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Learning Activities Utilized and Readiness for the Student Teaching Internship

Christopher T. Stripling[1], Andrew C. Thoron[2], and Christopher M. Estepp[3]

Abstract

Agricultural education has traditionally provided rich learning experiences for secondary school students; however, less attention has been paid to the learning experiences preservice agricultural education teachers utilize and provide secondary school students during the student teaching internship. This study sought to describe the learning activities preservice teachers utilize during instruction and assess preservice teachers' self-perception of preparedness in technical content knowledge and teaching methods after completing their student teaching internship. A majority of the preservice teachers used student-centered activities with the greatest frequency, and did not rely on one category of learning activities a majority of the time. This finding is encouraging since variety is a characteristic of effective teaching, and the types of learning activities utilized support the philosophical beliefs of agricultural education. On the other hand, preservice teachers identified agricultural mechanics, biotechnology, wildlife and fisheries management, and veterinary science as technical content areas in which they possessed less than appropriate content knowledge. A majority of the preservice teachers also perceived themselves as not prepared in instructional methods for wildlife and fisheries management and veterinary sciences. We recommend these technical content areas and pedagogical deficiencies be considered high priorities when developing in-service professional development for new teachers in Florida.

Keywords: readiness, learning activities, student teaching, student teacher, preservice

Wardlow and Osborne (2010) summarized the purpose of teacher education in agriculture as having "a single primary aim: to educate those professionals who will become the teachers of agriculture in the nation's schools" (p. 22). These words have espoused the basic principles shaping the thinking in agriculture teacher education programs around the country.

The contemporary philosophy of agricultural education programs can be traced back to the philosophers of Ancient Greece, who believed "knowledge derived from experience, observation, and experimentation" (Wardlow & Osborne, 2010, p. 23). Furthermore, agricultural educators have embraced the philosophies of John Dewey, whose views align with those aforementioned, but include the belief that the focus of education should be the development of the student as an individual (Wardlow & Osborne, 2010). As Hughes and Barrick (1993) pointed out, school-based agricultural education "has a rich heritage of developing student personal skills as well as providing abilities needed in agricultural employment" (p. 59) through experiential learning activities. Likewise, Phipps, Osborne, Dyer, and Ball (2008) stated agricultural education has historically taken great pride in providing relevant, individualized learning experiences to students via the

[1] Christopher T. Stripling is an Assistant Professor in the Department of Agricultural Leadership, Education and Communications at the University of Tennessee, 320B Morgan Hall, 2621 Morgan Circle, Knoxville, TN 37996-4511, cstripling@utk.edu.
[2] Andrew C. Thoron is an Assistant Professor of Agricultural Education in the Department of Agricultural Education and Communication at the University of Florida, 307C Rolfs Hall, Gainesville, FL 32611, athoron@ufl.edu.
[3] Christopher M. Estepp is an Assistant Professor of Agricultural Education in the Department of Animal Science at Sul Ross State University, RAS 108, Box C-11, Alpine, TX 79832, cestepp@sulross.edu.

three-circle model of agricultural education, which includes classroom/laboratory instruction, supervised agricultural experiences, and FFA.

While the literature-base and historical philosophy of school-based agricultural education supports rich learning experiences for secondary students, less attention has been paid to the learning experiences preservice agricultural education teachers utilize and provide secondary school students during the student teaching internship. This study will examine the learning activities utilized by preservice agricultural education teachers during their student teaching internship and determine if these activities support a learner-centered philosophy of instruction.

Literature Review and Theoretical Framework

An examination of the history of formalized agricultural education at the secondary school level has shown that hands-on, experience-based learning activities founded in the three-circle model have been a staple in school-based agricultural education programs from the initiation of the Vocational Education Act in 1917 (Knobloch, 2003). Rufus Stimson (1919) stated, "neither skill nor business ability can be learned from books alone, nor merely from observation of the work and management of others. Both require active participation, during the learning period" (p. 32). Furthermore, this focus on active, hands-on learning has been exemplified in the words of the FFA Motto: "Learning to do; Doing to learn…" (National FFA Organization, 2013). Consequently, learning activities, such as home-based projects (Roberts & Harlin, 2007), problem-solving (Parr & Edwards, 2004), inquiry-based instruction (Thoron, 2010), active learning, case studies, cooperative learning, and field trips among many others have been used extensively in school-based agricultural education classrooms and have typically focused on student development through learner-centered methods (Estepp & Roberts, 2011; Phipps et al., 2008).

