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Jonathan J. Velez

Abstract

The purpose of this study was to investigate the relationships between three teacher development experiences and early career agriculture teachers' efficacy. Additionally this study sought to define the relationship between five teacher efficacy constructs and career commitment among early career agriculture teachers in five western states. A census of all agriculture teachers in their first five years of teaching school-based agriculture in California, Idaho, Oregon, Utah and Washington was attempted. Early career teachers' perceptions of the impact of three teacher development experiences, agriculture teacher preparation, student teaching and professional development experiences, were measured. Five areas of teacher efficacy were measured: classroom management, instructional strategies, leadership of students, ability to teach science and ability to teach math. This study found that math and science teaching efficacy were the lowest efficacy areas for these early career agriculture teachers. The

perceptions of the impact of teacher development experiences were significantly related to teacher efficacy in the majority of teacher efficacy areas. Additionally, this study found that the five teacher efficacy areas measured were all significantly correlated with career commitment. These findings led the researcher to conclude that increased efforts need to be made to improve early career agriculture teachers' efficacy in math and science teaching. Additionally, the researcher concludes that agriculture teacher preparation, student teaching and professional development experiences are significant to the development of these early career agriculture teachers' efficacy. Lastly, classroom management efficacy, instructional strategies efficacy, leadership of students efficacy, ability to teach science efficacy and ability to teach math efficacy are all significant components to the retention of these early career agriculture teachers; therefore, future research should investigate specific experiences that related to increased agriculture teacher efficacy in those five areas.

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The Teacher Efficacy of Early Career Agriculture Teachers in Five Western States

by
Aaron J. McKim

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I understand that my thesis will become part of the permanent college of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

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Aaron J. McKim, Author

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CONTRIBUTION OF AUTHORS

Dr. Jonathan Velez assisted with data collection, editing of my thesis and interpretation of the data.

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The Teacher Efficacy of Early Career Agriculture Teachers in Five Western States

Chapter 1: Introduction

The self-efficacy of a teacher (teacher efficacy) has continually been found to be associated with the success and/or failure of a teacher. Previous research into teacher efficacy has found it to be a strong predictor of many essential aspects of the teaching profession including, but not limited to, a teachers' commitment to stay in the profession, ability to persist when working with difficult students and enthusiasm about their career (Tschannen-Moran, Woolfolk Hoy & Hoy, 1998). The teacher efficacy of school-based agriculture teachers has been linked to a major issue facing the profession maintaining an adequate supply of teachers (Knobloch & Whittington, 2003a; Swan, 2005). For many years a shortage of agriculture teachers has been a concern for the agriculture teaching profession (Kantrovich, 2010). This study seeks to further the understanding of the development of teacher efficacy in school-based, early career agriculture teachers as well as the relationship between teacher efficacy and career commitment.

The concept of efficacy has its origins in the Social Learning Theory. In his book *Social Learning Theory* Albert Bandura advocated a new way of looking at human action, using three reciprocal determinants: behavior, personal factors and environmental factors, illustrated in Figure 1 (Bandura, 1977a; 1986). In 1986 Albert Bandura coined the now widely used definition of self-efficacy, stating that self-efficacy refers to "Peoples judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391).

Throughout his research Bandura has emphasized cognitive processes as a factor in determining human behavior. Part of this cognitive emphasis was the introduction of self-efficacy, an individual's cognitive judgment of their abilities to successfully complete a task. The focus on these cognitive processes led Bandura to change the name of his theory from Social Learning Theory to Social Cognitive Theory in 1986 (Bandura, 1986).

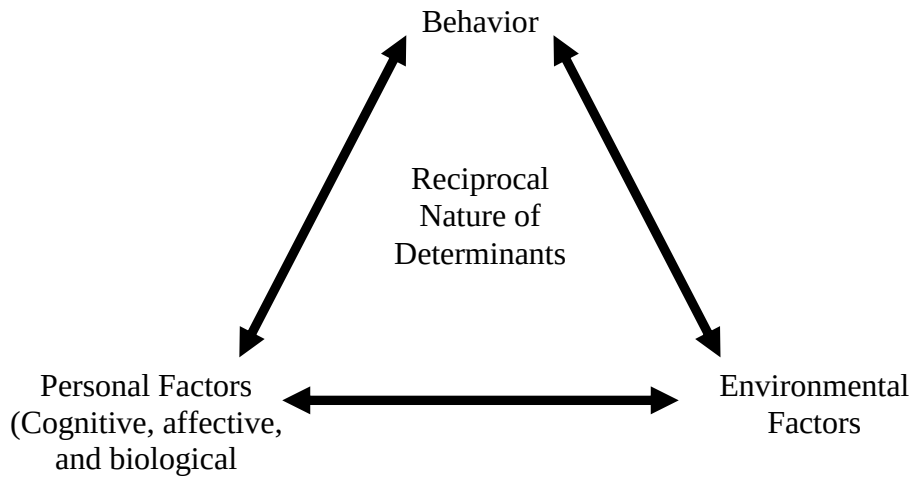

Figure 1. Three reciprocal determinants of human action (Bandura, 1977a; 1977b; 1986)

Bandura postulated that an individual's self-efficacy can be improved through four types of experiences: mastery experiences, vicarious experiences, physiological and emotional states and social persuasion (Bandura 1977a; 1986). Mastery experiences refer to a person's belief that success in a prior experience will lead to success in similar future tasks. Vicarious experiences, watching someone else successfully perform an anticipated experience, can also develop an individual's self-efficacy. Positive social persuasion, hearing positive comments towards yourself, or a group that you are a part of, also has the potential to increase self-efficacy. Finally physiological and emotional states,

specifically the type of emotion when contemplating a particular action will influence an individual's self-efficacy towards completing that action (Bandura, 1986; 1993).

One of the primary goals of this research is to further the understanding of the development of teacher efficacy by investigating the relationship between theorized efficacy building experiences during the teacher development process and early career agriculture teachers' efficacy. Tschannen-Moran, Woolfolk Hoy and Hoy (1998) established the connection between teacher efficacy and the teacher development process. These researchers acknowledged that vicarious experiences are prevalent in the teacher development experience; an example of this is watching peers teach a variety of lessons during peer teaching activities. Social persuasion was also identified as a common occurrence throughout a pre-service teacher's development. These experiences range from a "good job" mentioned after a peer teaching exercise to formal communication between student teacher and cooperating teacher. Furthermore, the student teaching experience has often been studied as the primary efficacy building experience due to the abundance of mastery experiences, vicarious experiences, social persuasion and physiological and emotional states (Harlin, Robert, Briers, Mowen & Edgar, 2007; Knobloch, 2006; Roberts, Harlin & Ricketts, 2006; Whittington, McConnell & Knobloch, 2006; Wolf, Foster & Birkenholz, 2010).

After the formal teacher development process ends and teachers enter the profession a variety of experiences can be identified as efficacy builders including teaching experience, comments from fellow teachers, self-identified success and professional development experiences. This study will focus on the development of teacher efficacy through three experiences identified as being controlled, to some extent,

by teacher development programs, these experiences are: agriculture teacher preparation classes, student teaching and agriculture teacher focused professional development experiences. This study will then take the idea of teacher efficacy a step further and investigate the relationship between teacher efficacy and career commitment.

Statement of the Problem

A chronic shortage of secondary Agriculture teachers has been identified by the National Study of the Supply and Demand for Teachers of Agricultural Education (2010). The most recent release of this study encapsulated the ongoing issue of a teacher shortage stating: "…regardless of the time span we are seeing a trend downward (supply of secondary Agricultural Educators) while a need continues to exist…" (Kantrovich, 2010, p. 42). In order to understand the magnitude of this problem we must look at the number of programs that were forced to close due to a lack of a qualified teacher: 21 in 2009, 40 in 2006, 35 in 2001, 55 in 1998 and 41 in 1995 (only years in which such data were collected). This study also found that in 2009 44% of agriculture teacher positions were filled by individuals without formal agriculture teacher training, including a total of 390 emergency/alternative certifications.

