AN EXAMINATION OF ACADEMIC PERFORMANCE AND SUBJECT AREA COMPETENCE OF AGRICULTURAL EDUCATION PRE-SERVICE TEACHERS

By

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Title of Study: AN EXAMINATION OF ACADEMIC PERFORMANCE AND SUBJECT AREA COMPETENCE OF AGRICULTURAL EDUCATION PRE-SERVICE TEACHERS

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Abstract: The acquisition of subject matter knowledge for teachers in agricultural education is a vital component of the modal curriculum model used at Oklahoma State University. The examination of this knowledge is equally vital to the certification process, and requires the successful completion of the Oklahoma Subject Area Test. The purpose of this study was to identify differences between performance in courses of technical agriculture (PICTA) and subarea scores of pre-service teachers in the agricultural education program at Oklahoma State University. Through the use of a time and place sample of pre-service agricultural education students, the study concluded the following: the existence of variability in the performance in courses of technical agriculture, Oklahoma Subject Area Test exam scores indicated most students met the knowledge level necessary to pass the exam and were well prepared through their coursework, and no relationships of magnitude higher than moderate were found between performance in technical agriculture courses and subarea scores on the Oklahoma Subject Area Test. It is recommended that changes be considered to either the curriculum for agricultural education at Oklahoma State University or the Oklahoma Subject Area – Agriculture exam to reflect the curriculum being taught and tested for on the exam. It is also recommended that prior knowledge and experiences related to agriculture be identified so advisors can suggest appropriate coursework and experiences that could potentially improve student performance in coursework and ultimately on subject area examinations.

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CHAPTER I

INTRODUCTION

Introduction

School-based agricultural education programs are tasked with attracting and educating students from non-traditional backgrounds to continue to produce future agriculturalists (Esters & Bowen, 2004). The passage of the No Child Left Behind (NCLB) legislation in 2001 required individuals to "earn a bachelor's degree, be state certified, and exhibit a specified level of competency for each content area one teaches" (Reese, 2004) to be considered a highly qualified teacher. NCLB policy mandates all core academic teachers to comply with requirements for being a highly qualified teacher. Career and Technical Education (CTE) teachers teaching courses for core academic credit are expected to follow these regulations, while courses not for core academic credit are exempt (Fletcher, 2006). "Despite this current provision, many high school CTE programs do in fact require CTE teachers to earn a bachelor's degree, teaching certificate, and pass an assessment in the particular subject area in which they teach, making them highly qualified" (Fletcher, 2006, p. 164). In Oklahoma individuals preparing to become certified for agricultural education must pass the Oklahoma Subject Area Test (OSAT) with a minimum score of 240 (CEOE Passing Requirements, 2014). Successful completion of the OSAT fulfills half of the NCLB mandate for individuals to be highly qualified effective teachers (HQET). According to NCLB legislation, being 'highly qualified' entails having "at least a bachelor's degree, and demonstrating competencies in the specific content area as defined by the state" (Simpson, Lacava & Graner, 2004, p. 70).

The Oklahoma Commission for Teacher Preparation (OCTP) serves as the standards board for teacher certification in Oklahoma (Oklahoma Commission for Teacher Preparation, 2014, para. 1). In 1995, the Oklahoma legislature passed House Bill 1549 which mandated OCTP with creating a competency-based teacher preparation system that would ensure competent and qualified teachers in every classroom (Oklahoma Commission for Teacher Preparation, 2014). To fulfill these requirements, the Evaluation Systems group of Pearson was chosen to develop and administer the Certification Examinations for Oklahoma Educators (CEOE Program Overview, 2014). The Evaluation Systems group of Pearson is tasked with developing standards-based, criterion-referenced teacher licensure testing programs (Evaluation Systems group of Pearson, 2014). The Evaluation Systems group of Pearson is an entity within Pearson Virtual University Enterprises (VUE) that is a part of Pearson Public Limited Company (PLC), the largest commercial testing company and education publisher in the world. The Certification Examinations for Oklahoma Educators (CEOE) consists of three exams: the Oklahoma General Education Test (OGET), the Oklahoma Professional Teaching Examination (OPTE), and the Oklahoma Subject Area Tests (OSAT) (CEOE Program Overview, 2014). Pre-service teachers seeking certification as an agricultural education teacher are required to take the OGET, the OPTE, and the OSAT for agricultural education.

In Oklahoma, the OSAT for agricultural education was revised in 2011 to include a new subarea in Foundations of Agricultural Education and a Constructed Response assignment anchored to the Foundations of Agricultural Education subarea (CEOE Faculty Guide, 2012; Ramsey, 2012). The revisions were in addition to the pre-existing subareas: Agricultural Business, Economics, and Marketing, Animal Science, Plant and Soil Science, Agricultural Mechanics, and Environmental Science and Natural Resources. (CEOE OSAT Study Guide, 2011). Prior to the revisions, the passing rate for agricultural education pre-service teachers at Oklahoma State University was reported at 100% since the 2007-2008 school year (Edwards, 2011; Edwards, 2010; Edwards, 2009; Edwards, 2008). After the OSAT revisions the passing rate was 84% (Ramsey, 2013; Ramsey, 2012). In order for the 16% of students who did not pass the OSAT to become certified, they had to retake the OSAT to achieve the 100% passing rate the Oklahoma State System for Higher Education 2012 and 2013 reports stated (Annual Student Assessment Report, 2012; Annual Student Assessment Report, 2013). Reported mean scores for the new subareas in school year 2011-2012 were (267) for Foundations of Agricultural Education and (217) for writing, while scores in school year 2012-2013 were 264.3 and 211.5, respectively.

Students who identify the agricultural education major with a teaching option at Oklahoma State University are required to complete 124 credit hours' of coursework to fulfill the five curriculum sections designated on the degree plan: e.g. general education requirements, college/departmental requirements, major requirements, professional core and electives (Appendix A). Three areas of the degree plan are directly related to courses offered in the College of Agricultural Sciences and Natural Resources (CASNR); with the other two sections reflecting general education requirements, and electives (CASNR Agricultural Education Teaching option requirements, 2013). A wide range of courses are available for students working to address the acquisition of technical agricultural skills and competencies. In addition, the seven sub areas assessed by the agriculture OSAT are reflected within the 382 undergraduate courses offered in CASNR's 17 departments.

Not all students admitted into the program complete all of courses at Oklahoma State University, 69.74 percent of students in the studies population transferred to Oklahoma State University and were admitted into the program, having attended a junior or community college prior to transferring. In many instances students earned Associate of Science Degrees from these colleges, and have fulfilled approximately one-half of the requirements on the degree plan.

For more than 30 years, colleges of agriculture have faced issues with declining numbers of students pursuing agricultural careers through a college education (Dyer, Breja, & Wittler, 2002; Jones, 1999; Zoldoske, 1996). High school or school-based agricultural education programs have also faced issues with enrollment decreasing drastically in the 1980's and only recently increasing to normal levels (Lynch, 2000). Not only are declining enrollment numbers a concern for colleges of agriculture, but so is the agricultural literacy of students enrolled in colleges of agriculture. (Frick, Kahler, & Miller, 1991; Kovar & Ball, 2013; Mayer & Mayer, 1974). The shift from the farm to the cities is reflected in many of these students; they represent families that have not had direct ties to agricultural production for multiple generations (Frick, Kahler, & Miller, 1991; Leising, Igo, Heald, Hubert, & Yamamoto, 1998; Powell & Agnew, 2011). These findings help inform colleges of agriculture to evaluate methods of selecting courses required for students; in this case, those in agricultural education. So, do pre-service teachers acquire the content knowledge necessary to teach students accurately and effectively through their coursework at Oklahoma State University? Irving, Dickson, and Keyser (1999) claimed “the need to improve teachers' content knowledge in the sciences and their ability to communicate that knowledge to students must be moved to the forefront of the national educational agenda” (p. 410). By doing this, both students with an agricultural production background, and those without one have the potential to be better prepared to teach.

Agricultural Education researchers have reported how the view of agricultural education varies greatly within and outside of the profession, evolving because of global, regional, and local pressures related to political, societal, and technological changes (National Research Council, 1988). The *Handbook on Agricultural Education in Public Schools* (Phipps, Osborne, Dyer, & Ball, 2008), *Methods of Teaching Agriculture* (Newcomb, McCracken, Warmbrod, & Whittington, 2004), and *Foundations of Agricultural Education* (Talbert, Vaughn, Croom, & Lee, 2007) serve as the primary texts for the professional development of school–based agricultural teachers. According to Phipps et al. (2008), an agricultural education teacher must realize the programs and activities they engage their students in must reflect the dynamic and changing industry of agriculture. Agricultural education teachers must also understand they deliver programs on a wide variety of agricultural education topics, no matter what area of agriculture they may be teaching (animal science, horticulture, wildlife, agricultural mechanics, etc.)

(Talbert et al., 2007). According to Jayaraj (1992) “the future emphasis in agricultural education should be the development of broadly applicable, transferable skills and attributes useful to students in a wide range of jobs in agriculture” (p. 181). In Oklahoma, agricultural education teachers have the opportunity to teach a wide variety of courses to students (CareerTech OCAS Subject Codes, 2013, p. 2). Teachers without the breadth of knowledge on a subject are not likely to have the knowledge necessary to help students learn the content being taught (Ball, Thames, & Phelps, 2008).

“Agricultural education programs in the public schools are designed to accomplish educational objectives that pertain specifically to acquiring appreciation, understanding, knowledge, and skills applicable to the agricultural sciences, agribusiness, and the production and processing of food and fiber” (Newcomb, et al., 2004, p. 10). Agricultural education teachers must “possess expert competence in the science, technology, and skills of the specialized areas of agriculture they teach” (Newcomb, et al., 2004, p. 26). Lieblein, Francis, and King (1999) described the coursework of a student in an agriculture related field:

> Agricultural students take their first courses.... in building block sciences and humanities…. and then move into more applied areas – crop science, soil science, animal science, agricultural engineering, agricultural economics, food science, others…. They eventually specialize, taking more courses in one department… and learning the unique language and research methods of a specific discipline. (p. 215)

After years of taking coursework related to agricultural education, students are expected to be specialists in the three intra-curricular components of agricultural education: experiential learning through supervised agricultural experiences (SAE's), youth development activities conducted through the FFA, and classroom instruction (Dailey, Conroy, Shelley-Tolbert, 2001). As the National Research Council (1988) stated, the view of agricultural education varies from group to group, and the discussion between whether a teacher should have generalized, or specialized knowledge of agriculture will be a topic of interest as long as agricultural education continues to flex and change with the agricultural industry as a whole.

There are various reasons pre-service teachers are required to take a multitude of courses (Cruickshank, 1996) in this studies context within CASNR at Oklahoma State University. It is important for teachers to comprehend the subject they are teaching for reasons such as interpreting student comments, responding to student questions, and devising a variety of teaching methods (Floden & Meniketti, 2005). Teachers willing to engage students in a subject will be more effective if they first have a complete grasp of that subject (Kennedy, 1998), and students generally learn more if teachers are quite knowledgeable of the subject (Houck, 2008).

The National Council for Accreditation of Teacher Education (NCATE) is the entity responsible for accreditation of universities with teacher preparation programs and supports the modal four-part curriculum model (Cruickshank, 2006). The four part modal curriculum model is a framework accepted by teacher education programs across the country. The sections include content studies, professional education, general studies, and integrative studies. In the context of pre-service teachers in agricultural education, the content studies include courses taught within the specific discipline of agriculture. These studies are considered an important part of the modal curriculum for pre-service teachers (Cruickshank, 1996). For teacher preparation programs to be effective they should be "evaluated for their content course requirements, and adapt these courses to not only teach the pre-service teachers the content, but instruct them in how to teach it well" (Houck, 2008, p. 3).

The various approaches to teacher education and teacher certification have evolved from over a century ago (Angus, 2001). Reform in American education regarding the quality and qualifications of teachers has long been an issue (Angus, 2001). Angus (2001) addressed four main questions in which reform has been shaped around: "who should control the licensing of teachers…. whether the profession or a public agency should control the process and standards through which the competence of teachers is assured…. what should be the elements of a course of training for teachers…. [and] how detailed and specific a licensing system should be" (pp. 1-2). The centralization of state authority over teacher certification began in the late nineteenth century with three states requiring certificates from state officials, increasing to 38 within 25 years. (Angus, 2001). The certification of teachers did not start out as a test, or a degree requirement, but as an approval by the local minister of the church. Certification requirements evolved into criteria including knowledge of subject matter, and eventually pedagogy; determined by an examination (Angus, 2001). During this time, the debate over who should provide training for teachers occurred. Training was delivered through state and private schools, training programs connected to high schools in large cities, teacher departments at universities and colleges, and institutes for rural teacher training (Angus, 2001).

The first three decades of the twentieth century ushered in a tremendous amount of reform through the development of education departments and schools at colleges and universities. The number of degrees and certificates, along with the types and specialization of these certificates increased. The growing trend of obtaining a degree or certificate from a college or university did not mesh adequately with the certification requirements of many states. By mid-century, 34 states required either some amount of college, or a high school diploma with professional preparation in order to be certified. Six of the remaining 14 states required a high school diploma, while eight had no requirements of education (Angus, 2001). Just as quickly as certification exams came to be the 'norm' of education, the exams were eliminated from the certification process. Many states chose to certify their teachers based solely on professional training or education (Angus, 2001). This was the case until the late 1980's when school districts began to require applicants to take certification exams. Almost 40 % of school districts in America required certification exams for teacher applicants by the mid 1990's (Angus, 2001). Due to the No Child Left Behind legislation of 2001, all states are required to set up certification requirements, including examinations in order to become certified to teach.

Vocational and technical education has not historically followed the same preparation pathways or certification rules described above. According to Lynch (1997), "many vocational and technical education teachers were employed because of their extensive experience in a craft or occupation" (p. 5). Scott and Sarkees-Wircenski (1995) discussed the educational needs during the industrial revolution when they stated, "For most Americans, what was needed was a more practical curriculum that would prepare them for work" (p. 79). Vocational education became somewhat formalized with the enactment of the 1917 Smith-Hughes Act. This legislation introduced a separate system of education that would train workers to meet labor needs, and for jobs requiring skills and academic abilities below college level (Lerwick, 1979). This legislation also "specified that states have adequate programs of vocational teacher education and provided federal funds to do so" (Lynch, 1997, p. 9). Like educational requirements for agricultural education teachers today, "agricultural… teachers usually completed baccalaureate degrees in subject-matter colleges and completed the general education requirements expected of their respective colleges" (Lynch, 1997, p. 11). The education requirements at this time differed from today; professional education courses were nearly non-existent and consisted of only the courses required for state certification (Lynch, 1997).

The tipping point for vocational education occurred in 1994 when the National Assessment of Vocational Education tasked Boesel, Hudson, Deich, and Masten (1994) with doing a synthesis of the literature related to teacher preparation and competency scores. As a result of an extensive literature review, Boesel et al. (1994) suggested the following:

> Extensive occupational experience confers no particular benefits on vocational teaching, although a few years' experience has a positive impact. Formal postsecondary education is positively associated with desirable teacher and

> student outcomes. In short… teachers would be better off with more formal education and less occupational experience. (p. 75)

The problem of permitting occupational experience as a substitute for formal education plagued vocational education for almost a century before being addressed by the National Assessment of Vocational Education (Lynch, 1997). To help alleviate the formal education issues related to vocational education, the National Board for Professional Teaching Standards (NBPTS, 1996) developed standards for each subject area that represent a "professional consensus on the critical aspects of practice that distinguish exemplary teachers in this field from novice or journeymen teachers" (p.1). Teachers must show their expertise in four different areas in order to pass the National Board for Professional Teaching Standards (Lynch, 1997). The Vocational Education Standards for National Board Certification include: a) creating a productive learning environment; b) advanced student learning; c) transitioning to work and adult roles; and d) professional development and outreach (Lynch, 1997). By proving competence in the four areas, teachers were considered highly accomplished vocational education teachers (Lynch, 1997). These standards existed prior to the NCLB legislation in 2001 that mandated teachers to be highly qualified effective teachers.