The basis for employing these types of learning activities has been established from the underlying philosophical belief guiding agricultural education – experiential learning (Knobloch, 2003; Roberts, 2006). Knobloch (2003) stated, "agricultural educators built their entire educational programs on the philosophical foundation of experiential learning" (p. 25). Drawing upon seminal works in experiential learning, Roberts (2006) synthesized a model illustrating the experiential learning process. He suggested learning occurs through a cycle of students undergoing an experience, reflecting upon that experience, generalizing the results of that experience, followed by experimentation. In addition, Roberts compared his model of the experiential learning process to the problem-solving approach and inquiry-based learning, both prevalent methods of instruction in school-based agricultural education, and found experiential learning was congruent with these types of teaching methods. Likewise, Knobloch reported that experiential learning, as used in agricultural education, typified the characteristics of authentic learning.

While experiential learning has long been an integral component of agricultural education, another theoretical belief espoused by many in agricultural education is constructivism (Knobloch, 2003). In their description of constructivism, Doolittle and Camp (1999) posited knowledge is constructed in the mind of the learner and while constructivist views vary, all views of constructivism have three commonalities. First, learning uses active cognitive processes; therefore, learners must be cognitively engaged in the learning process. Second, constructivism requires that learners have some interpretation of reality, and third, all learning is situation dependent; learning requires an experience. According to Knobloch, the pragmatic approach of experiential learning as presented by Dewey (1916; naturalistic inquiry), has informed
constructivist thinking. Additionally, Estepp and Roberts (2011) postulated the previously mentioned characteristics of constructivism parallel the principles of experiential learning (See Figure 1).

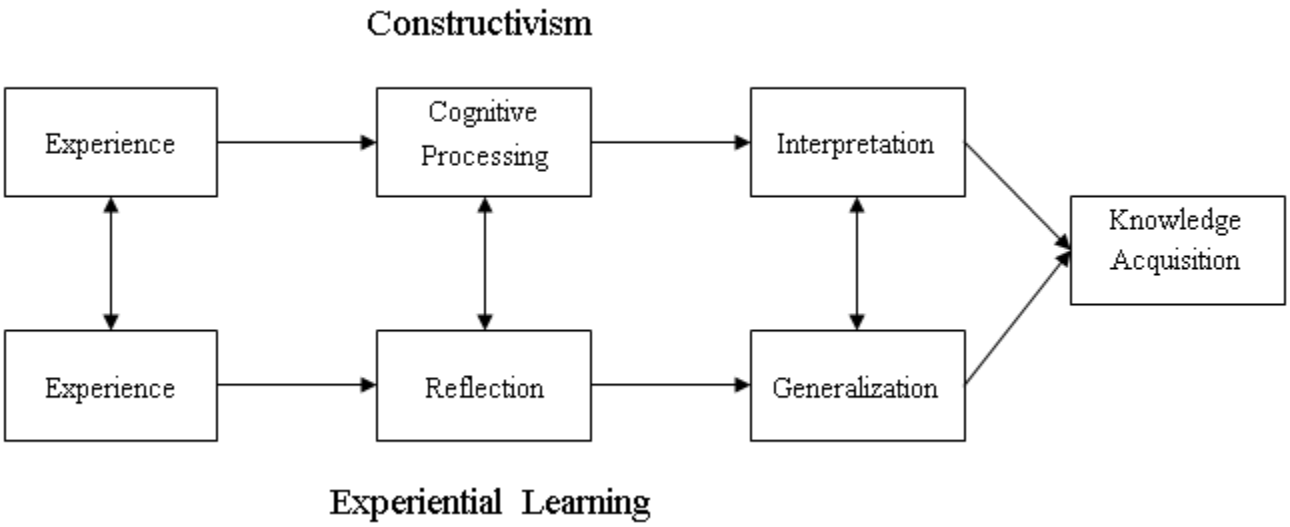

Figure 1. Comparison of constructivism and experiential learning (Estepp & Roberts, 2011, p. 30).