There are two major sides to the agriculture teacher shortage issue, recruitment and retention, this study will focus on retention, specifically retention of early career agriculture teachers. In order for agriculture teachers to be retained in the profession they must feel confident in their ability to be a successful teacher. This study, along with many others in the field of agricultural education, has operationalized self-confidence in one's teaching abilities as teacher efficacy (Knobloch, 2006; Stripling, 2005; Wolf, 2008).

Exploring the relationships between teacher development experiences and the efficacy of early career agriculture teachers will offer insight into how teacher development programs can strengthen the teacher development process to build efficacy in early career agriculture teachers, which will then in turn improve the retention of these teachers.

Established teacher efficacy can have a profound impact on the success of an agriculture teacher, especially those teachers early in their career. Numerous challenges faced by early career agriculture teachers have been identified as potential barriers to career commitment (Mundt & Connors, 1999; Talbert, Camp & Heath-Camp, 1994; Wolf, 2008). Early in the development of the concept of self-efficacy it was recognized that strengthening self-efficacy increases an individual's persistence in overcoming challenges when facing a given task (Bandura, 1977a; 1977b, 1986). Some of the research discovered challenges early career agriculture teachers face are; classroom instruction (Mundt & Connors, 1999; Wolf, 2008), classroom/laboratory management (Mundt & Connors, 1999; Talbert, et al., 1994), leadership of students through educational programs like the FFA and SAEs (Mundt & Connors, 1999; Wolf, 2008) and "shifts" in the educational landscape such as the current emphasis on the integration of math and science across all curriculums including agriculture (Layfield, Minor & Waldvogel, 2001; Parr, Edwards & Leising, 2008). Increased efficacy in essential areas of agriculture teacher success could potentially empower early career agriculture teachers to tackle the challenges associated with teaching agriculture as opposed to leaving the profession.

Purpose of the Study

The purpose of this research is to describe the relationship between agriculture teacher development experiences and early career agriculture teachers' efficacy. Additionally, the relationship between early career agriculture teachers' efficacy and career commitment will be explored.

Research Objectives

1.) Describe the demographic characteristics of early career agriculture teachers in five western states.

2.) Describe the teacher efficacy of early career agriculture teachers in five western states.

3.) Describe the perceived impact of identified teacher development experiences on early career agriculture teachers in five western states.

4.) Describe the relationship between teacher efficacy and career commitment for early career teachers in five western states.

5.) Describe the relationship between teacher efficacy and the perceived impact of teacher development experiences for early career teachers in five western states.

Significance of the Study

The knowledge gained through this study will benefit the agriculture teaching profession by providing additional understanding of the teacher efficacy of early career

agriculture teachers in five western states, a geographic region lacking agriculture teacher efficacy research. This study will be the first to investigate current agriculture teachers' efficacy in: leadership of students, ability to teach math and ability to teach science, three areas hypothesized as being essential to the career commitment of an early career agriculture teacher. The information regarding current agriculture teachers' efficacy in teaching math and science concepts is especially timely with the current educational shift towards the integration of Science, Technology, Engineering and Mathematics (STEM) throughout education (Sanders, 2009).

This study will provide insight into early career agriculture teachers' commitment to stay in the agriculture teaching profession and the relationship of that career commitment to five teacher efficacy areas: instructional strategies, classroom management, ability to positively lead students, ability to teach math and the ability to teach science.

Finally, the relationship between teacher development experiences and early career agriculture teachers' efficacy will provide useful insight into which teacher development experiences relate to higher teacher efficacy. Recommendations will be made, based on these findings, for strategies to develop teacher efficacy through these three experiences.

Limitations of the Study

This study will rely on respondents completing the questionnaire in an honest and timely manner. The research is also limited by the agriculture teacher directory for each state and/or the leader in agricultural education providing a complete and accurate list of

current agriculture teachers in their state teaching in their first through fifth year. The final limitation of this study is the reliability and effectiveness of the questionnaire to provide tangible data in order to meet the research objectives of this study.

Delimitations of the Study

This study will be delimited to school-based agriculture teachers, in their first through fifth year of teaching in five western states: California, Idaho, Oregon, Utah and Washington during the 2012-2013 school year. The results of this study will not be generalizable to any other population due to the census nature of the study.

This study will be delimited to an examination of teacher efficacy in the following areas: instructional strategies, classroom management, leadership of students, ability to teach science and ability to teach math. Teachers' efficacy in other areas is vitally important to the success of the agriculture teaching profession but it will not be considered by this study.

This study will be delimited to an examination of teachers' perception of the impact of three teacher development experiences: agriculture teacher preparation classes, student teaching and professional development experiences. The researcher recognizes that a variety of additional experiences impact current teachers and their strategies. The three identified experiences were selected based on their ability to be changed and/or improved by an agriculture teacher development program.

Definition of Terms

Career Commitment: In this study career commitment refers to the respondents' average score of two questions rated on a scale ranging from one to six (1=No Confidence, 6=Extreme Confidence). Question 1: How confident are you that you will be a school-based agriculture teacher in five (5) years? Question 2: How confident are you that you will be a school-based agriculture teacher in ten (10) years?

Impact: In this study impact refers to the respondents' perception of the value to which teacher development experiences affect their current strategies as teachers.

Teacher Development Experiences: Three teacher development experiences are measured in this study: agriculture teacher preparation classes, student teaching and professional development experiences. These specific items were selected because they offer the most potential for change by an agriculture teacher development program at a college or university.

Teacher Efficacy: A teacher's judgment of their capabilities to successfully execute the actions necessary to accomplish a specific teaching task. Other studies may refer to this as teacher self-efficacy.

Agriculture Teacher Efficacy Constructs: Five teacher efficacy areas were reviewed in this study based on the assessment of the related literature: instructional strategies, classroom management, leadership of students, ability to teach science and ability to teach math.

Early Career Agriculture Teachers: Teachers in their first through fifth year of teaching in five western states: California, Idaho, Oregon, Utah and Washington during the 2012-2013 school year.

Agriculture Teacher Preparation: Classes taken in college focused on teaching methods and strategies specific to agriculture teachers.

Chapter 2: Review of Related Literature

Social Learning Theory

Albert Bandura launched the Social Learning Theory in 1977 as a way of explaining human action using a model of three reciprocal determinants (Bandura, 1977a). Bandura's reciprocal determinism seeks to anticipate and explain human action using three constructs: behavior, personal factors and environmental factors. In order to understand Bandura's theory we must first understand each of these determinants and their subsequent interaction.

Behavior

Through the Social Learning Theory Bandura postulated that behavior alone cannot determine human action. Bandura's view challenged many theorist of the day including John Watson. Years before Bandura, Watson established the concept of behaviorism. Behaviorists, like Watson viewed the development of human behavior through a life-spanning series of individual action and the response from that action (Crosbie-Burnett & Lewis, 1993). Behaviorists argued that human action is learned and/or altered through the consequences of past behavior. Bandura's Social Learning Theory accepts human behavior as a determinant, but only when it's reciprocal interactions with the environment and personal factors are considered (Bandura, 1977a).

Personal Factors

Bandura realized that personal factors play a major role in human action. Personal factors should be broken into three types: affective, cognitive and biological (Bandura, 1977a). Affective factors include: expectations, beliefs, self-perceptions, goals, intentions and emotions. Cognitive factors include: efficacy and outcome expectations. Biological factors include: sex, age, ethnicity, temperament and genetic predisposition. The individuality created by our varying personal factors contributes to the vast array of human action, but personal factors alone cannot predict or explain human action (Bandura, 1977a; 1986).