Theoretical Framework

The theoretical framework for this study was based on the expectancy-value theory (Atkinson, 1957) using the model developed by Eccles et al. (1983). Choosing to pursue a vocation is a problem students have confronted for a very long time. Today, it is even more important to choose a vocation based on the following three factors prosed by Parsons (1909)

> In the wise choice of a vocation there are three broad factors: (1) a clear understanding of yourself, your aptitudes, abilities, interests, ambitions, resources, limitations, and knowledge of their causes; (2) a knowledge of the requirements, conditions of success, advantages and disadvantages, compensation, opportunities, and prospects in different lines of work; (3) true reasoning on the relations of these two groups of facts. (p. 5)

Students electing to pursue a degree in agricultural education do so for many reasons. It is important to understand the motivational factors and rewards that lure people into a particular career and the career-decision making process students are engaged in (Lucas, 1993; Zoldoske, 1996). The expectancy-value model of achievement was developed by Eccles et al. (1983) to potentially understand adolescents' performance and choice in the mathematics achievement domain (Wigfield, 1994) and based on the original work conducted by Atkinson in 1957. Wigfield (1994) stated researchers utilizing the theory must adopt the following perspective, characterized broadly, an individual's expectancies for success and the value they have for succeeding are important determinants of their motivation to perform different achievement tasks. Eccles et al. (1983) proposed a child's persistence, choice of achievement tasks, and achievement performance are most directly predicted by the expectancies they have for success on the tasks and the subjective value they attached to the success of each completed task. A student's desire to be successful is a very important determinant in their motivation to pass the OSAT, as well as to pass their classes in order to graduate and become a certified agricultural education teacher.

The two major constructs used in this study related to the Eccles et. al (1983) expectancy-value model included achievement behaviors and expectancies. Achievement behaviors include the persistence, choice and performance of students (Eccles et. al, 1983). The students in the population all have, to some degree, a choice in the courses taken at Oklahoma State University. The students' persistence and performance refers to the number of times the OSAT, or a certain course must be taken, as well as their grade in each course and the OSAT. The two aspects of expectancies include those that are current, those that are future, and those defined as the belief a student has about how they will do on an upcoming task (Wigfield, 1994).

The study focused on how the expectancy-value theory is related to the importance of subject matter knowledge and the eventual effective teaching methods and ability to teach the content provided in the classroom is essential to the development of pre-service teachers at Oklahoma State University. As students take more courses, it is expected their knowledge level will increase as well, eventually attaining appropriate competence in their field of study. Obtaining a bachelor's degree in agricultural education "demonstrates a mastery of knowledge and signif[ies] earned expertise in content" (Houck, 2008). The expectancy-value theory highlights the potential drive of students to achieve the collegiate goal of graduating with a bachelor's of science degree, and certification to teach agricultural education.

Statement of the Problem

Teacher certification requirements for agricultural education in Oklahoma include passage of the OSAT. After revisions to the OSAT were completed in 2011, results indicated students' were performing below the acceptable passing score of 240 in numerous content areas represented on the exam. Departments rely on core classes in agriculture for pre-service teachers to acquire the skills necessary to be competent in content areas on the OSAT. Do these core classes adequately prepare pre-service teachers to succeed in the certification process towards becoming agricultural education teachers? It is imperative to understand what content areas students are struggling with, and how improvements to the curriculum could alleviate struggles. By doing this, universities can better prepare pre-service teachers for careers as agricultural education teachers.

Purpose of the Study

The purpose of this study was to identify differences between performance in courses of technical agriculture (PICTA) and subarea scores of pre-service teachers in the agricultural education program at Oklahoma State University.

Objectives

Three objectives guided this study:

1. Identify the performance in courses of technical agriculture (PICTA) of agricultural education pre-service teachers at Oklahoma State University between 2011 and 2013 related to the following six subareas:
    a. Agricultural Business, Economics, and Marketing
    b. Animal Science

c. Plant and Soil Science

d. Agricultural Mechanics

e. Environmental Science and Natural Resources

f. Foundations of Agricultural Education

2. Identify scores on the six subareas and the constructed response section composing the OSAT for agricultural education pre-service teachers.

3. Describe relationships between PICTA and subarea scores on the OSAT for agricultural education pre-service teachers.

Definition of Terminology

The following terms were identified and defined as relevant to this study:

Agricultural content knowledge: knowledge on an agricultural content subject matter; determined by the OSAT agriculture scores.

Certification examinations for Oklahoma educators: a program ensuring all individuals seeking certification in the state of Oklahoma have the knowledge and skills necessary to perform an entry-level position in Oklahoma public schools. The CEOE consists of three tests: the Oklahoma General Education Test, the Oklahoma Professional Teaching Examination, and the Oklahoma Subject Area Tests.

Modal teacher preparation curriculum: The model for teacher preparation curriculum, based on nomenclature used by the National Council for Accreditation of Teacher

Education, consisting of four parts: (a) general studies, (b) content studies, (c) professional/pedagogical studies, and (d) integrative studies (Cruickshank, 1996).

Oklahoma Subject Area Test (OSAT)-Agriculture: a criterion-referenced, competency based test required by the state of Oklahoma to be considered for certification as a high school agricultural education teacher. The OSAT assesses six subareas: agricultural business, economics and marketing; animal science; plant and soil science; agricultural mechanics; environmental science and natural resources; and foundations of agricultural education, and one constructed response section

Performance in courses of technical agriculture (PICTA): grades and courses taken in all agricultural subareas as reported by student transcripts.

Subarea Scores: scores on each of the six subareas of the OSAT, the constructed response section, and a total overall score on the OSAT. Eighty-five percent of the total score comes from the six subareas; 15 % of the total score comes from the constructed response section

Technical Agriculture: courses offered at Oklahoma State University which are deemed similar to the competencies on the OSAT which teachers have the possibility to teach in the high school classroom.

Assumptions

The following assumptions were made regarding this study:

1. The OSAT is an accurate measure of agricultural content knowledge.

2. All students in the sample completed the curriculum for agricultural education majors at Oklahoma State University.

3. Grades are representative of effort put forth by students, and are delivered objectively by course instructors.

Limitations

The following were limitations identified for this study:

1. The findings of this study are limited to Oklahoma State University and should not be generalized to other populations.

2. Variability in course content and quality of instruction was not controlled through this study.

3. Extraneous variables were not controlled through this study.

4. Students with multiple test scores on the OSAT were not reflected in this study. Only the highest score was utilized in data collection.

5. The sample consisted of 69.74% of students who transferred to Oklahoma State University from other institutions.

6. The coursework of transfer students from other institutions was not identified in this study.

Scope of the Study

The study examined the performance in courses of technical agriculture of pre-service teachers related to their overall knowledge of subject matter in agriculture. If the relationship between variables indicates pre-service teachers are not adequately prepared to teach technical agriculture, then the curriculum may need to be evaluated and modified. Findings, conclusions and recommendations of this research will benefit teacher education programs; specifically agricultural education programs, and future agricultural education teachers.

CHAPTER II

REVIEW OF LITERATURE

This chapter is a review of relevant literature related to this study and the variables under examination. The chapter is organized into seven sections: an introduction of the chapter, expectancy-value theory, modal teacher preparation curriculum, subject matter knowledge, teacher preparation curriculum, standardized testing requirements in Oklahoma and a summary of the chapter.

Introduction

The purpose of this study was to identify differences between performance in courses of technical agriculture and individual subarea scores of pre-service teachers in the Agricultural Education program at Oklahoma State University in reference to the six subareas tested for, and the one constructed response section on the Oklahoma Subject Area Test (OSAT) between 2011 and 2013. The intent of this study was to analyze the framework from a pre-service teacher perspective through the lens of the expectancy-value theory. A literature review is necessary to inform readers of previous research on which to preface this study's contribution to the body of knowledge; to justify the approach taken in the study; to aid in delimiting the problem under investigation; and to justify the value, importance, and need for the study (Newman, Benz, Weis, & McNeil, 1997). This literature review will focus on the expectancy-value theory, as well as aspects of pre-service teacher education and educational requirements in the U.S. and the state of Oklahoma.

Expectancy-Value Theory

Expectancy-value theory belongs amongst the theories related to motivation. In the 1964 book *An Introduction to Motivation*, Atkinson (1964) explains the "'Expectancy X Value' theory…. as a conception of motivation which emphasizes the determinative role of expectation (or expectancy) of the consequences of action" (Atkinson, 1964, p. viii). According to Atkinson (1957), "the strength of motivation to perform some act is assumed to be a multiplicative function of the strength of the motive, the expectancy (subjective probability) that the act will have as a consequnece [*sic*] the attainment of an incentive, and the value of the incentive: Motivation = f(Motive X Expectancy X Incentive)" (pp. 360-361). Though the purpose of this literature review, and this study is not to determine the strength of motivation of students, the function of motivation posited by Atkinson (1957), is important to consider when understanding the expectancy-value theory itself. In order for a student to succeed, this sort of function must be subconsciously completed for every task set forth for them to complete.

When considering a students' ability to succeed in the classroom, or to successfully pass the OSAT, Atkinson and Feather (1966) posit the following: "let us consider the effects of success or failure on the level of motivation in a person whose motive to achieve is stronger than his motive to avoid failure" (p. 25). It is assumed students in the sample all attempted classwork and the OSAT with their best effort and with good intentions. Students with the motive to achieve should have a higher level of aspiration related to each task, making their ability to focus on the set task easier and more frequent. This notion holds true with student grades, performance on the OSAT and among classes reflected in the subareas on the OSAT. A student may have a particular interest in a certain subarea, rendering an increased strength of motivation, while another subarea may be of no interest to the student; with a decreased strength of motivation. "The use of the expectancy concept implies that the relative frequency of success and failure following previous performance in similar activities determines the present strength of expectancies of success and failure at a particular task" (Atkinson, 1964, p. 258). If a student performs poorly in a class reflecting a subarea they are interested in, their interest may decrease for the subarea altogether. The same may be true about poor performance in a class reflecting a subarea the student has no interest in; with the possibility of the student transferring from a motive to achieve to a motive to avoid failure. "The strength of motive can remain unchanged, but interest in a particular task can diminish completely" (Atkinson & Feather, 1966, p. 25). When a student loses interest in a particular task (i.e. coursework in a certain subarea), their ability to learn to their true potential could be impacted by a lack of interest in the subject and the coursework. Atkinson further discusses the probability of motivation at different levels, and the effect the probability level has on the individual's interest level related to the specific task. Atkinson (1957) found "motivation to achieve is strongest when uncertainty regarding the outcome is greatest, i.e., when P_8 equals .50" (p. 363).

Three variables constitute the theoretical model put forth by John Atkinson: motive, expectancy, and incentive (Atkinson, 1957). "A motive is conceived as a disposition to strive for a certain kind of satisfaction, as a capacity for satisfaction in the attainment of a certain class of incentives" (Atkinson, 1957, p. 360). The class of incentives includes achievement, affiliation, and power among others. All of these create a sense of satisfaction and pride in accomplishing a task (Atkinson, 1957). Achievement behaviors are considered in this study, and include the persistence, choice and performance of students (Eccles et al., 1983). "Expectancy is a cognitive anticipation, usually aroused by cues in a situation, that performance of some act will be followed by a particular consequence" (Atkinson, 1957, p. 360). Eccles et al. (1983) defined the expectancy for success as an individuals' belief about how well they will do on tasks, either in the present, or the future. "These expectancy beliefs are measured in a manner analogous to measures of Bandura's (1977) personal efficacy expectations" (Eccles & Wigfield, 2002, p. 119). Two kinds of expectancies are used in this study, those that are current, and those that are in the future, and are defined as the belief a student has about how they will do on an upcoming task (Wigfield, 1994). "[The incentive variable] represents the relative attractiveness of a specific goal that is offered in a situation, or the relative unattractiveness of an event that might occur as a consequence of some act" (Atkinson, 1957, p. 360). The incentive for the students in this study is the obtainment of a bachelor's degree from Oklahoma State University, and certification as an agricultural education teacher in the state of Oklahoma.

The model for this study was developed by Eccles, Adler, Futterman, Goff, Kaczala, Meece, and Midgley in 1983 "as a framework for understanding early adolescents' and adolescents' performance and choice in the mathematics achievement domain" (Wigfield, 1994, p. 50). Eccles et al. (1983) proposed a child's persistence, choice of achievement tasks, and achievement performance are most directly predicted by the expectancies they have for success on the tasks and the subjective value they attached to the success of each completed task.

Though research has primarily been conducted on children between pre-K and the 12th grade (Borders, Earleywine, & Huey, 2004; Dickhäuser & Stiensmeier-Pelster, 2003; Eccles & Wigfield, 1995; Heafner, 2004; Spinath, Spinath, Harlaar, & Plomin, 2006), and on work situations (Feather, 1992; Feather & O'Brien, 1987), there are few studies focused on students at the collegiate level (Bong, 2001; Turner & Schallert, 2001) The Eccles et al. (1983) model proposes a causal link between goals, competence beliefs, and expectancies for success. There are two main predictions which are prosed about the nature of the relationship between competence beliefs and the expectancies for success. The first is competence beliefs and expectancies for success should be positively related. Research has shown these two variables are positively, highly related (e.g., Eccles et al., 1983; Wigfield, 1984). This suggests if an individual believes they are competent in a task, then they also believe they are capable of succeeding in similar tasks, and vice-versa. The other prediction is related to elementary school aged children. The positive relations mentioned in prediction one should increase across the elementary school years as children's competence beliefs become more related to their performance outcomes.

Modal Teacher Preparation Curriculum

Teacher preparation programs in the United States have long been engaged in a debate regarding the modal teacher preparation curriculum model. Oklahoma State University and peer institutions seeking accreditation or endorsement by the National Council for the Accreditation of Teacher Education (NCATE) follow the four part model.

The NCATE model is made up of four segments: (a) general studies; (b) content studies; (c) professional/pedagogical studies; and (d) integrative studies.

General studies are the study of subjects and ideas valuable to all students (Cruickshank, 1996). For the Bachelor of Science in Agricultural Sciences and Natural Resources - Agricultural Education - Teaching Option degree plan, general studies or General Education Requirements include 42 required credit hours (see Figure 1).

GENERAL EDUCATION REQUIREMENTS: 42 HOURS		
Area	**Hours**	**To be selected from:**
English Composition & Oral Communication	9	ENGL 1113 or 1313; & 1213 or 1413 or 3323. (See Academic Regulation 3.5 in Catalog) SPCH 2713*
American History & Government	6	HIST 1103; POLS 1113
Analytical &Quantitative Thought (A)	6	Select from: MATH 1483* or 1493* or 1513* or higher or any course designated (A)
Humanities (H)	6	Any courses designated (H)
Natural Sciences (N)	9	BIOL 1114*; CHEM 1215* (or CHEM 1314*)
Social & Behavioral Sciences (S)	6	**AGEC 1113*; PSYC 1113*
Diversity (D)	--	Any course designated (D)
International Dimension (I)	--	Any course designated (I)
Scientific Investigation (L)	--	Any course designated (L)
*College & Departmental requirements that may be used to meet GE requirements.		

Figure 1 – General Education Requirements for Agricultural Education-Teaching Option.

Content studies are the study of content in the academic area the teacher plans to teach. Agricultural education majors are required to take 26 credit hours' of courses identified as College/Departmental Requirements and 24 credit hours' represent the Major Requirements portion of the plan of study (see Figure 2 and Figure 3, respectively).

COLLEGE/DEPARTMENTAL REQUIREMENTS: 26 HOURS		
Agricultural Sciences and Natural Resources	26	AG 1011; ANSI 1124; FDSC 1133(or 2253); HORT 1013; PLNT 1213; SOIL 2124 NREM 2013 (or 3343); MCAG 3011, 3211, 3222, 4101

Figure 2 – College/Departmental Requirements for Agricultural Education-Teaching Option.

MAJOR REQUIREMENTS: 24 HOURS**

Enrichment 15 Hours

To include courses from four of the following areas:
Agricultural Communications, Agricultural Economics, Agricultural Education, Agricultural Leadership, Animal Science, Biochemistry, Entomology, Forestry, Horticulture, Mechanized Agriculture, Natural Resource Ecology and Management, Plant Pathology, Plant Science, and Soil Science.

Related Courses 9 Hours

AGCM	3103 (or ENGL 3323)
AGLE	2303 or 2403 or 3303
AGED	4713[I] (or ANSI 3903[I])

**AGEC 1113 is a General Education Requirement in addition to the Major Requirement. Students must earn a minimum grade of "C" in each course in the College/Departmental Requirements, Major Requirements and Professional Core Requirements.

Figure 3 – Major Requirements for Agricultural Education-Teaching Option.