Accordingly, the abovementioned theoretical views have informed the way teacher education programs in agriculture prepare preservice agricultural educators. The *National Standards for Teacher Education in Agriculture* (American Association for Agricultural Education, 2001) recommended agriculture teacher education programs utilize a "dynamic conceptual framework, grounded in experience-based knowledge" (Standard 1) and stated teacher educators should "use a variety of effective instructional strategies that reflect an understanding of different models and approaches to learning (e.g., models, strategies, or approaches include, but are not limited to problem-solving, experiential learning, constructivism, inquiry, microteaching, reflective teaching, and effective use of emerging technologies;" Standard 4a).

In another report, the National Research Council (1988) contended programs preparing agriculture teachers should focus on applied learning. Further, Phipps et al. (2008) suggested that because the curriculum in school-based agricultural education is dynamic, preservice agriculture teachers need preparation to make them proficient in a variety of instructional techniques. Likewise, researchers outside of agricultural education indicated that teaching and learning in teacher education programs should be student-centered and focused on providing relevant learning experiences to preservice teachers (Bransford, Brown, & Cocking, 2000).

However, the argument has been made that teacher preparation programs are not adequately preparing preservice teachers for new challenges and the future (Eacute & Esteve, 2000). Bransford et al. (2000) claimed "the components of teacher education programs—collections of courses, field experiences, and student teaching—tend to be disjointed" (p. 201) so that preservice teachers are not able to make the appropriate connections between their various learning experiences. They additionally stated, "teacher preparation methods courses are often lectures and recitation. So, prospective teachers who do not have hands-on, 'minds-on' experiences with learning are expected to provide these kinds of experiences for students" (Bransford et al., 2000, p. 202). This is particularly important for preservice teachers according to Richardson (1990), because teachers tend to model behaviors consistent with how they were taught. Feiman-Nemser and Remillard (1996) concurred and maintained the classroom experiences of preservice teachers could affect their "dispositions toward teaching, learning, and subject matter" (p. 65) along with their understanding of the teaching process (Holt-Reynolds, 1992; Kagan, 1992). Moreover, the National Research Council (2009) suggested that teaching in colleges of agriculture has tended

to lean toward a passive lecture-based format, which could detrimentally influence preservice agriculture teachers' acquisition of subject-matter conten.

Since the goal of teacher education programs in agriculture is to produce effective teachers of agriculture, preservice agriculture teachers are expected to develop their subject-matter knowledge, pedagogical knowledge, and pedagogical content knowledge (Roberts & Kitchel, 2010) and exercise a variety of learning activities (Rosenshine & Furst, 1971). Therefore, an investigation into the learning activities implemented by preservice teachers is warranted. An examination of the literature found several studies in agricultural education that examined preferred teaching styles of preservice agriculture teachers; however, a paucity of research was found regarding the actual type of learning activities used by preservice teachers. In one study, Cano, Garton, and Raven (1992) examined the preferred teaching styles of preservice teachers and found a majority of the preservice teachers studied preferred to use a learner-centered teaching style. A breakdown of preferred teaching styles by gender revealed 72% of males preferred to use a student-centered teaching style, while 86% of females preferred using a student-centered teaching style. Similarly, Raven, Cano, Garton, and Van Shelhamer (1993) found 100% of the preservice teachers at Montana State University preferred using a learner-centered teaching style, while about 75% of preservice teachers at The Ohio State University preferred to use a learner-centered teaching style. Additionally, Whittington and Raven (1995) examined the preferred teaching styles of student teachers at Montana State University and the University of Idaho. Results showed overwhelmingly, the majority (93.5%) of student teachers at both universities preferred to use a learner-centered teaching style.

While they did not specifically examine the preferred teaching methods used by preservice teachers, a study by Ball and Knobloch (2005) investigated pedagogical knowledge espoused in agricultural teaching methods courses. Results showed instructors in methods courses spent about 21% of the time instructing on teaching methods and 11.6% of course time was spent on teaching the problem-solving method. In addition, nearly all of the teacher educators studied required students to complete lesson plans and microteachings.

Conceptual Framework

Rosenshine and Furst (1971) proposed a list of characteristics employed by effective teachers, and one characteristic they identified was variability in teaching. They indicated the most effective teachers utilize a variety of learning activities during a class session instead of relying upon a mono-method approach. As previously stated, Phipps et al. (2008) recommended preservice agriculture teachers should become well-versed at using a variety of learning activities, and while foundational textbooks used in many teaching methods courses have listed and categorized the plethora of potential learning activities, Roberts, Stripling, and Estepp (2010) proposed that no common taxonomy of learning activities exists. As a result, Roberts et al. created the *Taxonomy of Learning Activities Model*, which served as the conceptual framework for this study.