Environment

The environment that we are in, have been in and anticipate being in will also play a role in determining our action. Individuals' behavior and personal factors have the opportunity to both impact our environment and to be impacted by our environment (Bandura, 1977a; 1978). Therefore our environment is a continuous timeline of potential. Through the reciprocal interaction with our behavior and personal factors we develop our potential environment, as that environment develops it reciprocates change in our action (Bandura, 1977a). An example of this would be a teacher choosing to acknowledge a pair of students chatting in the corner of the classroom, by choosing to acknowledge the student's disruption the teacher creates a new environment in the classroom. This new environment will change the actions of the teacher, for example due to a quieter classroom the teacher may give instructions to the class using a more pleasant tone.

Interaction between Personal Factors and Behavior

An individual's outcome expectancy for a particular task will influence how they behave throughout that given task. The actual outcome, determined by their behavior will in turn influence their efficacy towards accomplishing a similar task in the future (Bandura 1977a; 1978).

Interaction between Behavior and Environment

An individual's behavior in any given environment will produce a change in that environment. The subsequent changes to the environment will alter the way they behave in their current and future environments (Bandura, 1978).

Interaction between Personal Factors and Environment

The way an individual's environment responds to them will impact their self-conception. Additionally an individual's personal goals and intentions will influence their willingness to interact with and alter their environment (Bandura, 1977a; 1978).

Self-Efficacy Theory and the Cognitive Emphasis

A major focus of the Social Learning Theory throughout its history has been the concept of self-efficacy. Bandura's earliest definition of self-efficacy is found in his 1977 book outlining The Social Learning Theory: "An efficacy expectation is the conviction that one can successfully execute the behavior required to produce the outcomes" (p.79). Bandura goes on to clarify that self-efficacy is part of the cognitive process inherent in the reciprocal interaction between personal factors and behavior and consequently human

behavior, thus linking self-efficacy to the Social Learning Theory and reciprocal determinism (Bandura 1977a; 1978).

In 1986 Bandura redefined self-efficacy in order to distinguish his theory from other concepts of the day. Bandura's 1986 definition of self-efficacy states: "Peoples judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). This definition better differentiates self-efficacy from outcome expectancy, and is used more often today to describe self-efficacy. The distinction between outcome expectancy and self-efficacy is important to understanding this transition. Outcome expectancy is an individual's belief that certain behaviors will lead to a favorable outcome. Self-efficacy refers to an individual's belief that they possess the skills needed to complete a specific behavior (Bandura, 1977b).

The year 1986 also saw the change of Bandura's Social Learning Theory. In 1986 Bandura changed the name of the theory from Social Learning Theory to the Social Cognitive Theory to add emphasis to the cognitive processes essential to his reciprocal determinism model (Bandura, 1986).

Bandura, using his theory of self-efficacy, set out to explain the role of efficacy in human action. Bandura focused his initial research on the relationship between self-efficacy and persistence when an individual encounters challenges. Bandura found that an individual with a high self-efficacy is more likely to cope with a challenge, put more effort forth when they encounter challenges and sustain their effort longer than those individuals with a lower self-efficacy (Bandura, 1977b). Through this work Bandura connected self-efficacy and an individual's ability to cope with a given challenge. This connection led to the discovery that individuals with a low self-efficacy and therefore low

coping ability will often avoid experiences when they perceive the experience will push them past their ability to cope. Likewise a high coping skill set will increase an individual's overall self-efficacy towards challenging experiences due to successful experiences overcoming challenges using their persistence and coping skills (Bandura, 1977b). Bandura's realization forms the foundation for the relationship between career commitment and teacher efficacy sought through this study. Based on Bandura's concept of self-efficacy it can be hypothesized that those early career teachers' with a lower teacher efficacy will be more likely to perceive the challenges associated with teaching agriculture as a career deterrent, and therefore have a lower career commitment score when compared to those early career teachers with a higher teacher efficacy.

The Development of Self-Efficacy

Bandura postulated that an individual's self-efficacy can be developed through four types of experiences: mastery experiences, vicarious experiences, social persuasion and physiological and emotional states (Bandura 1977a; 1977b, 1986).

Mastery Experiences

Successful accomplishment of a task will lead to the greatest increase in an individual's self-efficacy towards the completion of a similar task. Continuous success in a given task will lead to a substantial level of self-efficacy that singular negative experiences will not affect. Alternatively, continuous failures or negative experiences will lead to a similarly staunch self-efficacy on the opposite end of the spectrum. This negative self-efficacy rut will often result in an individual avoiding the task in the future.

This was the foundation behind Bandura's emphasis on the beginning of an experience, because the beginning of the experience is critical to the creation of a substantial positive or negative self-efficacy towards that experience. Positive results will lead to continued success as self-efficacy continues to rise. Negative early experiences will push many individuals, especially those with low coping skills, out of the experience entirely.

This study recognizes the presence of mastery experiences in the three agriculture teacher development experiences: agriculture teacher preparation classes (peer teaching), student teaching and potentially professional development experiences, depending on the type of professional development.

Vicarious Experiences

Observing others successfully complete an anticipated task has the potential to raise self-efficacy, especially if the individual completes the task either without the observer's predicted challenges or by overcoming the observer's predicted challenges. Vicarious experiences are not as powerful self-efficacy builders when compared to mastery experiences. It is important, however, to note that if an individual has not yet had a mastery experience, the role of observing another successfully accomplish the proposed task will significantly raise the inexperienced individual's self-efficacy. The impact of self-efficacy through vicarious experiences also varies based on the perception of similarity of the observer to the individual they are observing. An individual who they perceive as having similar personal factors and in a similar environment will have a greater impact on self-efficacy than someone who they perceive to have significantly different determinants (Bandura, 1977b; 1986). Based on Bandura's concept of vicarious

experiences it can be rationalized that agriculture teacher preparation classes (peer teaching, classroom visits), student teaching (observing cooperating teacher) and professional development experiences (teacher led workshops, discussion about successes in the classroom) all contain the potential for positive vicarious experiences.

Social Persuasion

An individual's self-efficacy can be increased through social persuasion, or hearing from someone that you have the skills necessary to accomplish a given task. Social persuasion lacks the efficacy improving power of master and vicarious experiences. This is a result of a lack of tangible experiences associated with social persuasion in which the participant can either successfully engage in or see another individual successfully engage in the anticipated task. Social persuasion alone has been found to increase self-efficacy sparingly but, when coupled with the learning of a new skill or tool to accomplish an identified task, it has been found to increase self-efficacy more than just learning the new skill or tool. Social persuasion also hinges on the authenticity of the persuasion; genuine persuasion brought on by another individual's true belief that you can accomplish the task will raise your self-efficacy whereas non-genuine persuasion has been found to have little to no effect (Bandura, 1977b; 1986). Social persuasion is theorized to occur throughout the agriculture teacher development experiences, through peers and professors during agriculture teacher preparation classes, the cooperating teacher during student teaching or through presenters at an agricultural education based professional development experience.

Physiological and Emotional States

The natural emotions as well as physiological state of an individual, when cognitively processing an anticipated task, give indicators to the individual that will either increase or decrease their self-efficacy. If, when contemplating the perceived challenges associated with a task, an individual becomes overly nervous or fearful, the individual perceives their body's reaction as indication they are unable to successfully complete the task. If an individual is without any negative physiological or emotional indicators when contemplating a task, they perceive that stability as an indication they can complete the task successfully. Negative physiological and emotional states can be reduced in a process called desensitization. Desensitization occurs when through modeled experiences, either tangible or thought based, an individual's negative physiological and emotional arousal recedes due to participating in these modeling exercises (Bandura, 1986). Although physiological and emotional states are hard to measure it is worth noting that they do play a role in the development process of an early career agriculture teacher.