Professional and pedagogical studies consist of pre-clinical experiences (AGED 3101), Foundations and Philosophy of Agricultural Education (AGED 3103), Educational Psychology (EPSY 3213), Special Education (SPED 3202), and teaching methods

(AGED 4103; AGED 4113). These courses are taught by departmental faculty in the Agricultural Education, Educational Psychology and Special Education departments. Integrative studies are the last segment of the model. These studies consist of the "on- and off-campus laboratory and clinical experiences…. [which] provide pre-service teachers with settings in which they may study teaching and practice what they have learned in general, content, and professional education" (Cruickshank, 1996, p. 28). The professional and pedagogical studies and the integrative studies make up the Professional Core area of the plan of study (see Figure 4), and consist of 27 credit hours'.

PROFESSIONAL CORE: 27 HOURS

AGED 3101, 3103, 3203, 4103, 4113, 4200 (9 hours), EPSY 3213 or 3413, SPED 3202

Figure 4 – Professional Core for Agricultural Education-Teaching Option.

Content studies or technical agriculture courses are one of the key areas of teacher preparation. With 50 credit hours to be taken within the college, students are exposed to a diverse knowledge base reflecting the multiple facets of the agriculture industry. Cruickshank (1996) stated "all who have a stake in K-12 education uphold the principles that 1) teachers must know the content they will teach and 2) they must be aware of how best to teach it" (p. 11). Universities face a problem on how to best prepare future teachers on how to best teach their subject (Cruickshank, 1996). In many multipurpose universities, classes are normally populated by students from a variety of majors (Cruickshank, 1996). Faculty in these classes have no need, or time to teach pre-service teachers the seminal pedagogical content knowledge necessary for them to teach it to others. An interdisciplinary approach with professors, schools, teachers, and teacher educators could determine what pre-service teachers need to know in order to be successful in the classroom (Cruickshank, 1996).

Subject Matter Knowledge

Teachers' subject matter knowledge is an important concept, and is more important for secondary school teachers than for elementary school teachers (Allen, 2000) because of the more intricate set-up of courses at the secondary level of education. Due to the nature of the agricultural education classroom being in a middle or high school setting, this point is extremely important. According to Cochran and Jones (1998),

> The implicit assumption is that an undergraduate degree in a subject area or a related area (and relevant pedagogical preparation) provides an adequate basis for teaching. However, as concerns increase regarding *children's* subject matter knowledge… corresponding concerns are being raised about *teachers'* subject matter knowledge. (p. 707)

Pre-service teachers need the content mastery and knowledge of how to teach content in K-12 settings (Cruickshank, 1996), but they also must possess knowledge to teach with (Broudy, 1972). Teachers willing to engage students in a subject will be more effective if they first have a complete grasp of that subject (Kennedy, 1998), and students generally learn more if teachers are quite knowledgeable of the subject (Houck, 2008). "Teachers who do not themselves know a subject well are not likely to have the knowledge they need to help students learn this content" (Ball, Thames, & Phelps, 2008, p. 404). A number of studies address the issue of teachers having adequate knowledge of a subject to teach in the classroom (Anderson & Mitchener, 1994; Ball, 1990; Ball, Thames, & Phelps, 2008; Baturo & Nason, 1996; Borko, Eisenhart, Brown, Underhill, Jones, & Agard, 1992; Cochran & Jones, 1998; Even, 1993; Graeber, Tirosh, & Glover, 1989; Harty, Samuel, & Andersen, 1991; Leinhardt & Smith, 1985; Hashweh, 1987; McDiarmid & Wilson, 1991; Monk, 1994; Rollnick, Bennett, Rhemtula, Dharsey, Ndlovu, 2008; Rovegno, Chen, & Todorovich, 2003; Stoddart, Connell, Stofflett, & Peck, 1993; Thompson & Balschweid, 2000; Wenner, 1993; Wilson, 1994; Wilson, Floden, & Ferrini-Mundy, 2002).

Pedagogical content knowledge "is described as knowing the ways of representing and formulating the subject matter that make it comprehensible to others as well as understanding what makes the learning of specific topics easy or difficult" (Even, 1993, pp. 94-95). Although the subject-matter knowledge of a teacher influences their pedagogical content knowledge, there is not much known about the interrelations between the two (Even, 1993). Roberts (1996) described the prevalence of experiential learning in both the secondary agricultural education classroom, and in agricultural education programs in higher education. This is the 'learning by doing' type of teaching approach; with numerous sources of curriculum readily available for agricultural education teachers to utilize and teach through this approach.

In science education, presentations are key for introducing new concepts, review learned material, offer explanations; and is where teachers must rely heavily on their subject matter knowledge (Leinhardt & Smith, 1985). Agriculture is in most cases considered a science subject; and agriculture teachers use presentations in the same way as teachers in science classrooms. Hashweh (1987) investigated the role of subject-matter knowledge in teaching on the ability to present curriculum to students, and found "teacher prior knowledge of subject-matter as contributing greatly to the transformation of the written curriculum into an enactive curriculum" (Hashweh, 1987, p. 119; Rollnick, et al., 2008; Sanders, Borko & Lockhard, 1993).

A high level of subject-matter knowledge is necessary for pre-service teachers to be successful in the classroom, and is detrimental if the level of subject-matter knowledge is not complete. Math and science teachers demonstrated they have incorrect, incomplete and often unconnected knowledge related to their subject area (Baturo & Nason, 1996; Hashweh, 1987; Leinhardt & Smith, 1985). In addition, Henning and King (2005) found pre-service teachers did not have enough content knowledge in social studies or science to make meaningful lessons for students. The quality of the curriculum being developed in the study reflected the students' lack of content knowledge (Henning & King, 2005).

Teacher Preparation Coursework

According to Sion and Brewbaker (2001), there is a weak link between university courses taken by students in their specific content areas and the practical transfer to the classroom. Teacher preparation programs tend to focus on the education-intensive courses rather than the subject matter courses (Floden & Meniketti, 2005) which are just as, if not potentially more important for a pre-service teacher. Floden and Meniketti (2005) determined despite the positive effects found, coursework did not bring all of the students to a strong understanding of the subject matter knowledge in the subject area they were studying. Darling-Hammond (2000) states:

> Teaching for problem solving, invention, and application of knowledge requires teachers with deep and flexible knowledge of subject matter who understand how to represent ideas in powerful ways can organize a productive learning process for students who start with different levels and kinds of prior knowledge, assess how and what students are learning, and adapt instruction to different learning approaches. (pp. 166-167)

If pre-service teachers do not have the deep and flexible knowledge Darling-Hammond (2000) referred to, students of all different learning styles, and educational levels will suffer from the lack of depth in the curriculum being taught. Teachers who began teaching with less than full preparation were usually less satisfied with their training, and had greater difficulty "planning curriculum, teaching, managing the classroom, and diagnosing students' needs" (Darling-Hammond, 2000, p. 167). A key theme reported by Floden and Meniketti (2005) focused on the lack of deep understanding teachers held concerning the concepts they would teach. Despite having basic skills, teachers must acquire the ability to conceptualize technical content to effectively teach students.

One critique of current four-year teacher preparation programs is the compressed time to learn the subject matter and pedagogy; content/pedagogical coursework and intensive university and school-based training experiences (Darling-Hammond, 2000). There are also concerns regarding the content in many of the courses pre-service teachers are taking; along with the lack of resources and adequate clinical training (Darling-Hammond, 2000). "Teacher education programs need resources to develop and implement courses that focus on an integrated track" (Thompson & Balschweid, 2000, p.

78). Like with many states, Oklahoma is making significant cuts to higher education, the possibility of getting these lost resources back is unknown.

Different types of teacher preparation programs have been developed, including 1-2 year graduate programs serving recent graduates, and five-year models which allow for a full year of school-based clinical training. These programs closely align with models used in many European countries, reporting higher satisfaction and retention rates (Darling-Hammond, 2000). "The majority of agriculture teacher preparation programs include a four-year program of study, including courses in teaching methods, program planning, and student teaching" (Myers & Dyer, 2004, p. 49). No research has been conducted investigating the need or success of the five-year programs created for agricultural education teacher preparation (Myers & Dyer, 2004).

"If colleges are to be a reliable source of future teachers then they must do one of two things: recruit students who already have a background in the subject or design a curriculum to provide the needed experience at the university level" (Houck, 2008, p. 16). A problem with the recruiting aspect of agricultural education teacher preparation programs is many program admissions and certification measures are possibly excluding potential agriculture teachers (Graham and Garton, 2001). Colleges of agriculture are encountering more students than ever before without a background in the field (Dyer, Breja, Wittler, 2002). To that end, colleges of agriculture should consider redesign of the curriculum in order to prepare not only students in the agricultural education program, but students in all agricultural majors.

The concern with coursework preparation of pre-service teachers lies with the current state of our society, and how society perceives education. “If our society really expects all students to learn at high levels, as current rhetoric suggests, a more deliberate set of strategies for ensuring that their teachers gain access to knowledge will be needed” (Darling-Hammond, Chung, & Frelow, 2002, p. 208). By re-evaluating the curriculum being taught to pre-service teachers, there is one final point to remember: “we would all benefit from the development measures of the knowledge, skill, commitments, and capacities we hope prospective teachers acquire in our company” (Wilson, Floden, & Ferrini-Mundy, 2002, p. 202).

Standardized Testing Requirements in Oklahoma

At Oklahoma State University, pre-service agricultural education teachers are required to take three tests offered by the Certification Examinations for Oklahoma Educators (CEOE). The three tests include: the Oklahoma General Education Test (OGET), the Oklahoma Professional Teaching Examination (OPTE), and the Oklahoma Subject Area Test (OSAT) in Agriculture. These examinations are required by the state of Oklahoma in order for an individual to become certified in their content area.

There are two main companies in the United States offering testing programs for teacher licensure. The state of Oklahoma chose to contract with the Evaluation Systems group of Pearson, however, many states rely on the Praxis II exam for their teacher licensure tests. The Praxis II: Subject Assessments are exams used to measure subject specific teaching knowledge and skills (Educational Testing Service, 2014). The exams are developed, administered, and scored by the Educational Teaching Service, a nonprofit testing corporation located throughout the world. The Praxis II agriculture subject exam is a multiple choice test based on surveys distributed to teachers in order to identify what they need to know to perform their job duties. The exam is created, reviewed, and approved by a committee of educators who use current research to identify skills required of beginning teachers (Educational Testing Service, 2014). Each state determines their own testing standards, and utilizes either Pearson, or the Educational Testing Service to develop and deliver their certification exams.

Oklahoma General Education Test (OGET).

The OGET is a criterion-referenced, competency based test designed to assess state core general education knowledge and skills, including critical thinking, communication, and computation. The scoring consists of two categories: 100 selected-response questions total 80% of the total score; while the one writing assignment accounts for 20% of the total score (CEOE Score Report, 2008). A minimum score of 240 from a scale of 100-300 is required to pass the OGET (CEOE Score Report, 2008). The test assesses six subareas: critical thinking skills: reading and communications; communication skills; critical thinking skills: mathematics; computation skills; liberal studies: science, art and literature, social sciences; and critical thinking skills: writing (Oklahoma General Education Test Study Guide, 2007).

Oklahoma Professional Teaching Examination (OPTE).

The OPTE is a criterion-referenced, competency based test designed to assess professional knowledge and skills needed by entry-level Oklahoma educators. The OPTE includes approximately 75 selected-response questions and a constructed-response section composed of 3 written performance assignments. The test competencies were derived from the Oklahoma General Competencies for Teacher Licensure and Certification (Certification Examinations for Oklahoma Educators Program Overview, 2014). A minimum test score of 240 from a scale of 100-300 is required for passing (CEOE Score Report, 2008). The selected-response questions account for 70% of the total score, and the constructed-response modules account for 30% of the total score (CEOE Score Report, 2008). The test evaluates three subareas: learners and learning environment; instruction and assessment; and the professional environment (Oklahoma Professional Teaching Examination Study Guide, 2007).

Oklahoma Subject Area Test (OSAT) – Agriculture.

The OSAT is a criterion-referenced, competency based test developed to assess six competencies: agricultural business, economics and marketing; animal science; plant and soil science; agricultural mechanics; environmental science and natural resources; and foundations of agricultural education (Oklahoma Subject Area Tests Study Guide, 2011). A minimum score of 240 on a 100-300 point scale is required for passing the OSAT. According to the Certification Examination for Oklahoma Educators Study Guide (2011),

> The OSATs are designed to assess subject-matter knowledge and skills in a test field. The explicit purpose of each examination is to help identify those examinees who have demonstrated the level of subject-matter knowledge and skills required by the state for entry-level educators in Oklahoma. (p. 1-2)

The scoring is broken down into two categories. Eighty selected-response questions totaling 85% of the total score; with one constructed-response assignment totaling 15% of the total score (Study Guide Introduction, N.D.). OSAT test competencies were derived from two different areas: the Oklahoma Full Subject-Matter Competencies, and the national standards for subject-matter knowledge and skills of entry-level educators (Study Guide Introduction, N.D.). The competencies were reviewed by Oklahoma educators, with content validity surveys being sent out to random school personnel and college and university faculty. Questions were then verified by a panel of Oklahoma educators which led to further field tests ensuring accurate and reasonable test materials (Study Guide Introduction, N.D.).

Summary of the Review of Literature

The literature review described the following concepts: expectancy-value theory and model used in the study, modal teacher preparation curriculum, subject matter knowledge, coursework preparation of teachers, and the standardized testing requirements in Oklahoma. The expectancy-value theory explains how a student's level of motivation can either increase or decrease their level of aspiration with a given task. Motive, expectancy and incentive are the three variables working together throughout a student's college career to drive students to achieve their goals. All students sought to graduate from Oklahoma State University with a Bachelor of Science degree in Agricultural Science and Natural Resources. The students also sought to successfully complete the agricultural education program. These two standards helped motivate students to perform to their best ability in the coursework. The modal teacher preparation curriculum model is used by Oklahoma State University as the model for curriculum taken by pre-service teachers. This model consists of four segments of curriculum: (a) general studies; (b) content studies; (c) professional/pedagogical studies; and (d) integrative studies.

With the completion of courses in each segment, students are expected to be knowledgeable in the appropriate amount of information necessary to teach agricultural education. Teacher preparation programs focus on education-intensive coursework designed to provide students with the building blocks necessary to run a classroom effectively. The students, in many instances, do not have the skills necessary to transfer the subject-knowledge they possess into effective lessons in a classroom. While gaining knowledge through coursework, students are required to take three tests to gain certification as an agricultural education teacher. The three tests assess general education knowledge and skills, professional knowledge and skills needed by Oklahoma educators, and subject-matter knowledge and skills in their area. If a student receives a minimum score of 240 out of 300 on all three of the tests, completes their coursework, as well as completing the foreign language proficiency and professional education unit portfolio, they are granted certification. The professional education unit portfolio consists of three submissions: a) application for admission to professional education; b) pre-student teaching/clinical experience; and c) student teaching/clinical practice.

Through the modal teacher preparation curriculum model, students are expected to learn both subject-matter knowledge and knowledge necessary to be an effective teacher in order to ultimately become certified as an agricultural education teacher must complete all certification requirements including successful completion of all three certification exams. The expectancy-value theory is the driver behind the motivation and expectations students have of their performance to achieve certification and graduation.

CHAPTER III

METHODOLOGY

Introduction

This chapter is a presentation of the methods and procedures used to accomplish the purpose and objectives of this study. The chapter includes the description of the research design, population and sample. Also included are descriptions of procedures used to collect and analyze data.

Institutional Review Board

In order to conduct research at Oklahoma State University, an application reviewed by the Office of University Research and the Institutional Review Board at Oklahoma State University is required per federal regulations and university policy. The review and approval is necessary for all research studies involving human subjects before research can begin. The review for this study was conducted to protect the rights and welfare of human subjects involved in biomedical and behavioral research. The researcher was granted permission to execute this study through this process. The institutional review board code for this study was AG149. A copy of the approval form can be found in Appendix (B).

Research Design

An ex post facto research design was chosen for this study. Kerlinger (2011) explained that with social science research, an ex post facto study seeks to reveal potential relationships by observing a state of affairs or an existing condition, along with searching back in time for possible contributing factors. One distinction made about ex post facto design is the assigned variables can only show relationships, not causation. There are three weaknesses in using the ex post facto research design in conducting a study. First is the inability to manipulate independent variables; second, the lack of randomization of the sample; and third, the risk of improper interpretation due to the lack of ability to manipulate variables. Regarding research design, Newman and Newman (1994) reported the following:

> In ex post facto research, causation is sometimes properly inferred because some people have propensity for assuming that one variable is likely to be the cause of another because it precedes it in occurrence, or because one variable tends to be highly correlated with another. (p. 112)

An ex post facto research design is sometimes criticized for resulting in low internal validity, but can potentially have a high external validity due to the representative sample size. Although causation cannot be inferred through the findings, correlational relationship tests can be extremely useful. Newman and Newman (1994) believe "one of the most effective ways of using ex post facto research is to help identify a small set of variables from a large set of variables related to the dependent variable for future experimental manipulation" (p. 124).