Roberts et al.'s (2010) model contains a variety of learning activities arranged on a continuum from teacher-centered activities to student-centered activities (See Figure 2). Their selection of learning activities for the model was informed by the various textbooks used in agricultural teaching methods courses (e. g. Newcomb, McCracken, Warmbrod, & Whittington, 2004; Phipps et al., 2008; Talbert, Vaughn, Croom, & Lee; 2007) and Ball and Knobloch (2005). The learning activities listed by Roberts et al. were lecture, demonstration, questioning, discussion, cooperative learning, inquiry, and individualized application.

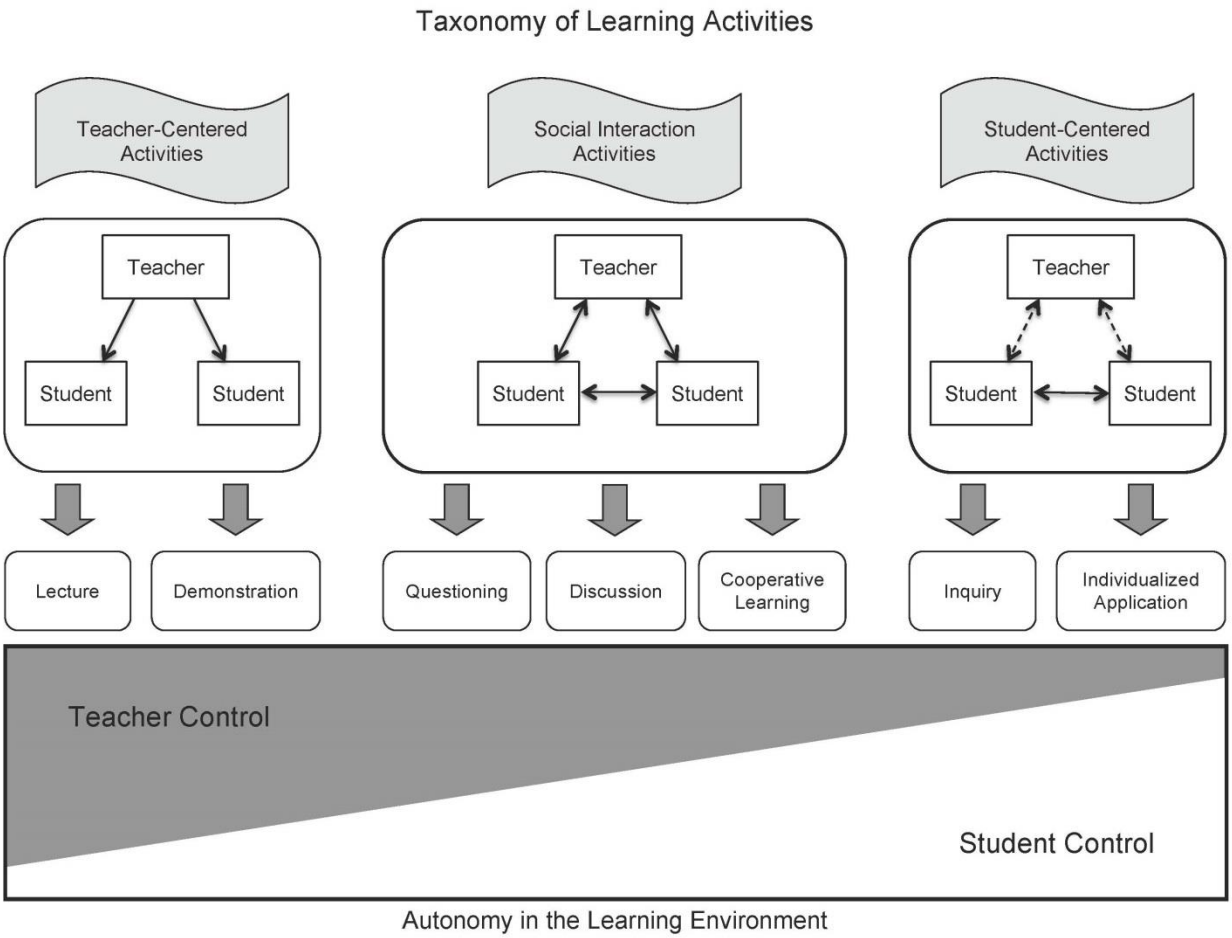

Figure 2. Taxonomy of learning activities model (Roberts et al., 2010)