Teacher Efficacy

Research into self-efficacy has been conducted throughout many areas including; addictive behaviors, healthcare, career choice and development, life transitions, family processes, life trajectories and education (Bandura, 1995). The educational research into self-efficacy has focused on two major themes: the student's self-efficacy in motivation and learning (Bandura, 1993; Zimmerman, 2000; Schunk, 1991) and teacher efficacy (Ashton & Webb, 1986; Bandura, 1993; Gibson & Dembo, 1984; Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998; 2007; Woolfolk Hoy, 2000).

Teacher's efficacy has been defined in many ways throughout the research but the predominant definition was developed by Tschannen-Moran, Woolfolk Hoy and Hoy (1998): "Teacher efficacy is the teacher's belief in his or her capability to organize and execute courses of action required to successfully accomplish a specific teaching task in a particular context" (p. 233). This definition distinguishes itself based on the clear separation from outcome expectancy. Many other definitions of teacher efficacy fail to clearly make the distinction between efficacy and outcome expectancy.

Creating a learning environment where students have the ability to succeed depends greatly on the efficacy of the teacher (Bandura, 1993). Throughout the history of teacher efficacy research many positive attributes have been found to correlate with the individual teacher's efficacy. Ability to motivate students, teacher innovation, adoption of innovations, superintendent's perception of the teacher's effectiveness, classroom management, time spent on difficult subjects and special education referrals are just a few of the many positive teacher characteristics associated with a high teacher efficacy (Woolfolk-Hoy, 2000).

Bandura noted that teachers with a high teacher efficacy are better able to create self-efficacy building experiences for their students (Bandura, 1993). The resulting efficacy will increase students' persistence, leading to a more effective classroom. Therefore, it's no surprise that efficacious teachers provide their students a better learning environment and have a stronger commitment to stay in the teaching profession (Coladarci, 1992).

Previous research into the development of teacher efficacy has sought to identify and explain the four types of efficacy building experiences in the development of a

teacher. Evidence of mastery & vicarious experiences, physiological and emotional states as well as social persuasion have been found throughout teacher development programs (Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998). The emphasis of teacher preparation college classes is on vicarious learning experiences as well as social persuasion (Watters & Ginns, 1995). Student teaching and early teaching experiences emphasize mastery experiences as a method of increasing teacher efficacy (Woolfolk & Hoy, 1990). Evidence of emotional and physiological states can be postulated throughout the teacher development process. It's important to note that vicarious experiences and social persuasion are not limited to college classes. An example of this would be in student teaching when a pre-service teacher observes their cooperating instructor or another student teacher successfully complete a lesson. Mastery experiences may also occur during teacher preparation college classes through student presentations and peer-teaching.

Bandura's original concept of the development of self-efficacy identifies that efficacy-building experiences are essential to the establishment of a stable level of efficacy (Bandura, 1977b; 1986). Most of the research into teacher efficacy focuses on pre-service teachers, student teachers or early career teachers. Some caution is laid out towards the research of teacher efficacy in pre-service and student teachers as these developing teachers often lack a full comprehension of the challenges associated with being a full-time teacher (Tschannen-Moran, Woolfolk-Hoy & Hoy, 1998). This research based concept is evidence towards the explanation of why student teachers will often have a higher teacher efficacy than early career teachers, and why they have been omitted from this study.

Teacher Efficacy in Agricultural Education

An in-depth review of the self-efficacy literature specific to Agricultural Education has yielded three primary lines of inquiry: the development of teacher efficacy, the relationship between agriculture teacher efficacy and career commitment and the role teaching experience plays in the efficacy of an agriculture teacher.

Development of Agriculture Teacher Efficacy

The first published piece on the efficacy of agriculture teachers was completed by Knobloch (2001). Knobloch completed a pre-experimental study of the teacher efficacy of pre-service teachers in their first year of professional studies in Agricultural Education. In this study, Knobloch examined the relationships between early field experiences, peer teaching and first year Agricultural Education students' efficacy. Knobloch found that early field experiences did not significantly relate to teacher efficacy. Knobloch's research did observe a significant positive relationship between teacher efficacy and peer teaching for one of the two groups investigated. Knobloch's research was a groundbreaking attempt at connecting presumed efficacy building experiences with pre-service agriculture teachers' efficacy.

The research into the development of agriculture teacher efficacy then expanded to look at student teachers and current agriculture teachers. This research, completed by Knobloch & Whittington (2002), focused on early career teachers in Ohio. A total of 106 student teachers through third year agriculture teachers were sampled to investigate the variables of teacher support, teacher preparation quality and the experience of student

teaching as they relate to current teachers' efficacy. Knobloch and Whittington found that collective teacher efficacy (the feeling that you are part of a larger school-wide team helping students), teacher preparation quality and the perception of the student teaching experienced explained 17% of the variance in agriculture teacher's efficacy. Knobloch and Whittington's findings support Bandura's concept of efficacy development. According to the theory of self-efficacy, the level of a teacher's efficacy should be related to their perception of experiences identified as efficacy builders. In the Knobloch and Whittington (2002) study those efficacy builders were operationalized as teacher preparation, student teaching and teacher support.

The role of the student teaching experience as a developer of agriculture teachers' efficacy was advanced by a 2006 study completed by Whittington, McConnell and Knobloch. These researchers found a significant correlation between teacher efficacy scores and teachers who agreed that their student teaching experience was "excellent." A similar study was conducted at a pair of universities to measure the positive effects of the student teaching experience across a wider scope of teachers (Knobloch, 2006). Knobloch's study also found a significant correlation between the perception of the student teaching experience and student teachers' efficacy at both universities. Additionally, more recent research completed by Wolf supports the idea that teacher's perception of the student teaching experience has a positive correlation with their teaching efficacy (2008; 2011).

Further investigation into the student teaching experience as a developer of teacher efficacy was conducted by three research teams: Harlin, Roberts, Briers, Mowen & Edgar (2007), Roberts, Harlin & Ricketts (2006) and Roberts, Mowen, Edgar, Harlin

and Briers (2007). These studies similarly found that through the student teaching experience the efficacy of student teachers varies significantly. These research studies found that a four week block on-campus, just prior to student teaching, was found to increase student teacher's efficacy. Teacher efficacy was then measured half way through the student teaching experience, in each of these studies a significant drop in student teachers' efficacy was found at this point of data collection. The student teachers participating in the studies experienced an increased in teacher efficacy at the final data collection point which corresponded with the final day of the student teaching experience. In a separate study Stripling, Ricketts, Roberts and Harlin (2008) found that University of Georgia and Texas A&M student teacher's efficacy improved at each point of data collection: before methods class, after methods class/before student teaching and after student teaching; unfortunately data were not collected half way through the student teaching experience to compare findings to the previous research of teacher efficacy completed during student teaching.

Edgar, Roberts and Murphy (2007) examined the communication between cooperating teachers and student teachers and focused their research on student teachers' efficacy related to the role of social persuasion as an efficacy building experience. They discovered that communication, when structured both in time and type between student teacher and cooperating teacher, resulted in a lower teacher efficacy when compared to non-structured communication. The researchers postulated that the establishment of a structured communication led to the student teacher's being more grounded in their ability to teach, and that structured communication forced student teachers' to examine their teaching abilities more critically.

A pair of 2006 research articles compared the teacher efficacy of traditionally and alternatively certified agriculture teachers (Duncan and Ricketts, 2006; Rocca & Washburn, 2006). Rocca and Washburn examined the effect of certification type on Florida agriculture teachers in their first five years of teaching. Their research found similar teacher efficacy levels between the two types of teacher certification. Further investigation into Rocca and Washburn's research shows that the alternatively certified teachers were on average 10 years older than traditionally certified teachers. Presumably, mastery experiences outside of teaching bolstered the alternatively certified teachers' efficacy to a level similar to those teachers with traditional certification. A second 2006 article on certification type and efficacy level of agriculture teachers, completed by Duncan and Ricketts, reported no significant age differences between traditionally and alternatively certified agriculture teachers. The researchers found that traditionally certified teachers were more efficacious in: content knowledge, FFA/leadership development/SAE and managing an agricultural education program. The Duncan and Ricketts article advances the idea that if age is accounted for, traditionally certified teachers are found to have a higher teaching efficacy.