The two variables studied were performance in courses of technical agriculture (PICTA), and subarea scores on the OSAT. PICTA was defined by the student transcripts of courses taken at Oklahoma State University, and subarea scores on the OSAT were defined by the Oklahoma Subject Area Test (OSAT) scores in agricultural education.

Population and Sample

The population for this study consisted of all pre service agricultural education majors who have completed the Oklahoma Subject Area Test while enrolled at Oklahoma State University. A time and place sample of the population was taken. According to Oliver and Hinkle (1982) a time and place sample is used when subjects in a given year are representative of the subjects who are followed over time. Students who graduated between 2011 and 2013 were chosen because of the revisions to the OSAT in 2011 to include the two new competencies, and because they are the most recent students to graduate from the program. The 92 individuals included in the population represent a manageable amount of data to study. Sixteen individuals did not have complete data entries for either PICTA or subarea scores on the OSAT, so they were excluded from this study. A sample of 76 individuals remained.

Data Collection Procedure

Data were collected using the student uploaded transcript records of each agricultural education student between the years of 2011 and 2013. The records specifically contained information related to performance in courses of technical agriculture including the courses, credit hours, and GPA for each student. The courses taken by students were examined using the subareas tested for on the OSAT: agricultural business, economics and marketing; animal science; plant and soil science; agricultural mechanics; environmental science and natural resources; and foundations of agricultural education. Subarea scores on the OSAT were obtained from the student portfolios in the Agricultural Education department.

Oklahoma Subject Area Test-Agriculture

The Oklahoma Subject Area Test-Agriculture (OSAT) scores were the data source used to identify the agriculture content knowledge of participants in this study. To become a certified agricultural teacher in the state of Oklahoma through the Oklahoma State University's Agricultural Education program, an individual must complete all of the requirements listed on the OSU Teaching Certificate Check Sheet and Recommendation for Agricultural Education (Grades 6-12) in Appendix (C). One of the requirements listed includes passing the OSAT with a minimum score of 240 on a 100-300 point scale. According to the Certification Examination for Oklahoma Educators Study Guide (2011):

> The OSATs are designed to assess subject-matter knowledge and skills in a test field. The explicit purpose of each examination is to help identify those examinees who have demonstrated the level of subject-matter knowledge and skills required by the state for entry-level educators in Oklahoma. (p. 1-2)

After the passage of House Bill 1549 by the Oklahoma Legislature in 1995, the Oklahoma Commission for Teacher Preparation (OCTP) was charged with developing a competency-based teacher assessment system (Certification Examinations for Oklahoma Educators Program Overview, 2014). Bids were given and the contract was signed with the Evaluation Systems group of Pearson, which developed and administers the three tests included in the Certification Examinations of Oklahoma Educators (CEOE). The OSAT is a criterion-referenced, competency based test designed to evaluate six subareas: agricultural business, economics and marketing; animal science; plant and soil science; agricultural mechanics; environmental science and natural resources; foundations of agricultural education; and one constructed response section (Oklahoma Subject Area Tests Study Guide, 2011). The scoring is broken down into two categories. Eighty selected-response questions are divided between the seven competencies, totaling 85% of the total score; while the one constructed-response assignment totals 15% of the total score (Study Guide Introduction, N.D.).

OSAT test competencies were derived from two different areas: the Oklahoma Full Subject-Matter Competencies, and the national standards for subject-matter knowledge and skills of entry-level educators (Study Guide Introduction, N.D.). The competencies were reviewed by Oklahoma educators, with content validity surveys being sent out to random school personnel and college and university faculty. Questions were then verified by a panel of Oklahoma educators which led to further field tests ensuring accurate and reasonable test materials (Study Guide Introduction, N.D.).

Performance in courses of technical agriculture (PICTA)

Transcripts were obtained from student portfolios uploaded to the www.livetext.com website. The uploaded transcripts were the data source for this study. The transcript for each student contained information regarding every course taken at an institution of higher education, including Oklahoma State University, the number of credit hours it was worth, and the grades received for courses.

Fifteen credit hours are identified as “enrichment” These hours are designed to meet the technical agriculture needs of students. To that end there is flexibility as to which courses a student can take to fulfill the degree requirements for Agricultural Education. To artificially control for this flexibility, a formula was modified from the Houck (2008) thesis which will be described in detail in the data analysis section. Sixty-nine point seven four percent of students in the time and place sample transferred to Oklahoma State University from another institution. The breadth of the Institutional Review Board application did not allow for transcripts to be obtained from the various institutions students transferred from. To control for this aspect of the population, courses were selected from a list of offered agricultural content courses through the College of Agricultural Sciences and Natural Resources at Oklahoma State University. No other courses were considered for this study.

The transcript records uploaded by students to their portfolio on www.livetext.com were determined to be valid because they were received by the student from the Office of the Registrar at Oklahoma State University. A strenuous process exists to ensure course requirements and policies are not changed often allowing the researcher to deem these records reliable. The time frame (2011-2013) resulted in no changes to the degree requirements for Agricultural Education students who represent the population for this study. A complete list of degree requirements can be found in Appendix (A).

Data Analysis

Objective One

Objective one sought to identify the performance in courses of technical agriculture (PICTA) of the sample. A complete list of courses offered through CASNR was obtained by the researcher. The courses were sorted into each of the seven subareas. The data for objective one were calculated by subarea using the six subareas tested for on the OSAT. A total for all six subareas was also calculated. The formula for calculating these scores was used by Houck (2008) due to the similarities in the two studies, but was modified for this study. “The formula developed to represent each area was the number of credits multiplied by the level of the course over one hundred multiplied by the grade received” (Houck, 2008, p. 25).

$$\text{Number of credits} * (\text{course level}/\ 1000) * \text{grade received} = \text{PICTA}$$

For example, if a student earned an A grade in AGED 3103, the calculation would be:

$$4 * (3000/1000) * 4 = 48$$

According to the Oklahoma State University 2013-2014 University Catalog, “[t]he unit of credit at Oklahoma State University is the semester hour” (p. 15); “[t]he [course number] indicates the class year in which the subject is ordinarily taken” (p. 66); and the “quality of student performance in all classes is indicated by the following letter grades: "A," "B," "C," "D," "F," "F!," "I," "NP," "P," "S," "U," "W," or "R," "SR," or "UR." (p. 68). For this study, only courses with the letter grades "A," "B," "C," "D," and "F," were considered. Per the formula, “[t]he course level was divided by 100 to approximate the magnitude” (Houck, 2008, p. 25), but was modified to reflect the course numbering system at Oklahoma State University. The University of Kentucky, where the formula originated from, uses a three-digit course numbering system. At Oklahoma State

University, a four-digit course numbering system is used.. The researcher exchanged a 1000 for the 100 in the formula to account for the difference in course level numbers. The common four point GPA scale was used where A = 4, B = 3, C = 2, D = 1, and F = 0. The result of the formula is interval (Houck, 2008) so means and standard deviations were calculated on the data. Means were calculated to determine the average PICTA for the sample population, and standard deviations were calculated to show the variance of scores from the mean.

Objective Two

Objective two sought to identify scores on each of the six subareas, and one constructed response tested for on the OSAT. The total overall OSAT scores also were calculated. Scores for each subarea are interval in measure. Interval scales have equal units of measurement, but there is not an absolute zero (Glass & Hopkins, 1996). The mean and standard deviation were therefore deemed appropriate to be calculated for the OSAT subarea scores. Students with no OSAT scores on record, or who had failed to take the OSAT were removed from the sample. The scores obtained reflected the highest score recorded for each student, with a majority not having to take the test more than once.

Objective Three

Objective three investigated the relationship between PICTA and OSAT scores. Both the PICTA scores, and the OSAT scores are interval in nature. The Pearson product-moment correlation coefficient was used to analyze correlations because both scores reflected interval scales. The Pearson correlation coefficient is the measure of the strength of a linear association between two variables, showing their correlation. Pearson correlations allow for the comparison of the strength and direction of association between two variables (Glass & Hopkins, 1996). In order for the correlations to be interpreted, Davis' conventions were used (Davis, 1971). Table 1 identifies his breakdown of the correlation coefficient scale, as well as the convention description for each.

Table 1.

Davis' Conventions for Correlation Coefficient

Convention	Correlation Coefficient
Perfect	1.00
Very High	.70- .99
Substantial	.50- .69
Moderate	.30- .49
Low	.10- .29
Negligible	.01- .09
No Correlation	0.00
Negligible	-.01- -.09
Low	-.10- -.29
Moderate	-.30- -.49
Substantial	-.50- -.69
Very High	-.70- -.99
Perfect	-1.00

CHAPTER IV

FINDINGS

Introduction

This chapter is the presentation of results achieved through the objectives of the study. The findings are organized by objective with data presented with tables and narrative discussion.

Findings Related to Objective One

The first objective was to identify and describe the performance in courses of technical agriculture (PICTA) of agricultural education pre-service teachers at Oklahoma State University in the six subareas tested for on the OSAT. This calculation was done for each technical agriculture course for each individual in the sample. A total was then calculated for each of the six subareas and a grand total was then calculated for all of the subareas together. Findings for this objective are displayed in Table 2. These data were categorized by the six subareas tested for on the OSAT. A total score for all areas combined was reported.

Table 2

Performance in courses of technical agriculture of all agricultural subareas; determined by college transcript records of participants by subarea (n = 76)

Subarea	*M*	*SD*	Range
Foundations of Agricultural Education	27.82	12.59	0-72
Animal Science	23.12	11.27	0–48
Agricultural Business, Economics, and Marketing	22.58	11.29	4–48
Environmental Science and Natural Resources	17.67	7.72	0–36
Plant and Soil Science	15.48	12.64	0–64
Agricultural Mechanics	11.64	5.71	0–48
Total	118.30	61.22	0–72

Of the population, 76 of the participants had data available. The content area category with the highest mean score was Foundations of Agricultural Education (*M* = 27.82; *SD* = 12.59) with a range of 0-72. The next highest mean score was Animal Science (*M* = 23.12; *SD* = 11.27) with a range of 0-48. For the Agricultural Business, Economics, and Marketing content area category (*M* = 22.58; *SD* = 11.29) with a range of 4-48. The Environmental Science and Natural Resources content area category was the next highest (*M* = 17.67; *SD* = 7.72) with a range of 0-36. The Plant and Soil Science content area category (*M* = 15.48; *SD* = 12.64) with a range of 0-64. The last content area category, Agricultural Mechanics, was (*M* = 11.64; *SD* = 5.71) with a range of 0-48. The total score for all six categories was (*M* = 118.30; *SD* = 61.22) with a range of 0-72.

Findings Related to Objective Two

Objective 2 sought to identify and describe the agricultural content knowledge of the participants based on the OSAT agriculture scores. A portion of the population (*n = 31)* graduated between 2011 and 2013 but completed the OSAT before the revisions were put into place. To include these individuals in the study, the researcher decided to compare the agricultural content knowledge scores of the individuals who completed the OSAT before the revisions with the scores of the individuals who completed the OSAT after the revisions. The data collected for the pre-revision OSAT scores were reported in Table 3 using means, standard deviations and range scores for the interval data of all seven categories and the overall scores while Table 4 reported the same statistics for the post-revision OSAT scores *(n = 45)*.

Table 3

Agriculture Content Knowledge of Participants by Pre-Revision OSAT Scores (n = 31)

Variable	*M*	*SD*	Range
Agricultural Business, Economics, and Marketing	273.55	18.23	200-295
Animal Science	270.84	12.60	245-294
Environmental Science and Natural Resources	269.55	14.84	236-300
Agricultural Mechanics	269.36	17.90	236-300
Plant and Soil Science	267.97	10.98	236-288
Foundations of Agricultural Education	n/a	n/a	n/a
Constructed Response	n/a	n/a	n/a

Variable	*M*	*SD*	Range
Overall OSAT Score	270.834	8.63	253-285

Table 3 reported the data collected for the pre-revision OSAT scores. The subarea with the highest mean score was Agricultural Business, Economics, and Marketing (*M* = 273.55; *SD* = 18.23) with a range of scores from 200-295. The next highest subarea was Animal Science (*M* = 270.84; *SD* = 12.60) with a range of scores from 245-294. For the Environmental Science and Natural Resources subarea (*M* = 269.55; *SD* = 14.84) with a range of scores from 236-300. The Agricultural Mechanics subarea (*M* = 269.36; *SD* = 17.90) was next with a range of scores from 236-300. The Plant and Soil Science subarea (*M* = 267.97; *SD* = 10.98) was the lowest scoring subarea with a range of scores from 236-288. For 31 participants pre-revision OSAT scores were available (*M* = 270.84; *SD* = 8.63) with a range of scores from 253-285. A 240 was the minimum passing score for the OSAT agriculture exam.

Table 4

Agriculture Content Knowledge of Participants by Post-Revision OSAT Scores (n = 45)

Variable	*M*	*SD*	Range
Animal Science	269.42	15.62	234-300
Foundations of Agricultural Education	263.33	22.49	201-300
Agricultural Business, Economics, and Marketing	262.00	20.67	217-300

Variable	*M*	*SD*	Range
Plant and Soil Science	261.18	13.78	224-291
Environmental Science and Natural Resources	256.62	20.68	216-300
Agricultural Mechanics	256.29	23.71	208-300
Constructed Response	225.44	36.06	152-300
Overall OSAT Score	255.80	9.62	241-286

Table 4 reported the data collected for the post-revision OSAT scores. The subarea with the highest mean score was Animal Science (*M* = 269.42; *SD* = 15.62) with a range of scores from 234-300. The next highest subarea was Foundations of Agricultural Education (*M* = 263.33; *SD* = 22.49) with a range of scores from 201-300. For the Agricultural Business, Economics, and Marketing subarea (*M* = 262.00; *SD* = 20.67) with a range of scores from 217-300. The Plant and Soil Science subarea (*M* = 261.18; *SD* = 13.78) with a range of scores from 224-291. The Environmental Science and Natural Resources subarea (*M* = 256.62; *SD* = 20.68) with a range of scores from 216-300. The next highest subarea was Agricultural Mechanics (*M* = 256.29; *SD* = 23.07) with a range of scores from 208-300. The lowest subarea was Constructed Response (*M* = 225.44; *SD* = 36.06) with a range of scores from 152-300. For 45 participants post-revision overall OSAT scores were available (*M* = 255.80; *SD* = 9.62) with a range of scores from 241-286. A 240 is the current minimum passing score for the OSAT agriculture exam.

Findings Related to Objective Three

Objective 3 focused on identifying the relationships between PICTA and agricultural content knowledge. Pearson product-moment correlations between PICTA in each subarea and OSAT test scores in all subareas were completed to show the relationship between the variables. Table 5-Table 10 show the correlation coefficients and statistical significance between variables.

Table 5

Pearson Product Moment Correlations between PICTA in Agricultural Business, Economics, and Marketing (M-AGEC) and Agricultural Content Knowledge of Participants (n = 76)

	1	2	3	4	5	6	7	8
1. M-AGEC	1.00	-.23*	-.05	-.07	.02	-.15	-.09	-.09
2. AGEC		1.00	-.25*	.25*	-.04	.27*	.22	.45*
3. AGED			1.00	-.29*	-.04	-.31*	-.23*	-.61*
4. AGMECH				1.00	-.13	.30*	.39*	.61*
5. ANSI					1.00	.18	.33*	-.34*
6. ESNR						1.00	.30*	.63*
7. PSS							1.00	.59*
8. TOTAL OSAT								1.00

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS)

* $p < .05$

In Table 5, correlations ranged from negligible to substantial in magnitude (Davis, 1971). The correlation between PICTA in Agricultural Business, Economics, and

Marketing (AGEC) and overall OSAT scores was negative and negligible (r = -.09). The correlation between PICTA in AGEC and the AGEC subarea of the OSAT was negative and low (r = -.23). This relationship was statistically significant at the $p < .05$ level. For the correlation between PICTA in AGEC and Animal Science was positive and negligible (r = .02). This was the only positive correlation between the PICTA in AGEC and another variable. The correlation between AGEC and Plant and Soil Science was negative and negligible (r = -.09). The AGEC and Agricultural Mechanics correlation was negative and negligible (r = -.07). For the relationship between AGEC and Environmental Science and Natural Resources, there was a negative and low correlation (r = -.15). The correlation between AGEC and the Agricultural Education was negative and low (r = -.05).