Purpose and Objectives

The purpose of this study was to examine the student teaching internship during the Spring 2012 semester at the University of Florida to describe the learning activities preservice teachers utilized during instruction. Additionally, this study sought to assess the preparedness of preservice teachers in regard to subject matter knowledge and teaching methods after completing their student teaching internship. Specifically, the following objectives framed this study:

1. Describe the learning activities preservice agricultural education teachers utilize during the student teaching internship.
2. Assess preservice agricultural education teachers' self-perception of their preparedness in various technical agriculture/subject matter content after the student teaching internship.
3. Assess preservice agricultural education teachers' self-perception of their preparedness to teach various technical agriculture/subject matter content after the student teaching internship.

Methods

This descriptive study consisted of a census of all preservice agricultural education teachers (N = 19) enrolled in the student teaching internship at the University of Florida during the spring semester of 2012. The population was a homogeneous Caucasian population, which consisted of

three males and 16 females. Ages of the preservice teachers ranged from 20 to 25 with a population mean of 22.1 (*SD* = 1.1), and their GPAs, on a 4-point scale, ranged from 2.50 to 3.90 with a population mean of 3.34 (*SD* = 0.36).

The preservice teachers all successfully completed thirty credit hours of technical agriculture courses offered through the College of Agricultural & Life Sciences (CALS). Twenty credit hours of the technical agriculture course work is prescribed through the degree program. The twenty hours consist of coursework in: Agriculture Operations Management (Ag Mechanics), Animal Science, Food and Resource Economics (Agriculture Business), Entomology, Plant Science (Agronomy or Horticulture), and Soil and Water Science. The remaining ten hours of course work is purposefully elective credits within CALS for completion of a minor, specialization based on interest, or courses in areas of noted student weakness. The ten hours are selected with the assistance of a faculty advisor. Further, preservice teachers complete six courses within the agricultural education department and a 14 week student teaching internship. One course in the agricultural education specialization focuses solely on the laboratory component of school-based agricultural education. This course utilizes on-site hands-on application and weekly in-class reflection across 12 of the 16 departments within CALS.

The student teaching coordinator at the University of Florida provided contact information for the preservice teachers and allowed us to inform the preservice teachers of the opportunity to participate during the post-internship experience meeting. During this meeting, we asked the preservice teachers for permission to use their daily lesson plans from the 13 week student teaching internship for research purposes and to complete an online questionnaire. All of the preservice teachers consented by signing an informed consent that was approved by the University of Florida's Institutional Review Board.

After consent was obtained, the student teaching coordinator provided access to the preservice teachers' electronic portfolios that were submitted to the student teaching coordinator as a requirement of the student teaching internship. We recognize that daily lesson plans contained in the electronic portfolios were self-reported by the preservice teachers and the actual teaching of the lessons during the student teaching internship could not be definitively verified. This issue is a limitation of this study. An additional limitation is lessons may be taught by the preservice teachers but not included in the electronic portfolios, though preservice teachers were aware a portion of their internship grade was calculated based on the completeness of their daily plans. Nonetheless, daily lesson plans purported to have been taught by the preservice teachers provides insight into the teaching methodologies used and their pedagogical knowledge. A total of 1,156 daily lesson plans were contained in the electronic portfolios.

The preservice teachers were then sent an electronic invitation to complete an online survey using the Qualtrics survey software, and a 94.7% response rate was obtained. The survey asked the preservice teachers to indicate, based on their student teaching internship, if they were prepared in technical agriculture/subject matter content and methods for teaching technical agriculture/subject matter content. The survey allowed the preservice teachers to respond yes, no, or not applicable regarding preparation for the following technical agriculture/subject matter content areas: (a) plant science, (b) animal science, (c) agricultural mechanics, (d) entomology, (e) agribusiness, (f) soil science, (g) wildlife and fisheries management, (h) food science, (i) biotechnology, (j) veterinary science, and (k) agricultural communications. In addition, the preservice teachers were asked to give their overall perception of their preparedness in technical agriculture/subject matter content and methods for teaching technical agriculture/subject matter content, based on the student teaching internship. The technical agriculture/subject matter content areas included in the survey were based on the secondary 2011-2012 Florida Agriculture, Food and Natural Resources Career Cluster Curriculum Frameworks and the University of Florida's baccalaureate agricultural education program of study. Teacher educators at the University of Florida confirmed that the survey represented the state's secondary agricultural curriculum and the university's baccalaureate program of study.