The first comprehensive look at agriculture teacher's efficacy from the perspective of Bandura's specific efficacy building experiences was completed by Wolf, Foster and Birkenholz (2010). These researchers studied the professional experiences of pre-service teachers at Ohio State during their student teaching. The researchers conceptualized professional experiences as either mastery, vicarious or social persuasion experiences and found that vicarious experiences were the largest influencer of teacher efficacy, specifically observing a first year agriculture teacher which accounted for 11%

of the variation in overall teacher efficacy and 17% of the variation in instructional strategies efficacy. In the social persuasion category of experiences, verbal feedback from their cooperating teacher was found to have a positive correlation with student teachers' efficacy. Mastery experiences, operationalized as the number of classes taught during student teaching, were identified as having a negative effect on a student teachers' efficacy in classroom management. This key research showcases the strength of vicarious experiences when mastery experiences are limited, additionally negative experiences like those theorized to have occurred with classroom management during student teaching can lower a teacher's efficacy for that specific task.

Agriculture Teacher Efficacy and Career Commitment

The study of career commitment and teacher efficacy in Agricultural Education began with research done by Knobloch and Whittington (2003a). Their research approached career commitment as an influence on the efficacy of first through third year agriculture teachers in Ohio. The researchers measured teacher efficacy and career commitment at the beginning of the year and split the teachers into two groups based on the median commitment score. At the beginning of the year the researchers observed that the two groups, low commitment and high commitment, had similar efficacy scores. After ten weeks of teaching the researchers measured teacher efficacy again and found that the low career commitment group's efficacy had dropped while the high commitment group maintained a steady level of teacher efficacy. The research done by Knobloch and Whittington started the process of understanding the relationship between teacher efficacy and career commitment among agriculture teachers.

Additional research into the relationship between teacher efficacy and career commitment used efficacy as the explanatory variable of career commitment. In his dissertation Swan (2005) looked at teacher efficacy and career intent of student teachers at Ohio State. He found that 17% of the variance in career intent could be contributed to the efficacy of student teachers. Research completed by Wheeler and Knobloch (2006) supports the idea that teacher efficacy positively relates to career commitment. These studies support Bandura's concept that a higher level of efficacy will strengthen an individual's commitment to persist in a given challenge.

Blackburn and Robinson (2008) addressed the issue of teacher attrition by examining the job satisfaction of Kentucky agriculture teachers with 1-6 years of teaching experience. Blackburn and Robinson's research examined the relationship between teacher efficacy and job satisfaction of these agriculture teachers. Researchers found a significant relationship between agriculture teachers' efficacy and level of job satisfaction.

Agriculture Teacher Efficacy and Years of Experience

Additional studies in Agricultural Education have evaluated the relationship between years of teaching experience and agriculture teachers' efficacy. Additional opportunities for mastery and vicarious experiences, social persuasion and physiological and emotional states come with additional experience in a given task. Therefore it can be reasoned that those individuals with more experience teaching will have a stronger teacher efficacy. Researchers in Agricultural Education have put this reasoning to the test through 14 years of investigation.

In his unpublished dissertation Rodriguez (1997) examined the efficacy of early field experience students, student teachers, first year and second year agriculture teachers in Ohio. Rodriguez sought a connection between the level of efficacy and teaching experience. Rodriguez was only able to obtain 11 first year teachers and 6 second year teachers in his sample. Possibly due to the low participant numbers Rodriguez did not find a significant difference between the efficacy of teachers based on years of experience.

Knobloch and Whittington (2003b) published research comparing teacher efficacy during the first ten weeks of school for student teachers through third year agriculture teachers in Ohio. Knobloch and Whittington found that student teachers, second year teachers and third year teachers maintained a stable teacher efficacy through the first ten weeks of school. First year teachers were found to have a significant drop in their self-efficacy over the same time period. Student teachers were found to have the highest teacher efficacy after ten weeks of school while first year teachers were found to have the lowest teacher efficacy of all the groups after 10 weeks of school. The findings that student teachers have a heightened teacher efficacy and first year teachers experience a dip in their efficacy was supported in a 2011 longitudinal study of agriculture teachers who graduated from Ohio State (Swan, Wolf & Cano, 2011).

Additional research into teaching experience and teacher efficacy in agricultural education has yielded varying results. In a 2006 study of novice (years 1-3) agriculture teachers in Ohio, no significant difference in teacher efficacy was found between first, second and third year teachers (Whittington, McConnell & Knobloch, 2006). Blackburn and Robinson (2008) found that splitting Kentucky agriculture teachers into groups based

on teaching experience: 1-2 years, 3-4 years and 5-6 years yielded teachers with 3-4 years of experience as the least efficacious agriculture teachers. Finally a 2006 study of Illinois agriculture teachers in their first through fourth year of teaching found a negative correlation between teaching experience and teacher efficacy (Wheeler & Knobloch, 2006). Wheeler and Knobloch hypothesized that early career agriculture teachers' enthusiasm could explain these counter-intuitive results.

Alternatively, three studies of agriculture teachers have seen significant positive correlations between teaching experience and teacher efficacy. In her dissertation, Wolf (2008) found a low positive relationship between years of teaching experience and teacher efficacy. In his Master's thesis Hartfield (2011) separated Arizona agriculture teachers into two groups based on years of experience: 1-5 years of experience and 5+ years of experiences, and found that those agriculture teachers with more experience had a higher level of efficacy. Finally, the research team of Burris, McLaughlin, McCulloch, Brashears and Fraze (2010) found that fifth year teachers were more efficacious in personal teaching efficacy, general teaching efficacy and content efficacy when compared to first year teachers.

Table 1 identifies all the available research pertaining to agricultural teacher efficacy over the last 16 years. In addition to the previously mentioned studies, Table 1 also examines the population, instrumentation, and findings.

Table 1

Previous Agriculture Teacher Efficacy Research

Author(s), Year	Population	Teacher Efficacy Instrument Used	Findings
Rodriguez, 1997	Pre-service through second year Agriculture Teachers in Ohio during the 1996-1997 school year.	Teacher Self Efficacy Scale (short form) (Hoy & Woolfolk, 1993)	Field dependent learning style yielded higher teacher efficacy scores than field independent or field neutral. Learning style was measured using the Group Embedded Figures Test.
Knobloch, 2001	Two groups of pre-service agricultural education students enrolled in a foundational agricultural education class.	Teacher Self Efficacy Scale (short form) (Woolfolk & Hoy, 1990)	One group experienced a significant increase in personal teaching efficacy after peer teaching, the other group did not. Neither group experienced an increase in personal or general teaching efficacy after their early field experience.
Knobloch & Whittington, 2002	Student teachers through third year agriculture teachers in Ohio during the 2001-2002 school year.	The Ohio State Teacher Sense of Efficacy Scale (TSES) (Tschannen-Moran & Woolfolk Hoy, 2001)	Collective teacher efficacy accounted for 10.8% of teacher efficacy, perceived teacher support accounted for 1.0% of teacher efficacy and the perception of the student teaching experience accounted for 2.8% of teacher efficacy.
Knobloch & Whittington, 2003a	First through third year agriculture teachers in Ohio during the 2001-2002 school year.	TSES	After ten weeks of teaching the teacher efficacy of the low career commitment group dropped while the teacher efficacy of the high career commitment group remained the same.
Knobloch & Whittington, 2003b; Knobloch, 2002	Student teachers through third year agriculture teachers in Ohio during the 2001-2002 school year.	Questionnaire developed based on Bandura's concept of self-efficacy and Darling-Hammonds (1999) review of effective teacher qualities.	After the initial ten weeks of school student teachers were found to have the highest teacher efficacy while first year teachers were found to have the lowest teacher efficacy.
Swan, 2005	Pre-service agricultural education students at Ohio State in 2004.	TSES	Learning style did no relate to teacher heart or teacher efficacy. Found that 17% of the variance in career intent was associated with teacher efficacy.