Although the scope of this objective does not seek to identify the relationships between the subareas on the OSAT, it is important to identify these correlations to properly explain Table 5 in depth, and to show the reliability of the exam.

The correlations between the OSAT and the subareas on the exam were positive except for the AGED subarea, which was negative. All of the relationships were statistically significant at the $p < .05$ level. Two of the relationships were positive and moderate: AGEC (r = .45) and ANSI (r = .34). Three relationships were positive and substantial: PSS (r = .59), AGMECH (r = .61), and ESNR (r = .63). The final relationship, AGED, was negative and substantial (r = -.61).

AGEC was negatively correlated to ANSI and negligible (r = -.04). A positive, low correlation was found between AGEC and the next three variables: PSS (r = .22), AGMECH (r = .25), and ESNR (r = .27). The AGMECH and ESNR relationships were both statistically significant at the $p < .05$ level. The last relationship between AGEC and AGED was negative, low (r = -.25) and statistically significant at the $p < .05$ level. ANSI has a positive, moderate relationship with PSS (r = .33) which was statistically significant at the $p < .05$ level, but a negative, low relationship with AGMECH (r = -.13). A positive, low correlation was found between ANSI and ESNR (r = .18). The correlation between ANSI and AGED was negative and negligible (r = -.04). Two relationships with PSS were positive and moderate: AGMECH (r = .39) and ESNR (r = .30). The relationship between PSS and AGED was negative, and low (r = -.23). All three of the relationships between PSS, AGMECH, ESNR and AGED were statistically significant at the $p < .05$ level. There was a positive, moderate relationship between AGMECH and ESNR (r = .30) which was statistically significant at the $p < .05$ level. The relationship between AGMECH and AGED however, was negative and low (r = -.29) but still statistically significant at the $p < .05$ level. The relationship between ESNR and AGED was negative, moderate (r = -.31), and statistically significant at the $p < .05$ level.

Table 6

Pearson Product Moment Correlations between PICTA in Animal Science (M-ANSI) and Agricultural Content Knowledge of Participants (n = 76)

	1	2	3	4	5	6	7	8
1. M-ANSI	1.00	-.001	-.08	.08	-.01	.04	-.003	.10
2. AGEC		1.00	-.25*	.25*	-.04	.27*	.22	.45*
3. AGED			1.00	-.29*	-.04	-.31*	-.23*	-.61*
4. AGMECH				1.00	-.13	.30*	.39*	.61*

	1	2	3	4	5	6	7	8
5. ANSI					1.00	.18	.33*	-.34*
6. ESNR						1.00	.30*	.63*
7. PSS							1.00	.59*
8. TOTAL OSAT								1.00

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS)

* $p < .05$

In Table 6, there were no statistically significant correlations between PICTA in Animal Science and any of the subareas of the OSAT. All of the correlations were negligible. The correlation between PICTA in Animal Science (ANSI) and overall OSAT scores was positive and low ($r = .1$). The correlation between PICTA in ANSI and the AGEC subarea of the OSAT was negative and negligible ($r = -.001$). For the correlation between PICTA in ANSI and Animal Science was negative and negligible ($r = -.01$). The correlation between ANSI and Plant and Soil Science was negative and negligible ($r = -.003$). The ANSI and Agricultural Mechanics correlation was positive and negligible ($r = .08$). For the relationship between ANSI and Environmental Science and Natural Resources, there was a positive and negligible correlation ($r = .04$). Finally, the correlation between ANSI and Agricultural Education was negative and negligible ($r = -.08$).

Refer to the explanation of Table 5 for descriptions of the remaining relationships between the subareas on the OSAT.

Table 7

Pearson Product Moment Correlations between PICTA in Plant and Soil Science (M-PSS) and Agricultural Content Knowledge of Participants (n = 76)

	1	2	3	4	5	6	7	8
1. M-PSS	1.00	-.12	.05	-.15	.20	.12	.15	.02
2. AGEC		1.00	-.25*	.25*	-.04	.27*	.22	.45*
3. AGED			1.00	-.29*	-.04	-.31*	-.23*	-.61*
4. AGMECH				1.00	-.13	.3*	.39*	.61*
5. ANSI					1.00	.178	.33*	-.34*
6. ESNR						1.00	.30*	.63*
7. PSS							1.00	.59*
8. TOTAL OSAT								1.00

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS)

* $p < .05$

In Table 7, there were no statistically significant correlations between PICTA in Plant and Soil Science and any of the subareas of the OSAT. The correlations ranged from negligible to low in magnitude (Davis, 1971). The correlation between PICTA in Plant and Soil Science (PSS) and overall OSAT scores was positive and negligible (r = .02). The correlation between PICTA in PSS and the AGEC subarea of the OSAT was negative and low (r = -.12). For the correlation between PICTA in PSS and Animal Science was positive and low (r = .20). The correlation between PSS and Plant and Soil Science was positive and low (r = .15). The PSS and Agricultural Mechanics correlation was negative and low (*r* = -.15). For the relationship between PSS and Environmental Science and Natural Resources, there was a positive and low correlation (*r* = .12). The last relationship was between PSS and Agricultural Education was positive and negligible (*r* = .05).

Refer to the explanation of Table 5 for descriptions of the remaining relationships between the subareas on the OSAT.

Table 8

Pearson Product Moment Correlations between PICTA in Agricultural Mechanics (M-AGMECH) and Agricultural Content Knowledge of Participants (n = 76)

	1	2	3	4	5	6	7	8
1. M-AGMECH	1.00	-.15	.15	-.01	.06	.06	.06	-.02
2. AGEC		1.00	-.25*	.25*	-.04	.27*	.22	.45*
3. AGED			1.00	-.29*	-.04	-.31*	-.23*	-.61*
4. AGMECH				1.00	-.13	.30*	.39*	.61*
5. ANSI					1.00	.178	.33*	-.34*
6. ESNR						1.00	.30*	.63*
7. PSS							1.00	.59*
8. TOTAL OSAT								1.00

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS)

* $p < .05$

In Table 8, there were no statistically significant correlations between PICTA in Agricultural Mechanics and any of the subareas of the OSAT. The correlations ranged from negligible to low in magnitude (Davis, 1971). The correlation between PICTA in Agricultural Mechanics (AGMECH) and overall OSAT scores was negative and negligible (*r* = -.02). The correlation between PICTA in AGMECH and the AGEC subarea of the OSAT was negative and low (*r* = -.15). For the correlation between PICTA in AGMECH and Animal Science was positive and negligible (*r* = .06). The correlation between AGMECH and Plant and Soil Science was positive and negligible (*r* = .06). The AGMECH and Agricultural Mechanics correlation was negative and negligible (*r* = -.01). For the relationship between AGMECH and Environmental Science and Natural Resources, there was a positive and negligible correlation (*r* = .06). Finally, the correlation between AGMECH and Agricultural Education was positive and low (*r* = .15).

Refer to the explanation of Table 5 for descriptions of the remaining relationships between the subareas on the OSAT.

Table 9

Pearson Product Moment Correlations between PICTA in Environmental Science and Natural Resources (M-ESNR) and Agricultural Content Knowledge of Participants (n = 76)

	1	2	3	4	5	6	7	8
1. M-ESNR	1.00	.14	-.04	-.06	-.25*	.04	.10	.04
2. AGEC		1.00	-.25*	.25*	-.04	.27*	.29	.45*
3. AGED			1.00	-.29*	-.04	-.31*	-.23*	-.61*

	1	2	3	4	5	6	7	8
4. AGMECH				1.00	-.13	.3*	.39*	.61*
5. ANSI					1.00	.18	.33*	-.34*
6. ESNR						1.00	.30*	.63*
7. PSS							1.00	.59*
8. TOTAL OSAT								1.00

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS)

* $p < .05$

In Table 9, there was only one statistically significant correlation between PICTA in Environmental Science and Natural Resources and any of the subareas of the OSAT. The statistically significant correlation was between Environmental Science and Natural Resources and Animal Science at the $p < .05$ level, was negative and low (r = -25). The correlations ranged from negligible to low in magnitude (Davis, 1971). The correlation between PICTA in Environmental Science and Natural Resources (ESNR) and overall OSAT scores was positive and negligible (r = .04). The correlation between PICTA in ESNR and the AGEC subarea of the OSAT was positive and low (r = .14). For the correlation between ESNR and Plant and Soil Science was positive and low (r = .1). The ESNR and Agricultural Mechanics correlation was positive and negligible (r = .06). For the relationship between ESNR and Environmental Science and Natural Resources, there was a positive and negligible correlation (r = .04). Finally, the correlation between ESNR and Agricultural Education was negative and negligible (r = -.04).

Refer to the explanation of Table 5 for descriptions of the remaining relationships between the subareas on the OSAT.

Table 10

Pearson Product Moment Correlations between PICTA in Foundations of Agricultural Education (M-AGED) and Agricultural Content Knowledge of Participants (n = 76)

	1	2	3	4	5	6	7	8
1. M-AGED	1.00	-.13	.05	.07	.05	.06	.31*	.04
2. AGEC		1.00	-.25*	.25*	-.04	.27*	.22	.45*
3. AGED			1.00	-.29*	-.04	-.31*	-.23*	-.61*
4. AGMECH				1.00	-.13	.30*	.39*	.61*
5. ANSI					1.00	.18	.33*	-.34*
6. ESNR						1.00	.30*	.63*
7. PSS							1.00	.59*
8. TOTAL OSAT								1.00

Note. Agricultural Business, Economics, and Marketing (AGEC), Foundations of Agricultural Education (AGED), Agricultural Mechanics (AGMECH), Animal Science (ANSI), Environmental Science and Natural Resources (ESNR), and Plant and Soil Science (PSS)

* $p < .05$

In Table 10, there was only one statistically significant correlation between PICTA in Agricultural Education and any of the subareas of the OSAT. The statistically significant correlation was between Agricultural Education and Plant and Soil Science at the $p < .05$ level, was positive and moderate ($r = .31$). The correlations ranged from negligible to moderate in magnitude (Davis, 1971). The correlation between PICTA in Agricultural Education (AGED) and overall OSAT scores was positive and negligible (*r*

= .04). The correlation between PICTA in AGED and the Agricultural Business, Economics, and Marketing subarea of the OSAT was negative and low (r = -.13). For the correlation between AGED and Animal Science was positive and negligible (r = .05). The AGED and Agricultural Mechanics correlation was positive and negligible (r = .07). For the relationship between AGED and Environmental Science and Natural Resources, there was a positive and negligible correlation (r = .06). Finally, the correlation between AGED and Agricultural Education was positive and negligible (r = .05).

Refer to the explanation of Table 5 for descriptions of the remaining relationships between the subareas on the OSAT.

CHAPTER V

CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS

This chapter presents highlights of the findings along with the conclusions, implications, and recommendations generated from those findings.

Introduction

According to Houck (2008), there is a necessity for the contribution of studies that focus on increasing the amount of research being done on the subject matter knowledge in agricultural education. A recommendation for future research in the Houck (2008) study was to use "[b]reak out scores from each specific content area of the [OSAT]" (p. 42), and "could be a useful piece of data to obtain. This information would be useful in comparing each individual agricultural content area instead of just the overall [OSAT] score" (pp. 42-42). This study sought to compare each subarea and to further the research base on this subject due to the availability of the individual subarea scores on the OSAT. Houck (2008) also suggested future research at "other colleges across the state of Kentucky and the United States that prepare agricultural educators" (p. 43) and the findings "should be examined to determine if the findings are similar and generalizable" (p. 43). This study fulfilled this need for future research and compared the findings of the Houck (2008) study to see if similarities were present.

Conclusions and Implications Related to Objective One

Variability among agriculture courses taken by agricultural education pre-service teachers was identified. This conclusion aligns with Stripling and Barrick (2013) which posited “today’s agricultural pre-service teachers need a broader understanding of agriculture and career skills” (p. 75). By taking a wide variety of agriculture courses, the pre-service teachers gained a broader understanding of the technical agriculture subjects they have the possibility of teaching. Barrick and Garton (2010) stated that pre-service teachers are expected to acquire teaching skills and knowledge that allows their students to learn and understand the subject matter of agriculture. The American Association for Agricultural Education (2001) established standards suggesting one-third of the teacher preparation coursework should consist of technical content. It was also suggested coursework should be designed for teachers to gain competence in principles, experiential practices, and concepts in agriculture related to: a) business, management, and economic systems; b) agricultural and mechanical systems; c) plant, animal, and food systems; and d) natural resources and environmental systems (American Association for Agricultural Education, 2001). The students in this study completed courses in all of the technical subareas identified by the American Association for Agricultural Education. Of the six subareas, students had the highest preparation in courses of technical agriculture in the Foundations of Agricultural Education subarea. This aligns with the number of courses students are required to take in agricultural education, agricultural communications and agricultural leadership, and the grades required in these courses to graduate. Students had the lowest preparation in courses of technical agriculture in the Agricultural Mechanics subarea. The large variability between subareas of preparation in courses of technical agriculture implies each subarea is not equal in the number of courses or course level required by the curriculum at Oklahoma State University. In addition, students transferring to Oklahoma State University have the opportunity to complete several of the required courses at the junior college level. The variability also indicates the wide variety of courses pre-service teachers are enrolling in to fulfill the requirements. The range of standard deviations among content preparation areas and the total course preparation indicates a wide range of grades in a variety of courses students enrolled in. The range of scores indicates at least one student received an F grade in one class within every single subarea besides Agricultural Business, Economics, and Marketing.

Edwards and Thompson (2010) noted:

> Frequently, the acquisition of technical competence has meant that preservice students complete required coursework that includes introductory or survey courses in the animal sciences, plant and soil sciences, mechanized agriculture (or agricultural systems technology), agricultural economics, and natural resources. In addition, some upperdivision or advanced coursework is required in those or related subject areas…. At some institutions, requirements also involve coursework – introductory and/or advanced – in horticulture, agricultural communications, and agricultural leadership. (pp. 114-116)

The curriculum requirements for agricultural education include at least one course required for each of the subareas mentioned by Edwards and Thompson (2010). Students also have the option of taking 15 credit hours of enrichment courses and five credit hours of electives which could potentially include a wide variety of courses in the same subareas.

The significant amount of courses taken in the professional core area implies students took more courses within this area, received better grades in these courses, or a combination of both. The curriculum supports the implication students were enrolled in more agricultural education related courses because the curriculum requires six courses in the professional core, three courses in the related courses section, along with the option of taking enrichment hours in agricultural education, agricultural communications, or agricultural leadership. The number of courses required in the foundations of agricultural education subarea suggests the subarea is deemed more important than the other subareas, moreover the technical subareas are more important than the general education requirements required by the university. McCracken (1982) believed technical agricultural knowledge preparation should have "priority over general education… in the allocation of credit-hours in the curriculum of the prospective teacher" (p. 133). The curriculum requirements at Oklahoma State University are supported by McCracken's beliefs in that general education requirements are less than the technical agricultural requirements which is less than the professional core courses.

A logical explanation for the knowledge base of students in the program could be due to the fact a number of students transfer to Oklahoma State University after being enrolled at a community or junior college. These students may experience different expectations regarding skill acquisition. This study does not control for previous experiences and knowledge therefore the explanation is speculation. A teacher's subject matter knowledge can come from a range of sources besides their coursework (Floden &

Meniketti, 2005). Students may have prior experiences with livestock evaluation teams at a community or junior college, from their home operations, or from high school experiences. The possibility of these experiences allows for some explanation of the variance in scores across the academic background of students.

Just as the high preparation in courses of technical agriculture indicate a higher number of required courses, or the possibility of prior experiences, the low preparation in courses of technical agriculture indicate a number of possibilities. For example, the lower preparation in courses of technical agriculture could be a result of the small number of courses required in plant and soil science and environmental science and natural resources. However, in the agricultural mechanics subarea, students are required to enroll in at least four agricultural mechanics related courses, and have the option to take more through the enrichment course requirements. This implies students may not be performing well in courses related to agricultural mechanics. The expectancy-value theory "implies that the relative frequency of success and failure following previous performance in similar activities determines the present strength of expectancies of success and failure at a particular task" (Atkinson, 1964, p. 258). Students have the option of dropping courses throughout the semester, or retaking courses when needed. Dropped courses were not factored into the data, while courses students chose to retake were considered. If a student continuously failed a course, this would, per the expectancy-value theory, determine the strength of expectancy of failure or success in the current course. This could explain why the mean for the agricultural mechanics subarea was over 15 points lower than the foundations of agricultural education subarea mean.