Data were analyzed using descriptive statistics. The learning activities contained in the daily lesson plans were coded using Robert et al.'s (2010) *Taxonomy of Learning Activities Model* (Figure 2). Learning activities in the individual daily lesson plans were coded as a teacher-centered activity, a social-interaction activity, or a student-centered activity. One coder was utilized and was trained by an author of the aforementioned model.

Findings

Objective 1. Describe the Learning Activities Preservice Agricultural Education Teachers Utilize During the Student Teaching Internship.

Individual student data is provided in Table 1. The number of self-reported daily lesson plans taught by the preservice teachers during the student teaching intern ranged from 21 to 135, and the average number of daily lessons plans taught was 60.8 (*SD* = 31.0). The total number of learning activities used ranged from 57 to 399 per preservice teacher, and the average number of learning activities per lesson was 3.9 (*SD* = 1.2). Student-centered activities were used with the greatest frequency by 13 preservice teachers, and the remaining six preservice teachers used social interaction activities with the greatest frequency. In addition, a majority of the preservice teachers (16 of 19) utilized teacher-centered activities least frequently. A majority of the preservice teachers did not utilize one category of learning activities a majority of the time. However, five preservice teachers used student-centered activities more than 50% of the time, and one preservice teacher used social interaction activities more than 50% of the time. Overall, the average percentage of teacher-centered activities, social interaction activities, and student-centered activities used per preservice teacher was 20.5%, 33.0%, and 46.6%, respectively.

Table 2 provides a comparison of daily lesson plans and learning activities based upon gender and the location of the student teaching internship. To that end, male preservice teachers on average taught more lessons than females. However, we would like to note the large standard deviations and remind readers that only three of the 19 preservice teachers were male. The total number of lessons for males ranged from 30 to 116 and from 21 to 135 for females. Additionally, the percentages of teacher-centered and social interaction activities were higher for males than females. As a result, females utilized student-centered activities at a greater percentage than males. In regard to location of the student teaching internship, preservice teachers in rural locations on average taught an additional 14.7 lessons and averaged 4.1 (SD = 1.2) learning activities per lesson as compared to 3.5 (SD = 1.0) for suburban/urban locations. Also, preservice teachers at suburban/urban locations used teacher-centered and student-centered activities at higher percentages and social interaction activities at a lower percentage than preservice teachers at rural locations.

Table 1

Daily Lesson Plans and Learning Activities

Preservice teacher	Number of daily lesson plans	Total number of learning activities	Teacher-centered activities		Social interaction activities		Student-centered activities	
			f	%	*f*	%	*f*	%
1	68	291	66	22.7	118	40.6	107	36.8
2	38	196	44	22.4	64	32.7	88	44.9
3	48	192	52	27.1	67	34.9	73	38.0
4	116	360	58	16.1	152	42.2	150	41.7
5	135	399	54	13.5	80	20.1	265	66.4
6	23	90	26	28.9	25	27.8	39	43.3
7	28	148	37	25.0	47	31.8	64	43.2
8	60	355	46	13.0	107	30.1	202	56.9
9	94	161	15	9.3	83	51.6	63	39.1
10	78	254	44	17.3	86	33.9	124	48.8
11	38	57	19	33.3	12	21.1	26	45.6
12	30	127	35	27.6	36	28.3	56	44.1
13	21	75	20	26.7	28	37.3	27	36.0
14	53	181	38	21.0	33	18.2	110	60.8
15	79	327	64	19.6	93	28.4	170	52.0
16	54	236	37	15.7	102	43.3	97	41.0
17	59	303	57	18.8	94	31.0	152	50.2
18	51	247	44	17.8	103	41.7	100	40.5
19	83	267	36	13.5	85	31.8	146	54.7
Overall	1156	4266	792	18.6	1415	33.2	2059	48.2