Whittington, McConnell & Knobloch, 2006	Ohio agriculture teachers in their first three years of teaching in 2002.	TSES	Career commitment had the strongest positive relationship with teacher efficacy. Number of students enrolled in agriculture education, the student teaching experience and confidence were also positively correlated with teacher efficacy. Number of class preparations and planning not to teach were negatively correlated with teacher efficacy.
Knobloch, 2006	Student teachers at Ohio State University and University of Illinois during the 2001-2002 school year.	TSES	Those student teachers who perceived their teacher preparation programs positively had a higher teacher efficacy. The two groups has similar teacher efficacy throughout the student teaching experience.
Roberts, Harlin & Ricketts, 2006	Student teachers at Texas A&M in the 2004 Fall cohort.	TSES	Teacher efficacy increased during a four week on campus experience, then dropped halfway through student teaching, but rebounded by the end of the student teaching experience. Student engagement efficacy dropped during student teaching.
Rocca & Washburn, 2006	Agriculture teachers in their first five years of teaching in Florida during the 2003-2004 school year.	TSES	Alternatively certified teachers were on average 10 years older than traditionally certified teachers, with an average of 12 more years of agriculturally related occupational experience. Alternatively and traditionally certified teachers had equal teacher efficacies.
Duncan & Ricketts, 2006	Middle school and/or high school agriculture teachers in a southern state during the 2004-2005 school year.	A researcher developed instrument measuring efficacy in four areas specific to Agricultural Education.	Traditionally certified teachers had higher efficacy scores in the following areas: technical content knowledge, FFA/SAE/Leadership Development, program management. The two groups were equally efficacious in the teaching and learning construct.
Wheeler & Knobloch, 2006	Illinois agriculture teachers in the first four years of teaching during the 2002-2003 school year.	TSES	Years of teaching experience was negatively correlated with teacher efficacy. Contract length, career commitment, number of students enrolled in the agricultural education program and years of teaching experience explained 11% of the variation in teacher efficacy.

Harlin, Roberts, Briers, Mowen & Edgar, 2007	Student teachers at Tarleton State, Texas A&M, Texas Tech and Oklahoma State in 2005.	TSES	Teacher efficacy increased through a four week on-campus experience, declined to its lowest level at the mid-point of student teaching, rebounded to the highest level at the end of student teaching.
Edgar, Roberts & Murphy, 2007	Student teachers at Texas A&M during the 2004, 2005 and 2006 Fall cohorts.	TSES	Structured communication with the cooperating teacher yielded a lower teacher efficacy. Those in the unstructured communication group increased in teacher efficacy during student teaching.
Roberts, Mowen, Edgar, Harlin & Briers, 2007	Student teachers at Texas A&M during the 2005 Spring and Fall semesters.	TSES	Researchers observed a dip in the overall teacher efficacy of student teachers at the mid-point of student teaching. Researchers also found that the personality type "sensing" was negatively correlated with instructional strategies efficacy and the personality type "judging" was positively related to classroom management efficacy. Personality types were measured using the Myers-Briggs Type Indicator.
Wolf, 2008; 2011	Agriculture teachers in Ohio who had been licensed though Ohio State University who had been teaching four years of less in 2008.	Researcher designed instrument used to collect agriculture teacher efficacy in three domains: classroom, FFA and SAE.	Highest level of teacher efficacy found in the classroom domain, lowest teacher efficacy levels in the SAE domain. Teachers' perception of their student teaching and first year of teaching were positively correlated with teacher efficacy.
Blackburn & Robinson, 2008	Agriculture teachers in Kentucky in their first six years of teaching.	TSES	Teachers in their 3-4 years of teaching had the lowest teacher efficacy and job satisfaction scores. In general teacher efficacy was positively correlated with overall job satisfaction.
Stripling, Ricketts, Roberts & Harlin, 2008; Stripling, 2005	Pre-service agricultural education students at the University of Georgia and Texas A&M University from the Fall of 2004 to the Spring of 2006.	TSES	Overall teaching efficacy increased at each point of data collection: before teaching methods class, after teaching methods class and after student teaching.

Aschebrener, Garton & Ross, 2010	Agriculture teachers with five years or less experience teaching in Missouri during the 2006-2007 school year.	Modified version of working with diverse students scale (Brownell & Pajares, 1999).	Teacher efficacy accounted for 14% of the variance in teachers' self-perceived success working with students with special needs.
Burris, McLaughlin, McCulloch, Brashears & Fraze, 2010	First and fifth year agriculture teachers in Texas during the 2006-2007 school year.	General and Personal Teacher Efficacy through the Teacher Self Efficacy Scale (Woolfolk & Hoy, 1990). Content efficacy was measured using a researcher developed instrument.	Fifth year agriculture teacher were more efficacious in: personal teaching efficacy, general teaching efficacy and in five areas of specific agriculture content knowledge. The differences in efficacy between the two groups were considered "Small."
Wolf, Foster & Birkenholz, 2010	Student teachers at Ohio State University during the 2007 Fall term.	TSES	Vicarious experiences accounted for the strongest relationship with teacher efficacy. The vicarious experience of observing a first year teacher accounted for 11% of the overall teaching efficacy and 14% of the instructional strategies efficacy. Verbal feedback from cooperating teacher was also positively correlated with teacher efficacy. The number of courses taught was negatively correlated with the classroom management efficacy domain.
Swan, Wolf & Cano, 2011	Longitudinal study of Ohio State University's 2004 Fall agriculture student teaching cohort. Efficacy recorded after student teaching, first, second and third years of teaching.	TSES	The lowest point of teacher efficacy was after the first year of teaching, the highest point of teacher efficacy was after the student teaching experience. The student engagement domain yielded the lowest level of teacher efficacy throughout the study.
Hartfield, 2011	Agriculture teachers in Arizona during the 2010-2011 school year.	Wolf's (2008) Agriculture Teacher Efficacy Scale	Experienced teachers (those with more than five years of experience) were more efficacious in classroom, FFA and SAE domains when compared to those Arizona teachers with less than five years of teaching experience.

Teacher Retention in Agriculture

Self-efficacy is directly connected with an individual's ability to persist through challenges (Bandura 1977a, 1977b, 1986, 1993). Early career agriculture teachers face a variety of challenges that might push a non-efficacious teacher out of the profession. Talbert et al. (1994) logged the daily struggles of new agriculture teachers during the 1988-1989 school year. Student discipline, unique requirements, unique pitfalls, teacher isolation, students, FFA activities, time management, lesson planning and classroom/laboratory management were consistently identified as challenges for these early career agriculture teachers.

In a more recent study conducted by Myers, Dyer and Washburn (2005) many major issues were identified as problems faced by beginning agriculture teachers. The top five issued identified by this study were: organizing an effective alumni chapter, organizing an effective advisory board, conducting FFA chapter events and activities, student discipline and recruiting and maintaining alumni members. Additionally, Croom (2003) investigated teacher retention in agriculture through the lens of teacher burnout. Croom found that agriculture teachers suffer from moderate levels of emotional exhaustion as well as low levels of depersonalization.

The triennial study, conducted by Kantrovich (2010), of the supply and demand of agriculture teachers has continually identified a need for stronger recruitment and retention strategies to increase the supply of agriculture teachers to an adequate level. Kantrovich identifies that national pushes to increase the number of agriculture programs will be unsuccessful without enough teachers with high career commitment. Kantrovich recommends additional research to identify why teachers are leaving the profession

including an investigation into national education agendas that could contribute to teachers not entering/leaving the profession. This study investigates one of these national education agendas, STEM and how science and math teaching efficacy relate to early career agriculture teachers' career commitment.