Conclusions and Implications Related to Objective Two

Due to the nature of students having the personal responsibility of taking the OSAT exam on their own time, there was overlap in when individuals chose to complete the exam. Thirty-one of the individuals in the population completed the OSAT before the revisions were put into place, while 45 completed the OSAT after the revisions were included on the exam. In order to include these individuals in the study, a comparison of the preparation in courses of technical knowledge of those who completed the OSAT before the revisions with the scores of those who completed the OSAT after revisions was computed. The OSAT scores of pre-service agricultural education students at Oklahoma State University who completed the exam before the revisions were included on the OSAT had higher overall scores than those who completed the exam after the revisions were included. The mean scores differed by over 15 points. Each of the exam's subarea scores were higher than the minimum score required for passing the OSAT as a whole. Students who completed the exam before the revisions were included performed best in the Agricultural Business, Economics, and Marketing subarea, and reported the lowest performance in the Plant and Soil Science subarea. This implies students met the knowledge level necessary to pass the OSAT, and were well prepared through their coursework. Besides preparation through coursework, the high mean scores for all of the subareas can be credited to incentives related to the expectancy-value theory. Achievement, the persistence, choice, and performance of students (Eccles et al., 1983), and expectancy beliefs could have driven students to perform better on the OSAT in order to achieve certification and a baccalaureate degree.

The OSAT scores of pre-service agricultural education students at Oklahoma State University who completed the exam after the revisions were included on the OSAT had lower scores in each subarea when compared to students who completed the exam before the revisions were included. The revisions included the addition of the foundations of agricultural education subarea, and a constructed response section, which reflects concepts from the foundations of agricultural education subarea. Individual tests questions may have been exchanged for more challenging questions through this revision process. The constructed response mean was the only subarea score below the minimum passing score. The questions for the constructed response section are based on the foundations of agricultural education subarea, so the preparation in courses of technical agriculture in this subarea was not identifiable. According to the CEOE Study Guide Introduction (N.D.), the constructed response section is evaluated based on purpose, subject matter knowledge, support and rationale. While the section is intended to assess a student's subject matter knowledge, the question remains how qualified the individuals who score the exams are to assess the subject matter knowledge of the student. How can a student's writing ability not be assessed in a constructed response section (CEOE Study Guide Introduction, N.D.), when an inability to write would cause a reader to be unable to read the content related to the subject matter knowledge? The six subareas were all above the minimum passing score with animal science being the highest OSAT score mean, and having the lowest mean OSAT scores on the Agricultural Mechanics question.

The Animal Science and Agricultural Business, Economics, and Marketing subareas had the highest mean scores in both the pre and post-revision participant scores. The only difference was the Agricultural Business, Economics, and Marketing mean score was higher for the pre-revision OSAT scores, while the Animal Science mean score was higher for the post-revision OSAT scores. Plant and Soil Science was the lowest subarea for the pre-revision OSAT scores, while Agricultural Mechanics was the lowest subarea for the post-revision OSAT scores. No departmental curriculum requirement changes occurred during the years the pre-service students attended Oklahoma State University. The mean scores being above the minimum passing level implies most students met the knowledge level necessary to pass the OSAT, and were well prepared through their coursework. The same concept of achievement and expectancy beliefs described at the end of objective 1 can be applied to the pre-service agricultural education students who completed the OSAT after the revisions were included; the goal being for those students to achieve certification and receiving a baccalaureate degree.

Conclusions and Implications Related to Objective Three

The relationships between the OSAT exam scores and the preparation in courses of technical agriculture related to the six subareas were low to moderate at best. It is important to consider the lack of relationships when discussing the implications for each subarea. The data show no real relationships between preparation in courses of technical agriculture related to the six subareas and any of the subareas tested for on the OSAT. The lack of relationships could indicate the need for the concepts tested for in the six subareas to be evaluated for accuracy. A misalignment in the curriculum being taught to pre-service teachers and the curriculum being tested for on the OSAT could be possible.

The curriculum only requires a minimal number of courses in all of the subareas besides the foundations of agricultural education subarea, which could account for the lack of relationships. Students have the opportunity to pick and choose courses that interest them, which aligns with Floden and Meniketti (2005) who state how an inadequate amount and type of subject matter courses are included in teacher preparation. An examination of the types of courses students are enrolling in related to the six subareas could provide insights into why the relationships were essentially non-existent. The only statistically significant ($p < .5$) relationship with a moderate relationship in magnitude was between preparation in courses of technical agriculture in the foundations of agricultural education subarea and the plant and soil science subarea. The moderate relationship can imply, to a certain extent, as preparation in courses of technical agriculture in the foundations of agricultural education subarea increases, the scores in the plant and soil science subarea increases as well. This relationship could be due to curriculum related to the plant and soil science subarea being implemented and taught in various course related to the foundations of agricultural education subarea.

Major Conclusions

There are five major conclusions from the three objectives researched in this study:

1. Pre-service agricultural education teachers take a wide variety of courses related to technical agriculture.

2. At least one pre-service agricultural education teacher received an "F" grade in one course in every subarea besides the agricultural business, economics, and marketing subarea.

3. Students who completed the OSAT exam before revisions were included had higher overall scores than those who completed the OSAT exam after revisions were included.

4. Students met the knowledge level necessary to pass the OSAT, and were well prepared through their coursework.

5. The relationships found between the PICTA subareas and the OSAT subarea scores were negligible, to low at best, excluding a relationship between PICTA related to the foundations of agricultural education subarea and the plant and soil science subarea.

Recommendations

Recommendations for Future Research

This study should be replicated at teacher preparation programs across the state of Oklahoma and the U.S. which have agricultural education teacher preparation programs; especially in mid-western states that border Oklahoma (Arkansas, Colorado, Kansas, New Mexico, Missouri, and Texas). Houck (2008) reported the need to use the break out scores from certification exams for a more complete picture to be discovered. By replicating this study across schools in the state of Oklahoma, the curriculum and needs of pre-service agricultural education students can be addressed from a state-wide level, and not just for each individual teacher preparation program.

Another beneficial recommendation includes the examination of potential differences between current high school curriculum in the state of Oklahoma, the curriculum pre-service agricultural education students are required to take at Oklahoma State University, and the courses pre-service agricultural education students choose to take. These differences should be identified to address gaps in knowledge, or lack of value set on certain competencies at different levels. One potential gap could be seen in the environmental sciences and natural resources subarea. The number of classes taken by pre-service agricultural education students in environmental sciences and natural resources is drastically different than courses taken in other subareas. Since Oklahoma is a state with a prominent natural resources and energy production, there is a need for students entering the agricultural industry to be knowledgeable in this field. Teachers of these students should also have subject-matter knowledge related to this industry. If a gap between high school curriculum, required curriculum at Oklahoma State University, and courses being taken by pre-service agricultural education students is apparent, an evaluation of the ways curriculum is chosen is warranted.

To address the low mean scores seen in each content area category, a provisional admission program should be implemented for incoming pre-service agricultural education students. The provisional admission program is explained further in the recommendations for future research section. A study should be done comparing grades of transfer students from either their community or junior college coursework, and at Oklahoma State University. This type of study could assist in the fluid transfer of students to Oklahoma State University, and could better prepare students for the rigorous coursework being required.

Related to the OSAT, research should be conducted examining roles of prior knowledge in agricultural subareas and their effect on OSAT scores. The role of agricultural experiences and their effect on OSAT scores should be examined as well. The scope of this study did not take into account either of these variables, but future studies should identify the roles these variables have in the development of a pre-service agricultural education teacher. Research should also be conducted to identify why OSAT scores have low or negligible relationships with preparation in courses of technical agriculture in certain subareas, and why many of the relationships are negative.

The final recommendation is for the results of this study to be shared with the department heads and faculty in agricultural education teacher preparation programs at Oklahoma State University system schools, and junior colleges in the state of Oklahoma. The results should also be shared with individuals in charge of revising the OSAT, and with high school agricultural education teachers. The results should also be shared with deans of colleges of agriculture throughout the state of Oklahoma to ensure future pre-service agricultural education teachers have the best opportunities for success.

Recommendations for Future Practice

Department heads and faculty tasked with training pre-service agricultural education students should work together with department heads and faculty in the various disciplines within colleges of agriculture to identify courses where students would benefit from having a separate section dedicated to pre-service agricultural education students. At Oklahoma State University this has already happened through the creation of the Animal Science 3703 course which focuses on animal management techniques. This course was taught with two lab sections, including a lab portion specifically focused on pre-service agricultural education students. If the Agricultural Education faculty had not proposed the separate section to help students learn direct transferability of concepts in the class to the classroom, the Animal Science faculty may have never identified the need for separate labs.

Animal Science is not the only department working with the Agricultural Education teacher preparation program. Many of the required Mechanized Agriculture courses for pre-service agricultural education students have portions of the curriculum allow students to focus on the practicality of the concepts and how they will be used in the high school classroom. Brover, Deagan, and Farina (2001) believed that if teachers do not have the subject-matter or content knowledge necessary to make quality curriculum for students, then universities should consider modeling teacher preparation from other countries which present lessons with enough depth of material to challenge students. Through the use of separate sections, and potentially separate requirements within courses, the need to remodel teacher preparation programs will be unnecessary because students will have the opportunities to learn the skills. It is recommended Agricultural Education faculty reach out to other departments which teach a high number of pre-service agricultural education students and see if opportunities exist to create separate sections for these students, and to implement curriculum creation requirements into the coursework itself.

Another recommendation is for colleges of agriculture and Agricultural Education departments to consider increasing the number of courses required in certain competencies. The increase in courses should be identified through an evaluation of the existing course requirements as well as the identification of OSAT competencies in which students are not succeeding. By evaluating the existing course requirements, and the aggregate grade data from these courses, recommendations can be made whether courses should remain required, or if other courses would serve students needs better. If a substantial number of students are experiencing problems passing one course, providing another course with like content or identifying the problems students are having may help to increase subject-matter knowledge. Darling-Hammond (1998) stated teachers need to know their subject matter deeply in order to address problems, relate ideas, and connect material to the real world.

Stakeholders in agricultural education should also focus on the accuracy of the content assessed on the OSAT as compared to content being taught in high school agricultural education programs. Teacher educators responsible for teacher preparation programs should have a say in the content being included on the OSAT, and where this content is found. Changes should be considered to either the OSAT or to the agricultural education curriculum to ensure students are prepared with the appropriate content to teach in the classroom, and laboratory components of agricultural education. If subareas have low effects on the OSAT scores, then why are these subareas emphasized so strongly in the curriculum? According to this study, the OSAT is an indicator of a student's agricultural content knowledge, but the values put on certain subareas at Oklahoma State University may not be equal to that of the value put on subareas tested for on the OSAT. The high passing rate of students taking the OSAT may lead stakeholders to decide against changing the curriculum.

An evaluation of pre-existing knowledge of incoming pre-service agricultural education students could prove useful when advising courses in which to enroll. Irving, et al., (1999) stated improving teachers' content knowledge should be made a priority in national education in the United States. This evaluation would be useful by identifying courses students took in high school agricultural education programs, along with courses students may have taken while at a community/junior college. The analysis would also encompass FFA and SAE experiences for a well-rounded composite of the student's background. This recommendation would begin the path to solving the university-wide problem on the best way to prepare future teachers on how to best teach their subject (Cruickshank, 1996). Consequentially, better prepared teachers are twice as likely to stay in the profession (Gardner, 2006).

To address the low mean scores seen in each subarea, a provisional admission program should be implemented for incoming pre-service agricultural education students. A provisional admission program would help transition students into the agricultural education program, and would give faculty a predictor to future success in agricultural education. Findings by Kulik, Kulik, and Shwalb (1983) identified "individuals would fail less often than their peers in conventional programs. Their college records might become a source of pride instead of a point of embarrassment" (p. 408). The expectancy-value theory supports the pride vs embarrassment statement regarding college records because it implies that the frequency of success or failure follows previous performance in similar activities, and determines the strength of expectancies of success and failure (Atkinson, 1964). The analysis of 60 studies suggested raised student GPAs by .25 to .4 standard deviations…. about .25 points higher (on a 4-point scale)" (Kulik, Kulik, & Shwalb, 1983, p. 408). Although over 70% of students who transfer from community colleges eventually earn bachelor's degrees (Boswell, 2004), the low mean scores present in this study indicate both transfer and traditional students are facing problems in the classroom.

Major Contributions of the Study

Contributions to Literature

The findings of this study address the need set forth by Houck (2008) to replicate the study by using "[b]reak out scores from each specific content area of the [OSAT]" (p. 42), and "could be a useful piece of data to obtain. This information would be useful in comparing each individual agricultural content area instead of just the overall [OSAT] score" (pp. 42-43). It can be generalized for our population that pre-service agricultural education teachers at Oklahoma State University are knowledgeable in technical agriculture subareas, and take a wide variety of courses to assist in this knowledge. These individuals are also well prepared for the OSAT exam, and on average pass the OSAT with high subarea scores. This study can help further the literature base related to educating and preparing pre-service teachers for the classroom. It can also further the literature base in research related to certification exams and the effect university preparation has on the outcomes of the exams.

Contributions to Theory

In the case of this study, the theory-base was not completely upheld. The lack of relationships showed students may not have a drive to do better in their coursework, and their coursework has no effect on the success they have on the OSAT exam. Parts of the expectancy-value theory related to incentives to succeed such as achieving certification and graduating with a degree from Oklahoma State University seemed to be valid incentives for the sample to try their hardest and pass the OSAT when coursework proved difficult.

Contributions to Practice

The findings of this study show the need for teacher preparation programs to focus on how students are advised, specifically students who transfer into agricultural education programs. Prior knowledge of these students, and students who enter programs as freshmen should be collected to identify knowledge gaps already existent. Those in charge of teacher preparation programs should work closely with other department heads and faculty of courses pre-service agricultural education teachers are enrolling in to identify better methods of preparing these students for the classroom. Successful discussions have been seen at Oklahoma State University, and can be implemented in other subareas at Oklahoma State University and in other universities across the country to increase the transferability of knowledge students are learning. The final contribution to practice is for department heads, faculty, and other stakeholders to address the curriculum being tested for on certification exams. Even though pre-service agricultural education teachers have a high passing rate on the OSAT, the misalignment of content is an issue that can be easily fixed. The engagement of high school agricultural education teachers, developers of the OSAT, and individuals in charge of teacher preparation programs across the state of Oklahoma can lead to a better informed group of individuals working towards the same goal of preparing pre-service agricultural teachers to be better teachers.

Discussion

As the researcher in this study, a few questions related to the conclusions are surprising. The most surprising have to deal with my beliefs on teacher preparation, and the certification process. Having minimal agricultural experience before entering my undergraduate institution, I strived to learn as much as possible so I could be competent in the technical agriculture subareas. This continued through my student teaching experience, the certification process I went through in the state of Texas, and the time in my master's degree. I question the validity of the entire certification process, how certification exams are created and what content they are based on. The findings of this study show me the lack of relationship between curriculum being taught at the university level, and the curriculum expected to be taught at the secondary level. If these curriculums do not match up, where are agricultural education teachers filling in the knowledge gaps? Why are certification exams and required curriculum at the university level not based off of each other? There is no rhyme to being tested over content you are not expected to teach until you reach the classroom. An inherent flaw exists between these two curriculums. In order for our profession to see continued success, this flaw needs to be addressed by stakeholders at every level, from the high schools, to the universities, and at the state and national level. Creators of certification exams need to identify the correct stakeholders in the teacher preparation process. Not to make the certification exams any easier, but to successfully connect the curriculums, and increase the success of our agricultural education teachers in Oklahoma, and across the U.S.

REFERENCES

Allen, M. (2000). Teacher preparation and inclusion. *Progress of Education Reform, 2*(3), 1-6. Retrieved from: http://www.ecs.org/html/educationIssues/ProgressofReform.asp

American Association for Agricultural Education. (2001). *National standards for teacher education in agriculture.* Retrieved from http://aaaeonline.org/files/ncatestds.pdf

Anderson, R. D., & Mitchener, C. P. (1994). Research on science teacher education. *Handbook of research on science teaching and learning*, 3-44.