Table 2

Demographic Comparison of Daily Lesson Plans and Learning Activities

	Average number of daily lesson plans		Average number of learning activities per lesson plan		Teacher-centered activities		Social interaction activities		Student-centered activities	
	M	*SD*	*M*	*SD*	*f*	%	*F*	%	*f*	%
Male	71.3	43.1	3.8	0.7	159	20.4	306	39.3	313	40.3
Female	58.9	30.0	3.9	1.2	633	18.1	1109	31.8	1746	50.1
Rural	66.3	34.9	4.1	1.2	533	17.6	1043	34.4	1453	48.0
Suburban/Urban	51.6	21.9	3.5	1.0	259	20.9	372	30.1	606	49.0
Overall	60.8	31.0	3.9	1.2	792	18.6	1415	33.2	2059	48.3

Note. Twelve of the student teaching internship locations were categorized as rural and seven as suburban/urban.

Objective 2. Assess Preservice Agricultural Education Teachers' Self-perception of Their Preparedness in Various Technical Agriculture/Subject Matter Content After the Student Teaching Internship.

As seen in Table 3, some technical agriculture/subject matter areas were not applicable in the context of the preservice teachers' student teaching internship. All preservice teachers reported teaching the following content/subject matter: (a) plant science, (b) animal science, and (c) soil science. The remaining subject areas (agricultural mechanics, entomology, agribusiness, wildlife and fisheries management, food science, biotechnology, veterinary science, and agricultural communications) were taught by a majority of the preservice teachers.

Table 3

Technical Agriculture/Subject Matter Taught During the Student Teaching Internship

	Content/subject matter taught			
	Yes		No	
	f	%	*f*	%
Plant Science	18	100.0	0	0.0
Animal Science	18	100.0	0	0.0
Soil Science	18	100.0	0	0.0
Entomology	17	94.4	1	5.6
Veterinary Science	17	94.4	1	5.6
Agriculture Communications	17	94.4	1	5.6
Agribusiness	16	88.9	2	11.1
Agriculture Mechanics	15	83.3	3	16.7
Wildlife and Fisheries Management	15	83.3	3	16.7
Food Science	14	77.8	4	22.2
Biotechnology	14	77.8	4	22.2

Note. One preservice teacher did not consent to completing the survey portion of this study.

Overall, a majority of the preservice teachers believed they were prepared in technical agriculture/subject matter content (Table 4). The technical agriculture/subject matter content areas in which a majority of the preservice teachers believed they were not prepared were (a) agricultural mechanics, (b) wildlife and fisheries management, (c) biotechnology, and (d) veterinary science. A majority of the preservice teachers did feel prepared in the following areas: (a) plant science, (b) animal science, (c) entomology, (d) agribusiness, (e) soil science, (f) food science, and (g) agricultural communications.

Table 4

Self-perception of Preparedness in Applicable Technical Agriculture/Subject Matter Content

	Prepared in content/subject matter			
	Yes		No	
	f	%	*f*	%
Animal Science	17	94.4	1	5.6
Entomology	16	94.1	1	5.9
Soil Science	16	88.9	2	11.1
Agriculture Communications	15	88.2	2	11.8
Food Science	8	57.1	6	42.9
Agribusiness	9	56.3	7	43.7
Plant Science	10	55.5	8	44.5
Wildlife and Fisheries Management	7	46.7	8	53.3
Veterinary Science	6	35.3	11	64.7
Agriculture Mechanics	5	33.3	10	66.7
Biotechnology	3	21.4	11	78.6
Overall	16	88.9	2	11.1

Note. Some frequencies do not total to 18 because some of content/subjects matter was not applicable to all preservice teachers.

Objective 3. Assess Preservice Agricultural Education Teachers' Self-perception of Their Preparedness to Teach Various Technical Agriculture/Subject Matter Content After the Student Teaching Internship.

Overall, a majority of the preservice teachers believed they were prepared to teach technical agriculture/subject matter (Table 5). In two areas, food science and biotechnology, an equal number of preservice teachers believed they were prepared or not prepared to teach the agricultural content. A majority of the preservice teachers did feel prepared to teach the following: (a) plant science, (b) animal science, (c) agricultural mechanics, (d) entomology, (e) agribusiness, (f) soil science and (g) agricultural communications. They perceived themselves as not prepared in wildlife and fisheries management and veterinary science.

