this study seems to support Bandura's theory in that training received is related to which instructional method was chosen.

Confidence in using instructional methods aligned well with the methods that were being used by the early career teachers. Demonstration, cooperative learning, lecture, and discussion were all near the top of the list, while experiments, field trips, guest speakers, and role play were at the bottom. These really are not surprising since they align well with what the teachers practice in their classrooms. Higher confidence in a method would naturally mean teachers would be more likely to engage in using that particular teaching method more often (Bandura, 2002).

Teachers with alternative certification had no sizable differences in confidence in using any of the teaching methods listed compared to traditionally certified teachers. Discussion was the only method falling out of the same ranking as with traditionally certified teachers. With alternative certification, it was ranked second rather than fourth. This leads to the question of where confidence in using instructional methods is coming from. Is it from the pre-service training received or from gained experience in using a particular method?

When we examined how effective early career teachers viewed the different instructional methods, demonstration and cooperative learning were again at the top of the list for both traditionally and alternatively certified teachers. This aligns well with receiving training for the methods, percent of

time they are used, and confidence in using the methods. This should be expected. Why would anyone use a teaching method often that they perceive to be ineffective? On the other hand, why would you not use a teaching method often that is perceived to be effective? This is the case with experiments. The use of experiments was ranked third most effective by early career teachers yet ranked seventh in amount of time using them. Confidence in using experiments as an instruction method is also ranked low. What is leading to this difference in perceived effectiveness and lack of use? Could it be that there is a lack of training received through their certification program? Approximately 77% of traditionally certified teachers reported receiving training in this area while only 52% of alternatively certified teachers reported receiving training. It could be that more training is needed in this area. It could also be related to the extensive amount of planning that goes into conducting class experiments.

Perceived effectiveness of instructional methods aligns well with the findings of Smith et al. (2015). With experienced teachers, experiments were also viewed as more effective but were used less. Interestingly, lecture was viewed as less effective in the Smith et al. (2015) study but was used more. The same results were found in this study. Do teachers use lecture because it is easy or maybe because it was modeled most often in college?

From a different viewpoint, perceived effectiveness of instructional methods is not actual effectiveness of the instructional method. A teacher may think that a particular instructional method is the most effective but there is little evidence that it actually is the most effective. Maybe the teacher thinks it is most effective because that is what they use most often. On the other hand, for example, role play was viewed as least effective by early career teachers. Is it actually the least effective teaching method? Actual instruction method impacts on student learning would be interesting to see compared to how effective the teacher views their teaching of that method.

According to social cognitive theory, personal factors such as training received for instructional methods and self-efficacy can influence behavior factors which in our case is the selection of instructional methods (Bandura, 2002). After examining the data from this study, there could be another form of training received that could influence the selection of an instructional method used. Training for how to choose the appropriate method for the environmental factors at hand such as content, social conditions, and classroom facilities could have an impact on the instructional method decision. For example, role play, field trips, and guest speakers were not used often or viewed to be effective in the early career teachers' classrooms. Should these teaching methods be used often? We would not necessarily want a teacher to use a guest lecturer all the time, for example. Variability in instructional techniques is a characteristic of effective teaching according to Rosenshine and Furst (1971). The decision on choosing the appropriate instructional method probably depends on the environmental factors mentioned above. This begs the question; how do early career teachers know which methods to use? Did their certification program provide instruction in this area?

Approximately 75% of the teachers in this study reported being traditionally certified through a university teacher education program, while nearly 25% reported being alternatively certified. Several differences were found in training received between the two certification types. For example, only about half of those reporting alternative certification received training in teaching with experiments and even less in teaching with role play and field trips. These are still important instructional methods that, when used appropriately, can be effective teaching techniques that are irreplaceable for some topics. More information is needed on training received from alternative programs compared to traditional programs. Knowing which instructional methods were addressed and modeled and in how much detail in the certification program could have greater implications for how teacher preparation programs train teacher candidates, especially if that information was then correlated with actual practices in the field after graduation.

This study also found that alternatively certified teachers reported using each method for a greater percentage of time compared to traditionally certified teachers, however they are generally

slightly less confident in using the instructional methods compared to traditionally certified teachers. What effect does that have on quality of instruction in the classroom or on student learning? In many of the instructional methods listed, alternatively certified teachers viewed engagement in the activity as less effective than did traditionally certified teachers. Is this actually the case and if so, why?

Conducting this study has raised several more questions related to teacher certification program preparation and in the ability of early career teachers to choose the appropriate instructional method for the topic at hand. From these questions, several recommendations for further research can be made. A study tracking the actual time spent by teachers using each instructional method could provide more accurate data on the topic and could then be compared to student learning. Research in the area of effectiveness of different instructional methods on student learning has many possibilities. Determining which instructional method is most effective for popular topics taught in secondary agricultural education is a research topic worth pursuing. Exploring how to systematically choose the appropriate instructional method for the environmental conditions at hand would also be of use to the profession.

Further research should also be conducted in determining where confidence in using various teaching methods comes from. Is it from instruction on the topic in certification programs or from continued use over time? Determining how teacher preparation programs can increase confidence levels and perceived effectiveness of early career teachers could be helpful in keeping them in the field of agricultural education. An examination of how different teacher certification programs teach instructional methods would be telling for the profession. The identification of methods used for teaching this material to pre-service teachers more effectively would be useful.

This study should be replicated in other states to compare early-career teachers' use of instructional methods, their confidence levels, and perceived effectiveness across the United States. Qualitative methods could be used to better explain why teachers use certain methods more or less, why they are more or less confident using those instructional methods, and why they find certain methods to be more or less effective. Replication of this study to compare early-career teachers, mid-career teachers, and late-career teachers on instructional method use, confidence and effectiveness, and how each evolves throughout a teaching career would be beneficial to our profession. We know that teachers change over time. Using a longitudinal approach to examine these changes will be time and labor intensive but may yield valuable results that can shape the next several generations of agricultural educators.

A few recommendations for practice can also be made from the conclusions of this study. We recommend teacher preparation programs model the various instructional methods that can be used in agricultural education programs. While some instructors may not be comfortable with all types of instructional methods, it is difficult to expect pre-service teachers to model something they have never seen or experienced. Efforts should be made to include opportunities for pre-service teachers to practice teaching using a variety of instructional methods. Demonstration and lecture are commonly required for pre-service teachers to demonstrate, but other methods are left out. Finally, teacher preparation programs should consider teaching their students how to actually select the appropriate instructional method for a given topic or environmental conditions. This may reduce some of the barriers to choosing instructional methods in the secondary classroom and result in more effective early career teachers. Instructional methods are the tools we send our novice teachers into the field with. Tools are a great resource only if we know how to use them!

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