Angus, D. L. (2001). *Professionalism and the public good: A brief history of teacher certification.* Washington, DC: The Fordham Foundation.

Atkinson, J. W. (1957). Motivational determinants of risk-taking behavior. *Psychological Review, 64*(6), 359-372. doi: 10.1037/h0043445

Atkinson, J. W. (1964). *An Introduction to Motivation*. Princeton, NJ: D. Van Nostrand Company, Inc.

Atkins, J. W., & Feather, N. T. (1966). *A Theory of Achievement Motivation.* New York, NY: John Wiley & Sons, Inc.

Ball, D. L. (1990). Prospective elementary and secondary teachers' understanding of division. *Journal of Research in Mathematics Education,* 21(2), 132-144. doi: 10.2307/749140

Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching what makes it special?. *Journal of Teacher Education, 59*(5), 389-407. doi: 10.1177/0022487108324554

Barrick, R. K., & Garton, B. L. (2010). Frameworks for agricultural teacher preparation. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds.), *Preparing and advancing teachers in agricultural education* (pp. 30-41). Columbus, OH: Curriculum Materials Service, The Ohio State University.

Baturo, A., & Nason, R. (1996) Student teachers' subject matter knowledge within the domain of area measurement. *Educational Studies in Mathematics, 31*(3), 235-268. Retrieved from http://www.jstor.org/stable/3482719

Boesel, D., Hudson, L., Deich, S., & Masten, C. (1994). Participation in and quality of vocational education. In *National Assessment of Vocational Education Final Report to Congress,* Volume II. Washington, D. C. Office of Educational Research and Improvement, U. S. Department of Education.

Bong, M. (2001). Role of self-efficacy and task-value in predicting college students' course performance and future enrollment intentions. *Contemporary Educational Psychology, 26*(4), 553-570. doi: http://dx.doi.org/10.1006/ceps.2000.1048

Borders, A., Earleywine, M., & Huey, S. J. (2004). Predicting problem behaviors with multiple expectancies: expanding expectancy-value theory. *Adolescence, 39*(155). 539-550.

Retrieved from http://web.b.ebscohost.com/ehost/pdfviewer/pdfviewer?sid=7181a780-e830-40a9-a1bc-77d92c9636a2%40sessionmgr115&vid=2&hid=124

Borko, H., Eisenhart, M., Brown, C. A., Underhill, R. G., Jones, D., & Agard, P. C. (1992). Learning to teach hard mathematics: Do novice teachers and their instructors give up too easily? *Journal for Research in Mathematics Education, 23*(3), 194-222. doi: 10.2307/749118

Boswell, K. (2004). Bridges or barriers?: Public policy and the community college transfer function. *Change: The Magazine of Higher Learning, 36*(6), 22-29. doi: 10.1080/00091380409604240

Broudy, H. S. (1972). *The Real World of the Public School.* New York, NY: Harcourt Brace Jovanovich.

Brover, C., Deagan, D., & Farina, S. (2001). Why understanding 1-3/4 divided by ½ matters to math reform. In *Proceedings of the Annual Adult Learning Mathematics Conference, 8*, 247-251

CareerTech OCAS Subject Codes. (2013). 1-31. Retrieved from http://www.okcareertech.org/educators/ocas-codes/2013-14-careertech-ocas-subject-codes

Certification Examinations for Oklahoma Educators Passing Requirements. (2014). Retrieved from http://www.ceoe.nesinc.com/CE16_passingrequirements.asp

Certification Examinations for Oklahoma Educators Faculty Guide. (2012). Retrieved from http://www.ceoe.nesinc.com/PDFs/CEOE_Faculty_Guide.pdf

Certification Examinations for Oklahoma Educators Oklahoma General Education Test Study Guide. (2007). Retrieved from http://www.ceoe.nesinc.com/PDFs/OGET_074_SG.pdf

Certification Examinations for Oklahoma Educators Oklahoma Professional Teaching Examination Study Guide. (2007). Retrieved from: http://www.ceoe.nesinc.com/PDFs/OPTE_075_SG.pdf

Certification Examinations for Oklahoma Educators Oklahoma Subject Area Tests Study Guide. (2011). Retrieved from http://www.ceoe.nesinc.com/PDFs/OK_042_SG.pdf

Certification Examinations for Oklahoma Educators Program Overview. (2014). Retrieved from http://www.ceoe.nesinc.com/CE16_overview.asp

Certification Examinations for Oklahoma Educators Score Report. (2008). Retrieved from http://www.ceoe.nesinc.com/PDFs/CE_ISR.pdf

Certification Examinations for Oklahoma Educators study guide introduction. (N.D.). Retrieved from http://www.ceoe.nesinc.com/PDFs/CEOE_generic_SG_frontmatter.pdf

Cochran, K. F., & Jones, L. L. (1998). The subject matter knowledge of preservice science teachers. In *International Handbook of Science Education*. 707-718. Great Britain: Kluwer Academic Publishers.

College of Agricultural Sciences and Natural Resources Agricultural Education Teaching option requirements. (2013). Retrieved from http://registrar.okstate.edu/images/DRS2013-2014/CASNR/ag19-aged-tchg.pdf

Commission for Teacher Preparation. (2014). Retrieved from http://www.ok.gov/octp/About_OCTP/index.html

Cruickshank, D. R. (1996). *Preparing America's Teachers.* Bloomington, IN: Phi Delta Kappa Educational Foundation.

Dailey, A.L., Conroy, C.A., and Shelley-Tolbert, C.A. (2001). Using agricultural education as the context to teach life skills. *Journal of Agricultural Education*, *42*(1), 11-20. doi: 10.5032/jae.2001.01011

Darling-Hammond, L. (1998). Teachers and teaching: Testing policy hypotheses from a national commission report. *Educational Researcher, 27*(1), 5-15. Retrieved from http://www.jstor.org/stable/1176922

Darling-Hammond, L. (2000). How teacher education matters. *Journal of Teacher Education, 51*(3), 166-173. doi: 10.1177/0022487100051003002

Darling-Hammond, L., Chung, R., & Frelow, F. (2002). Variation in teacher preparation how well do different pathways prepare teachers to teach. *Journal of Teacher Education, 53*(4), 286-302. doi: 10.1177/0022487102053004002

Davis, J. A. (1971). *Elementary survey analysis.* Englewood, NJ: Prentice-Hall.

Dickhäuser, O., & Stiensmeier-Pelster, J. (2003). Gender differences in the choice of computer courses: Applying an expectancy-value model. *Social Psychology of Education, 6*(3), 173-189. doi: 10.1023/A:1024735227657

Dyer, J. E., Breja, L. M., & Wittler, P. S. H. (2002). Predictors of student retention in colleges of agriculture. (Report No. SE065591), 3-13. Retrieved from http://files.eric.ed.gov/fulltext/ED462290.pdf

Eccles, J., Adler, T. F., Futterman, R., Goff, S. B., Kaczala, C. M., Meece, J., and Midgley, C. (1983). Expectancies, values and academic behaviors. In Spence, J. T. (Ed.). (1983). *Achievement and achievement motives: Psychological and sociological approaches*. WH Freeman

Eccles, J. & Wigfield, A. (2002). The development of competence beliefs, expectancies for success, and achievement values from childhood through adolescence. *Development of Achievement Motivation,* 91-120. San Diego, CA: Academic Press.

Eccles, J. & Wigfield, A. (1995). In the mind of the actor: The structure of adolescents' achievement task values and expectancy-related beliefs. *Personality and Social Psychology Bulletin, 3*(21), 215-225. doi: 10.1177/0146167295213003

Educational Testing Service. (2014). The Praxis Series. Retrieved from: http://www.ets.org

Edwards, M. C. (2008). Annual report on assessment of agricultural education student learning outcomes.

Edwards, M. C. (2009). Annual report on assessment of agricultural education student learning outcomes.

Edwards, M. C. (2010). Annual report on assessment of agricultural education student learning outcomes.

Edwards, M. C. (2011). Annual report on assessment of agricultural education student learning outcomes.

Edwards, M. C., & Thompson, G. (2010). Designing technical agriculture curriculum. In R. M. Torres, T. Kitchel, & A. L. Ball (Eds). *Advancing and preparing teachers in agricultural education.* Columbus, OH: Curriculum Materials Services.

Esters, L. T., & Bowen, B. E. (2004). Factors influencing enrollment in an urban agriculture education program. *Journal of Career and Technical Education, 21*(1), 25–37. Retrieved from http://scholar.lib.vt.edu/ejournals/JCTE/v21n1/esters.html

Evaluation Systems group of Pearson. (2014). Retrieved from http://www.pearsonvue.com/espilot/

Even, R. (1993). Subject-matter knowledge and pedagogical content knowledge: Prospective secondary teachers and the function concept. *Journal of Research in Mathematics Education, 24*(2), 94-116. doi: 10.2307/749215

Feather, N. T. (1992). Values, valences, expectations, and actions. *Journal of Social Issues, 48*(2), 109-124. doi: 10.1111/j.1540-4560.1992.tb00887.x

Feather, N. T., & O'Brien, G. E. (1987). Looking for employment: An expectancy-valence analysis of job-seeking behavior among young people. *British Journal of Psychology, 78*(2), 251-272. doi: 10.1111/j.2044-8295.1987.tb02244.x

Fletcher, Jr, E. C. (2006). No curriculum left behind: The effects of the No Child Left Behind legislation on career and technical education. *Career and Technical Education Research, 31*(3), 157-174. doi: 10.5328/CTER31.3.157

Floden, R., & Meniketti, M. (2005) Research on the effects of coursework in the arts and sciences and in the foundations of education. In M. Cochran-Smith & K. M. Zeichner

(Eds.), *Studying Teacher Education: The Report of the AERA Panel on Research and Teacher Education,* 261-308. Mahwah, NJ: Erlbaum

Frick, M. J., Kahler, A. A., & Miller, W. W. (1991). A definition and the concepts of agricultural literacy. *Journal of Agricultural Education, 32*(2), 49-57. doi: 10.5032/jae.1991.02049

Gardner, S. (2006). Producing well-prepared teachers. *Educational Digest, 71*(6), 42-46. Retrieved from http://search.proquest.com/docview/218192020?accountid=4117

Glass, G. V., & Hopkins, K. D. (1996) *Statistical methods in education and psychology.* (3rd ed.). Needham Heights, MA: Allyn & Bacon.

Graeber, A. O., Tirosh, D., & Glover, R. (1989). Preservice teachers' misconceptions in solving verbal problems in multiplication and division. *Journal of Research in Mathematics Education, 20*(1), 95-102. doi: 10.2307/749100

Graham, J. C., & Garton, B. L. (2001, Dec.). *The use of teacher certification measures in predicting secondary agriculture instructors' teaching performance.* Paper presented at the 28th Annual National Agricultural Education Research Conference, New Orleans, LA. 132-143. Retrieved from: http://aged.caf.wvu.edu/Research/NAERC-2001/grahamj.pdf

Harty, H., Samuel, J. V., & Andersen, H. O. (1991). Understanding the nature of science and attitudes toward science and science teaching of preservice elementary teachers in three preparation sequences. *Journal of Elementary Science Education*, *3*(1), 13-22. doi: 10.1007/BF03173034

Hashweh, M. Z. (1987). Effects of subject matter knowledge in the teaching of biology and physics. *Teaching and Teacher Education, 3*(2), 109-120. doi: http://dx.doi.org/10.1016/0742-051X(87)90012-6

Heafner, T. (2004). Using technology to motivate students to learn social studies. *Contemporary Issues in Technology and Teacher Education,* 4(1), 42-53. Retrieved from: http://www.editlib.org/p/21905

Henning, M. B., & King, K. P. (2005). Implementing STS curriculum: From university course to elementary classrooms. *Bulletin of Science Technology and Society, 25*(3), 254-259. doi: 10.1177/0270467605276106

Houck, A. (2008). Content preparation of pre-service agricultural education teachers and its influence on their content knowledge (Master's Thesis). Retrieved from http://uknowledge.uky.edu/gradschool_theses/547

Irving, M. M., Dickson Jr, L. A., & Keyser, J. (1999). Retraining public secondary science teachers by upgrading their content knowledge and pedagogical skills. *Journal of Negro Education, 68*(3), 409-418. Retrieved from http://www.jstor.org/stable/2668111

Jayaraj, S. (1992). Agricultural education: The need for generalists. *Agricultural Systems*, *40*(1), 177-193. doi: http://dx.doi.org/10.1016/0308-521X(92)90020-O

Jones, W. A. (1999). *Factors Influencing Career Choice of African American and Hispanic Graduates of the College of Agriculture and Life Sciences at Texas A&M University* (Doctoral dissertation, Texas A&M University).

Kennedy, M. M. (1998). Education reform and subject matter knowledge. *Journal of Research in Science Teaching,* 35(3), 249-263. doi: 10.1002/(SICI)1098-2736(199803)35:3<249::AID-TEA2>3.0.CO;2-R

Kerlinger, F. N. (2011). Foundations of behavioral research, 1986. *New York, NY:* Holt, Rinehart, and Winston.

Kovar, K. A., Ball, A. L. (2013). Two decades of agricultural literacy research: A synthesis of the literature. *Journal of Agricultural Education. 54*(1), 167-178. doi: 10.5032/jae.2013.01167

Kulik, C. L. C., Kulik, J. A., & Shwalb, B. J. (1983). College programs for high-risk and disadvantaged students: A meta-analysis of findings. *Review of Educational Research, 53*(3), 397-414. doi: 10.3102/00346543053003397

Leising, J. G., Igo, C. G., Heald, A., Hubert, D., & Yamamoto, J. (1998). A guide to food and fiber systems literacy: A compendium of standards, benchmarks, and instructional materials for grades K-12. *WK Kellogg Foundation & Oklahoma State University, Stillwater.*

Leinhardt, G., & Smith, D. A. (1985) Expertise in mathematics instruction: Subject matter knowledge. *Journal of Educational Psychology, 77*(3), 247-271. doi: 10.1037/0022-0663.77.3.247

Lerwick, L. P. (1979). *Alternative concepts of vocational education*. Minneapolis: University of Minnesota. Minnesota Research and Development Center.

Lieblein, G., Francis, C., & King, J. (1999). Conceptual framework for structuring future agricultural colleges and universities in industrial countries. *The Journal for Agricultural Education and Extension, 6*(4), 213-222, doi: 10.1080/13892240085300041

Lynch, R. L. (1997). Designing Vocational and Technical Teacher Education for the 21st Century: Implications from the Reform Literature. Information Series No. 368. 1-90.

Lynch, R. L. (2000). New Directions for High School Career and Technical Education in the 21st Century. Information Series No. 384. 9-12

Lucas, M. S. (1993). Personal, social, academic, and career problems expressed by minority college students. *Journal of Multicultural Counseling and Development, 21*(1), 2-13. doi: 10.1002/j.2161-1912.1993.tb00578.x

Mayer, A., Mayer, J. (1974). Agriculture, the island empire. *Daedalus. 103*(3). 83-95. Retrieved from http://www.jstor.org/stable/20024221

McCracken, J. D. (1982). The curriculum: Agricultural subject matter and occupational experience. In A. L. Berkey (ed.). *Teacher education in agriculture* (pp. 119-134). Danville, IL: Interstate Printers & Publishers.

McDiarmid, G. W., & Wilson, S. M. (1991). An exploration of the subject matter knowledge of alternate route teachers: Can we assume they know their subjects? *Journal of Teacher Education, 42,* 93-103. doi: 10.1177/002248719104200203

Monk, D. H. (1994). Subject area preparation of secondary mathematics and science teachers and student achievement. *Economics of Education Review, 13,* 125-145. doi: http://dx.doi.org/10.1016/0272-7757(94)90003-5

Myers, B. E., & Dyer, J. E. (2004). Agriculture teacher education programs: a synthesis of the literature. *Journal of Agricultural Education, 45*(3), 44-52. doi: 10.5032/jae.2004.03044

National Board for Professional Teaching Standards. (1996). *Vocational Education: Draft Standards for National Board Certification* ("Draft" ed.) Washington, D. C.: Author.

National Research Council. (1988). *Understanding Agriculture New Directions for Education.* Washington, D.C.: National Academy Press.

Newcomb, L. H., McCracken, J. D., Warmbrod, J. R., & Whittington, M. S. (2004). *Methods of Teaching Agriculture* (3rd ed.). Upper Saddle River, N.J.: Pearson/Prentice Hall.