Table 5

Self-perception of Preparedness to Teach Applicable Technical Agriculture/Subject Matter Content

	Prepared to teach content/subject matter			
	Yes		No	
	f	%	*f*	%
Animal Science	16	88.9	2	11.1
Entomology	15	88.2	2	11.8
Agriculture Communications	15	88.2	2	11.8
Soil Science	14	77.8	4	22.2
Plant Science	12	66.7	6	33.3
Agriculture Mechanics	9	60.0	6	40.0
Agribusiness	9	56.3	7	43.7
Food Science	7	50.0	7	50.0
Biotechnology	7	50.0	7	50.0
Wildlife and Fisheries Management	7	46.7	8	53.3
Veterinary Science	7	41.2	10	58.8
Overall	16	88.9	2	11.1

Note. Some frequencies do not total to 18 because some of content/subjects matter was not applicable to all preservice teachers.

Conclusions and Recommendations

During the student teaching internship, a majority of the preservice teachers used student-centered activities with the greatest frequency and did not rely on one category of learning activities a majority of the time. This finding is consistent with Raven et al. (1993) and Whittington and Raven (1995), who found a majority of preservice teachers preferred to teach using student-centered methods. Thus, it may be reasonable to conclude that preservice teachers were able to follow through with their preferred method and extend student-centered lessons into the authentic experience – their student teaching internship. Furthermore, the teacher educators at the University of Florida should be encouraged since preservice teachers were utilizing a variety of learning activities and using student-centered activities with the most frequency. Utilization of a variety of learning activities supports Rosenshine and Furst (1971) and Phipps et al. (2008). Moreover, providing student-centered learning experiences is consistent with the philosophical beliefs of agricultural education (Estepp & Roberts, 2011; Knobloch, 2003; National FFA Organization, 2013; Phipps et al., 2008; Roberts, 2006). This research provides insight into the types of learning experiences facilitated by the preservice teachers during the student teaching internship, but does not assess the quality of those learning experiences. Future research in this area is warranted.

Overall, male student teaching interns taught more daily lessons when compared to their female counterparts. Males also utilized the student-centered approach fewer times during their student teaching internship. Perhaps males feel the need to teach at a faster pace and utilize teacher-centered activities more often in an attempt to cover subject matter quickly. Definitive conclusions cannot be drawn to due to the small number of males in the study and the large standard deviations reported. However, further investigation into male perceptions of curricula pacing is worthy of investigation.

Preservice teachers, upon the completion of their internship, identified agricultural mechanics, biotechnology, wildlife and fisheries management, and veterinary science as technical content areas in which they did not possess the appropriate content knowledge. Upon examination of the courses offered at the University of Florida, we recognize agricultural mechanics as a difficult

subject in which to prepare preservice teachers because of the focus on agricultural technology and less emphasis on application in current university courses. Further, there are no courses offered at the undergraduate level specifically in biotechnology and veterinary science. Consideration of coursework and feasibility of the degree requirements must be examined by teacher preparation programs to maintain current and future program needs at the school-based level. It is plausible that the university policy of limiting the agricultural degree program to 120 semester hours may not provide sufficient course hours to prepare preservice teachers in 11 agricultural content areas. Correspondingly, a majority of the preservice teachers perceived themselves as not prepared in appropriate instructional methods for wildlife and fisheries management and veterinary sciences, and 50% of preservice teachers believed they were not prepared in appropriate instructional methods for food science and biotechnology. This too may be partially explained by the University of Florida's limit on program hours. With that in mind, future research should investigate the degree program requirements and determine the most appropriate configuration of coursework to prepare preservice teachers for Florida's agriculture, food, and natural resources pathways. Further, the state structure for secondary program frameworks should be investigated to determine the feasibility of the current 15 agriculture, food, and natural resources pathways. We recommend the technical content areas and pedagogical deficiencies identified by the preservice teachers be considered as high priority when developing in-service professional development for new teachers in Florida.

Finally, as identified by Richardson (1990) preservice teachers utilize learning activities they are most familiar and are consistent with how they were taught. Consideration of preservice pedagogy in teaching methods courses should reflect desired outcomes for the student teaching internship. Preservice teachers at the University of Florida complete a teaching methods course taught using mostly social-interaction and student-centered methods and two additional special methods courses that promote inquiry and the student-centered approaches in the classroom and laboratory. Future research should determine if this structure is the rationale for preservice teachers utilizing student-centered learning activities with the greatest frequency and creating nearly four learning activities per lesson.

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