Conceptual Framework for the Current Study

Based on the review of literature related to the development of self-efficacy, teacher efficacy, the relationship between teacher self-efficacy and retention and agriculture teacher efficacy the following conceptual framework is proposed.

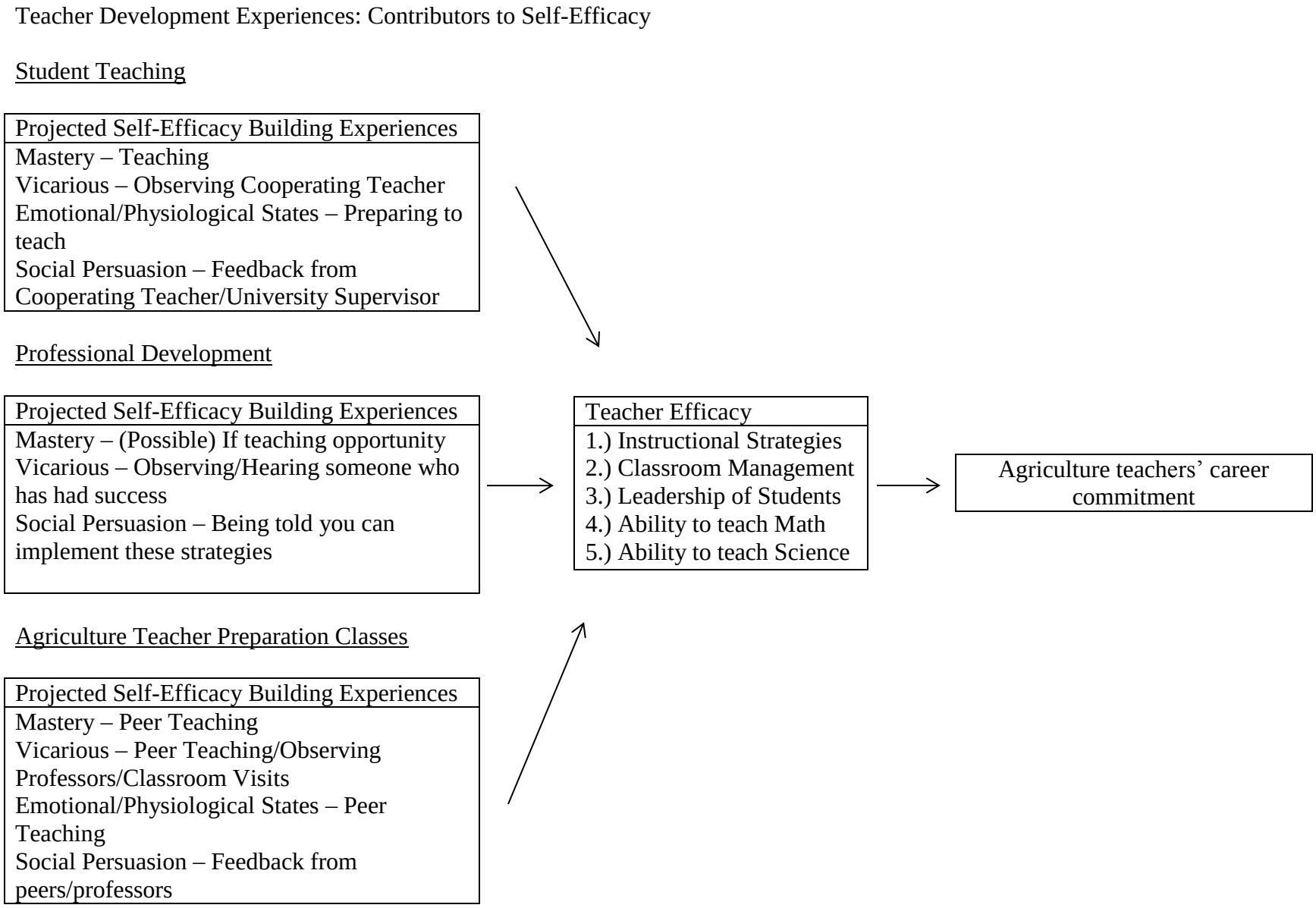

Figure 2. Conceptual model of the development of agriculture teacher efficacy and relationship between agriculture teacher efficacy and career commitment

Chapter 3: Research Methods

Type of Research

This descriptive, correlational study examined early career teacher's perceived impact of three teacher development experiences, early career teacher's current teaching efficacy in five constructs and early career teacher's career commitment. This study sought to capture all early career teachers, in their first through fifth year of teaching agriculture, in five western states during the 2012-2013 school year and is therefore considered a census. Potential threats to validity were addressed by this study. Sampling error was addressed by pursuing all early career teachers in the five identified western states. Frame and selection error were addressed by utilizing each states directory of school-based agriculture teachers checked by a leader in agricultural education within each respective state. In order to account for non-response error, on-time versus late respondents were compared. Validity and reliability tests were used to address measurement error.

The correlational component of this study sought to measure the relationships between early career teachers' perceived impact of three teacher development experiences and their current efficacy in five agriculture teaching related constructs. Additionally, the relationships between early career teachers career commitment and teacher efficacy were investigated.

Population and Subject Selection

The population of this descriptive, correlational study included all current agriculture teachers in their first five years of teaching in five western states: California,

Idaho, Oregon, Utah and Washington. The frame of this research was obtained by reviewing each states directory of school-based agriculture teachers and by contacting leaders in agricultural education within each respective state to ensure teachers in their first through fifth year of teaching were included in this study.

Outcome Measures

The five teacher efficacy constructs were assembled from four established efficacy scales used in education. Instructional strategies and classroom management constructs were taken from the Teacher's Sense of Efficacy Scale long form (Tschannen-Moran & Woolfolk Hoy, 2001). The wording of each question in the instructional strategies and classroom management constructs was changed to from "How much can you/To what extent can you/How well can you" to "I can/I am able" to ensure homogeneity throughout the five efficacy constructs. The scale used in the Teacher's Sense of Efficacy scale was changed from a nine point scale (1= Nothing; 9 = A Great Deal) to a scale ranging from one to six (1= Strongly Disagree; 6 = Strongly Agree) to ensure homogeneity throughout the instrument.

The 13 questions used to assess teachers' ability to teach science were taken from the Personal Science Teaching Efficacy Belief portion of the Science Teaching Efficacy Belief Instrument (Riggs & Enochs, 1990). The scaling was also changed from a five point scale (1 = Strongly Agree; 5 = Strongly Disagree) to a six point scale (1= Strongly Disagree; 6 = Strongly Agree).

The seven question construct used to measure early career teachers' ability to teach math efficacy was developed using the Ohio State University Teaching Confidence

Scale Math/Science efficacy construct after eliminating the two science specific questions (Woolfolk Hoy, 2000). "I can/I am able" was added at the beginning of each question.

The leadership of students efficacy section of the instrument was developed from the Individual Leadership Factors Inventory (ILFI) (Velez, Simonsen & Birkenholz, 2012). Wording in each question was changed from "others" to "students" to clarify for teachers that the assessment was of their leadership of students.

In addition to the teacher efficacy measurement was the measurement of teachers' perceived level of impact from three agriculture teacher development programs. The three areas of teacher development were selected based on their ability to be influenced by a college based teacher development program. A six point scale was used to measure teacher's perceived impact (1 = No Impact; 6 = Extreme Impact) with an additional "Not Applicable" selection made available for those respondents who did not go through the traditional teacher development process.

The final outcome measured was that of career commitment. Career commitment was measured based on the respondents' mean score from two questions: "How confident are you that you will be a school-based agriculture teacher in five (5) years?" and "How confident are you that you will be a school-based agriculture teacher in ten (10) years?" Confidence scores relating to career commitment were scored based on a six point scale (1 = No Confidence; 6 = Extreme Confidence).