Newman, I., Benz, C. R., Weis, D., & McNeil, K., (1997). *Theses and dissertations: A guide to writing in the social and physical sciences.* Lanham, MD: University Press of America.

Newman, I., & Newman, C. (1994). *Conceptual statistics for beginners* (2nd ed.). University Press of America.

Oklahoma Commission for Teacher Preparation. (2014). Retrieved from http://www.ok.gov/octp/About_OCTP/

Oklahoma Department of Career & Technology Education CareerTech OCAS Subject Codes (2013). 1-31. Retrieved from http://www.okcareertech.org/educators/ocas-codes/2013-14-careertech-ocas-subject-codes

Oklahoma State System for Higher Education Annual Student Assessment Report. (2012). Retrieved from https://www.okhighered.org/studies-reports/annual-report2012.pdf

Oklahoma State System for Higher Education Annual Student Assessment Report. (2013). Retrieved from https://www.okhighered.org/studies-reports/assessment/2013-student-assess.pdf

Oklahoma State University (2013). *2013-2014 University Catalog*. Retrieved from http://registrar.okstate.edu/images/2013Catalog/2013-2014_catalog-final.pdf

Oliver, J. D., & Hinkle, D. E. (1982). Occupational education research: Selecting statistical procedures. *Journal of Studies in Technical Careers, 4*(3), 199-208.

Phipps, L. J., Osborne, E. W., Dyer, J. E., Ball, A. L. (1998). *Handbook on agricultural education in public schools,* Danville, IL; The Interstate Printers & Publishers, Inc.

Parsons, F. (1909). Choosing a vocation. Boston, MA: Houghton Mifflin.

Powell, D. V., & Agnew, D. M. (2011). Assessing agricultural literacy elements of project food land and people in K-5 using the food and fiber systems literacy standards. *Journal of Agricultural Education, 52*(1), 155-170. doi: 10.5032/jae.2011.01155

Ramsey, J. W. (2012). Annual report on assessment of agricultural education student learning outcomes.

Ramsey, J. W. (2013) Annual report on assessment of agricultural education student learning outcomes.

Reese, S. (2004). The highly qualified teacher under NCLB. *Techniques: Connecting Education and Careers, 79*(8), 33-35. Retrieved from http://eric.ed.gov/?id=EJ718673

Roberts, T. G. (2006). A philosophical examination of experiential learning theory from agricultural educators. *Journal of Agricultural Education, 47*(1), 17-29. doi: 10.5032/jae.2006.01017

Rollnick, M., Bennett, J., Rhemtula, M., Dharsey, N., & Ndlovu, T. (2008). The place of subject matter knowledge in pedagogical content knowledge: A case study of South African teachers teaching the amount of substance and chemical equilibrium. *International Journal of Science Education, 30(*10), 1365-1387. doi: 10.1080/09500690802187025

Rovegno, I., Chen, W., & Todorovich, J. (2003). Accomplished teachers' pedagogical content knowledge of teaching dribbling to third grade children. *Journal of Teaching in Physical Education*, *22*(4) 426-449. Retrieved from http://journals.humankinetics.com.argo.library.okstate.edu/AcuCustom/Sitename/Documents/DocumentItem/1793.pdf

Sanders, L.R., Borko, H., & Lockard, J.D. (1993). Secondary science teachers' knowledge base when teaching science courses in and out of their area of certification. *Journal of Research in Science Teaching, 30*(7), 723–736. doi: 10.1002/tea.3660300710

Scott, J. L., & Sarkees-Wircenski, M. (1996). *Overview of vocational and applied technology education.* Homewood, IL: American Technical Publishers.

Simpson, R., Lacava, P., & Graner, P. (2004). The no child left behind act: Challenges and implications for educators. *Intervention in School and Clinic, 40*(20), 67-75. doi: 10.1177/10534512040400020101

Sion, R. T., & Brewbaker, J. (2001). Cross conversations: How well prepared to teach content are student teachers? What can college/university faculty do better?. *English Journal, 90*(6), 23-27. Retrieved from http://search.proquest.com.argo.library.okstate.edu/docview/237287981/fulltextPDF/AB4FD0EA34004984PQ/8?accountid=4117

Spence, J.T. (1983). *Achievement and Achievement Motives,* W. H. Freeman, San Francisco.

Spinath, B., Spinath, F. M., Harlaar, N., & Plomin, R. (2006). Predicting school achievement from general cognitive ability, self-perceived ability, and intrinsic value. *Intelligence, 34*(4), 363-374. doi: http://dx.doi.org/10.1016/j.intell.2005.11.004

Stoddart, T., Connell, M., Stofflett, R., & Peck, M. (1993). Reconstructing elementary teacher candidates' understanding of mathematics and science content. *Teaching and Teacher Education, 9,* 229-241. doi: http://dx.doi.org/10.1016/0742-051X(93)90040-N

Stripling, C. T., & Barrick, R. K. (2013). Examining the professional, technical, and general knowledge competencies needed by beginning school-based agricultural education teachers. *Journal of Agricultural Education, 54*(3), 67-83. doi: 10.502/jae.2013.03067

Talbert, B. A., Vaughn, R., Croom, D. B., & Lee, J. S. (2007). *Foundations of Agricultural Education* (2nd ed.). Danville, IL: Professional Educators Publications.

Thompson, G. W., & Balschweid, M. M. (2000). Integrating science into agriculture programs: Implications for addressing state standards and teacher preparation programs. *Journal of Agricultural Education, 41*(2), 73-80. doi: 10.5032/jae.2000.02073

Turner, J. E., & Schallert, D. L. (2001). Expectancy-value relationships of shame reactions and shame resiliency. *Journal of Educational Psychology, 93*(2), 320-329. doi: 10.1037/0022-0663.93.2.320

Wenner, G. (1993). Relationship between science knowledge levels and beliefs toward science instruction held by preservice elementary teachers. *Journal of Science Education and Technology, 2*(3), 461–468. doi: 10.1007/BF00694428

Wigfield, A. (1984). Relations between ability perceptions, other achievement-related beliefs, and school performance. Paper presented at the Annual Meeting of the American Educational Research Association, New Orleans, LA.

Wigfield, A. (1994). Expectancy-value theory of achievement motivation: A developmental perspective. *Educational Psychology Review, 6*(1). 49-78. doi: 10.1007/BF02209024

Wilson, M. (1994). One preservice secondary teacher's understanding of function: The impact of a course integrating mathematical content and pedagogy. *Journal for Research in Mathematics Education, 25*(4), 346-370. doi: 10.2307/749238

Wilson, S. M., Floden, R. E., & Ferrini-Mundy, J. (2002). Teacher preparation research: An insider's view from the outside. *Journal of Teacher Education, 53*(3), 190-204. doi: 10.1177/0022487102053003002

Zoldoske, D. F. (1996). *Motivational factors that influence high school juniors' and seniors' perceptions of agriculture as career choice* (Doctoral dissertation, University of La Verne).

APPENDIX A

Agricultural Education Teaching Option 2013-14

COLLEGE OF AGRICULTURAL SCIENCES & NATURAL RESOURCES

OKLAHOMA STATE UNIVERSITY

Requirements for Students Matriculating in or before Academic Year 2013-2014

BACHELOR of SCIENCE in AGRICULTURAL SCIENCES and NATURAL RESOURCES

MAJOR: Agricultural Education OPTION: Teaching

Minimum Overall Grade Point Average: 2.00 Total Hours: 124

(cumulative graduation/retention GPA)

Other GPA requirements, see below.

GENERAL EDUCATION REQUIREMENTS: 42 HOURS

Area	Hours	To be selected from:
English Composition & Oral Communication	9	ENGL 1113 or 1313; & 1213 or 1413 or 3323. (See Academic Regulation 3.5 in Catalog) SPCH 2713*
American History & Government	6	HIST 1103; POLS 1113
Analytical &Quantitative Thought (A)	6	Select from: MATH 1483* or 1493* or 1513* or higher or any course designated (A)
Humanities (H)	6	Any courses designated (H)
Natural Sciences (N)	9	BIOL 1114*; CHEM 1215* (or CHEM 1314*)
Social & Behavioral Sciences (S)	6	**AGEC 1113*; PSYC 1113*
Diversity (D)	--	Any course designated (D)
International Dimension (I)	--	Any course designated (I)
Scientific Investigation (L)	--	Any course designated (L)

*College & Departmental requirements that may be used to meet GE requirements.

COLLEGE/DEPARTMENTAL REQUIREMENTS: 26 HOURS

Agricultural Sciences and Natural Resources	26	AG 1011; ANSI 1124; FDSC 1133(or 2253); HORT 1013; PLNT 1213; SOIL 2124 NREM 2013 (or 3343); MCAG 3011, 3211, 3222, 4101

*MAJOR REQUIREMENTS: 24 HOURS***

Enrichment 15 Hours

To include courses from four of the following areas:
Agricultural Communications, Agricultural Economics, Agricultural Education, Agricultural Leadership, Animal Science, Biochemistry, Entomology, Forestry, Horticulture, Mechanized Agriculture, Natural Resource Ecology and Management, Plant Pathology, Plant Science, and Soil Science.

Related Courses 9 Hours

AGCM 3103 (or ENGL 3323)

AGLE 2303 or 2403 or 3303

AGED 4713I (or ANSI 3903I)

**AGEC 1113 is a General Education Requirement in addition to the Major Requirement. Students must earn a minimum grade of "C" in each course in the College/Departmental Requirements, Major Requirements and Professional Core Requirements.

PROFESSIONAL CORE: 27 HOURS

AGED 3101, 3103, 3203, 4103, 4113, 4200 (9 hours), EPSY 3213 or 3413, SPED 3202

ELECTIVES: 5 HOURS

Required for graduation and recommendation for Licensure/Standard Certification: (1) 2.50 overall GPA; (2) 2.50 GPA in Major Requirements; and (3) 2.50 GPA in Professional Requirements. The student must earn minimum grades of "C" in each course in the College/Departmental Requirements, Major Requirements, Professional Core Requirements, and demonstrate proficiency in a foreign language (i.e., a grade of "C" or better or completion of two years of the same foreign language in high school with a "B" average or better).

Other Requirements:
A minimum of 40 semester credit hours and 100 grade points must be earned in courses numbered 3000 or above. A 2.00 GPA or higher in upper-division hours.

Additional State/OSU Requirements – At least: 60 hours at a four-year institution; 30 hours completed at OSU; 15 of the final 30 or 50% of the upper-division hours in the major field completed at OSU. Limit of: one-half of major course requirements as transfer work; one-fourth of hours earned by correspondence; 8 transfer correspondence hours.
Students will be held responsible for degree requirements in effect at the time of matriculation and any changes that are made, so long as these changes do not result in semester credit hours being added or do not delay graduation. Degrees that follow this plan must be completed by the end of Summer 2019.

Signature on file in the Office of the Registrar

DEAN

Signature on file in the Office of the Registrar

DEPARTMENT HEAD

AG - 19

APPENDIX B

Institutional Review Board Approval

Oklahoma State University Institutional Review Board

Date:	Wednesday, March 12, 2014
IRB Application No	AG149
Proposal Title:	An Examination of Academic Performance and Competence of Agricultural Education Pre-service Teachers
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved   Protocol Expires: 3/11/2017

Principal Investigator(s):

Rachel Thornburg	Jon Ramsey
711 E Redbud Dr	455 Ag Hall
Stillwater, OK 74075	Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☐ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1.Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval. Protocol modifications requiring approval may include changes to the title, PI advisor, funding status or sponsor, subject population composition or size, recruitment, inclusion/exclusion criteria, research site, research procedures and consent/assent process or forms
2.Submit a request for continuation if the study extends beyond the approval period. This continuation must receive IRB review and approval before the research can continue.
3.Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of the research; and
4.Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Dawnett Watkins 219 Cordell North (phone: 405-744-5700, dawnett.watkins@okstate.edu).

Sincerely,

Shelia Kennison, Chair
Institutional Review Board

APPENDIX C

OSU Teaching Certification Check Sheet and Recommendation for Agricultural Education (Grades 6-12)

Fall 2012-13

OSU Teaching Certificate Check Sheet and Recommendation for Agricultural Education (Grades 6-12)

(Completion of these requirements DOES NOT result in a B.S. degree)

LAST______________________ FIRST______________________ MI ____ CWID #______________________

Status **Program Certification Requirements**

__________ Gain and Retain Full Admission to Professional Education (See Professional Education @ http://www.okstate.edu/peu)

__________ Maintain a 2.50 Overall Cumulative Retention GPA; for graduate students this includes all undergraduate and graduate coursework

__________ Pass the Oklahoma General Education Test (OGET) for Admission to Professional Education

__________ Successfully complete a Foundations of Education Course **AND** a Clinical Experience

__________ Submit **Application for Admission to OSU's Professional Education Unit** @ https://coeforms.okstate.edu/peu/PEU_App.php.

Submit online, print a copy, **SIGN**, and **return to*: Applications, Professional Education, 325 Willard, Stillwater, OK 74078***.

__________ Demonstrate Competency in a Foreign Language

__________ Pass the Professional Portfolio Submissions (1) __________ (2) __________ (3)__________

__________ Pass the other Certification Exams for Oklahoma Educators: __________OPTE __________OSAT-Agriculture

__________ Hold a bachelor's degree from OSU in Agricultural Education (teaching option) **OR** approved double major **OR**

__________ Hold a bachelor's degree in another area or from another institution and complete the following coursework

Status **Professional Education Courses (Total hours will vary depending on courses taken to meet SPED and Student Teaching requirements; 2.50 GPA with no grade below "C" is required.)**

__________ Lab and Clinical Experiences: AGED 3101

__________ Foundations of Education: AGED 3103

__________ Human Growth and Development: EPSY 3213, 3413, **OR** 5103*

__________ Exceptional Child: SPED 3202 **OR** 5633*

__________ Planning the Community Program in Ag Ed: AGED 3203*

__________ Teaching Methods: AGED 4103* (*FL ADM*)

__________ Laboratory Teaching Methods: AGED 4113 (*FL ADM*)

__________ Student Teaching: AGED 4200 (9) (*FL ADM*) OR AGED 5900 (6)

Status **Specialization Courses (52 hours needed: 2.50 GPA with no grade below "C")**

__________ Ag Economics: AGEC 1114

__________ Animal Science: ANSI 1124

__________ Plant Science: PLNT 1213

__________ Horticulture: HORT 1013

__________ Soil Science: SOIL 2124

__________ Agricultural Leadership: AGLE 2303, 3303, **OR** 5303*

__________ Agricultural Communications: AGCM 3103 **OR** ENGL 3323

__________ International Dimensions: AGED 4713 **OR** ANSI 3903

__________ Mechanized Agriculture: 5 hours

__________ Food Science: FDSC 1133 **OR** ANSI 2253

__________ Environmental Science: NREM 2013 **OR** 3343

__________ Enrichment: 14 hours (to be determined and listed by certification advisor) ______________________________

__________ **TOTAL HOURS (52)**

Required for Full Admission (*FL ADM*) Must be fully admitted to Professional Education prior to enrollment *Course approved for graduate credit

Office of Professional Education 325 Willard Hall Stillwater, OK 74078-0431 405.744.6252 Fax: 405.744.1834 http://www.okstate.edu/peu (Revised 11/10)

VITA

Rachel Elizabeth Thornburg

Candidate for the Degree of

Master of Science

Thesis: AN EXAMINATION OF ACADEMIC PERFORMANCE AND SUBJECT AREA COMPETENCE OF AGRICULTURAL EDUCATION PRE-SERVICE TEACHERS

Major Field: Agricultural Education

Biographical:

Education:

Completed the requirements for the Master of Science in your major at Oklahoma State University, Stillwater, Oklahoma in May, 2014.

Completed the requirements for the Bachelor of Science in Agricultural Science at Texas A&M University, College Station, Texas in 2012.

Experience:

Peer-Reviewed Paper Presentations

Ramsey, J. W., Thornburg, R., & Bloomberg, B. (2014). An Examination of Undergraduate Students Self-Efficacy Related to the Performance of Animal Handling and Management Techniques. *Proceedings of the 2014 Southern Region American Association for Agricultural Education (AAAE) Research Conference, Dallas, TX*

Peer-Reviewed Poster Presentations

Bloomberg, B, Stein, D, Thornburg, R & Ramsey, J. W. (2013). Animal Science 101: Back to the basics. *Proceedings of the 2013 Southern Region American Association for Agricultural Education (AAAE) Research Conference,* Orlando, FL