Instrument Validity and Reliability

Following the development of the outcome measures, the reliability of the instrument used in this test was assessed through a pilot test (n=31) using the Cronbach's

alpha internal consistency reliability coefficient. Indiana agriculture teachers in their first through fifth year of teaching were used as the population for this pilot test. The reliabilities of this pilot test are presented in Table 2 and Table 3.

Table 2

Reliabilities of Teacher Efficacy Constructs (Cronbach's alpha) (n=31)

	Instructional Strategies	Classroom Management	Ability to Teach Science	Ability to Teach Math	Leadership of Students
Teacher efficacy	.83	.93	.75	.91	.95

Table 3

Reliabilities of Teacher Development Experiences (Cronbach's alpha) (n=31)

	Agriculture Teacher Preparation Classes	Student Teaching	Professional Development
Teacher Development Experience	.76	.72	.88

Data Collection Procedures

Data were collected using Dillman's (2000) tailored design method. Approval from the Institutional Review Board was sought and the study was approved. The data were collected using the secure online survey provider Qualtrics® with an option for individuals to receive a mailed questionnaire if they preferred.

The data were collected during February of 2013. Potential respondents were first sent a personalized e-mail which notified them of the study as well as offered them an

option to request a mailed copy of the questionnaire. Three days after original contact, a second e-mail was sent including a cover letter and a link to the questionnaire. In the event a respondent requested a mailed copy a cover letter, copy of the instrument and a pre-stamped return envelope were mailed to the potential respondent. Subsequent contacts, with a maximum of five points of contact, with the respondents were only with those who had not returned/completed the questionnaire.

On-time respondents were compared to late respondents using an independent samples t-test. On-time respondents were those who returned the questionnaire after the first two contacts containing a like to the questionnaire (Miller & Smith, 1983).

Data Analysis

The Statistical Package for the Social Science (SPSS) version 20 was used to analyze the collected data. Efficacy domains were summated to analyze the data. Career commitment was determined by identifying the mean response of two questions: "How confident are you that you will be a school based agriculture teacher in five (5) years?" and "How confident are you that you will be a school based agriculture teacher in ten (10) years?"

Descriptive statistics were used to complete research objective one: describe the demographic characteristics of early career agriculture teachers, objective two: describe the teacher efficacy of early career agriculture teachers and objective three: describe the perceived impact of identified teacher development experiences on early career agriculture teachers.

The data were then checked for normality using a one-sample Kolmogrov-Smirnov Test; career commitment and teacher development experience impact scores were not normally distributed. Due to the lack of a normal distribution, Spearman's correlation coefficients (ρ) were used to complete research objective four: describe the relationships between early career agriculture teachers' efficacy and their commitment to stay in the agriculture teaching profession. Spearman's Correlation coefficients (ρ) were also used to complete objective five: describe the relationship between early career agriculture teachers' efficacy and their perceived level of impact from identified teacher development experiences. The significance level used in this study was set *a priori* at $\alpha = < .05$. The effect size decision was also made *a priori*: $\rho < .10$ = trivial effect, $\rho > .10$ = small effect, $\rho > .30$ = moderate effect and $\rho > .50$ = large effect (Cohen 1988; 1992).

Similar to other studies inferential statistics were used in this research (Knobloch, 2006; Harlin, et al., 2007). This method was deemed acceptable by Gall, Gall and Borg (2003, p.176) who stated: "inferential statistics can be used with data collected from a convenience sample if the sample is carefully conceptualized to represent a particular population." As stated by Harlin and fellow researchers (2007, p. 81) "Readers are encouraged to examine the description of the sample and make their own judgment about generalizing the findings to other populations…"

Chapter 4: Findings

A total of 295 agriculture teachers were identified for this study. All identified teachers' were in their first five years of teaching school-based agriculture in California, Idaho, Oregon, Utah and Washington during the 2012-2013 school year. The majority of teachers, 184, were teaching in California at the point of data collection; an additional 25 Idaho teachers, 34 Oregon teachers, 28 Utah teachers and 24 Washington teachers comprised the scope of this study. A total of 168 teachers responded to the questionnaire, yielding a 57% response rate. The decision was made *a priori* to remove respondents who failed to complete at least 75% of the questionnaire, this decision removed 18 of the responses yielding a useable response rate of 51%. A total of 97 respondents taught in California, 8 in Idaho, 21 in Oregon, 18 in Utah and 6 in Washington. The breakdown of response rates by state can be found in Table 4.

Table 4

Response rates by state (N =150)

	Questionnaires Sent	Number Responded	Response Rate
California	184	97	52.72%
Idaho	25	8	32.00%
Oregon	34	21	61.76%
Utah	28	18	64.29%
Washington	24	6	25.00%
Total	295	150	50.85%

On-time respondents (those responding before the third point of contact; $N = 104$) were compared to late respondents (those responding after the third point of contact; $N =$

46) using an independent samples *t*-test ($\alpha = 0.05$). No significant difference was found between the two groups in the areas of career commitment, science teaching efficacy, instructional strategies efficacy, classroom management efficacy, math teaching efficacy and leadership of students efficacy. Therefore, non-response bias was not considered an issue.

Results for objective 1: Describe the demographic characteristics of early career agriculture teachers in five western states.

Respondents to this questionnaire included 39 (26.00%) first year agriculture teachers, 32 (21.33%) second year teachers, 35 (23.33%) third year teachers, 25 (16.67%) fourth year teachers and 19 (12.67%) fifth year teachers. The average age of respondents was 28.6 years old, with a range of ages from 23 to 64 years old; the most common age was 25, which included 23 (15.33%) respondents, 71.80% of respondents were between the ages of 23 to 28. The majority of teachers (67.80%) were female. Of the respondents: 83.33% went through a high school agriculture program, 26.00% held a bachelor's degree, 45.33% had completed some graduate work, 28.67%, 25.17% were CASE certified and 89.33% taught agriculture courses for science credit.

The average number of students enrolled in early career teachers' agriculture programs was 280 students; the smallest agriculture program included 8 students with the largest program serving 1,700 students. On average respondents taught 65 minute class periods and facilitated just over one agri-science lab per week in each agriculture class they taught. The most common response to the number of teachers in the agriculture

program was one (39.33%) with a range in the number of teachers per agriculture program from one to nine; the average number of teachers per program was 2.34.

When asked how confident these early career teachers were they would still be teaching school-based agriculture in five years, 61.33% were either highly confident or extremely confident they would still be teaching. Only 14.67% early career teachers responded that they had less than moderate confidence they would be teaching in five years. Additionally, teachers in this study were asked how confident they were that they would be teaching school-based agriculture in ten years; 41.33% of the respondents indicated they were either highly confident or extremely confident they would still be teaching in ten years. The percentage of respondents that indicated they were less than moderately confident they would still be teaching school-based agriculture in ten years was 28.67%.

Results for objective 2: Describe the teacher efficacy of early career agriculture teachers in five western states.

Respondents to this questionnaire indicated the strongest efficacy in the area of classroom management. The average classroom management efficacy score was 5.01 on a six point scale. The next highest efficacy identified through this study was respondent's instructional strategies efficacy which averaged 4.90. Following instructional strategies teachers felt most efficacious in their ability to lead students, which averaged 4.80. Teachers' perceived the least amount of efficacy in their ability to teach science (4.20), and their ability to teach math (4.04). A summary of how teachers' perceived their efficacy in these five areas can be found in Table 5.

Table 5

Respondents' Teacher Efficacy (*N* = 150)

	Minimum	Maximum	Average	Standard Deviation
Classroom Management	3.29	6.00	5.01	.69
Instructional Strategies	2.75	6.00	4.90	.63
Leadership of Students	2.75	6.00	4.80	.68
Ability to Teach Science	2.92	5.46	4.20	.49
Ability to Teach Math	1.00	6.00	4.04	.94

Note. Teachers' sense of efficacy measured on a six point scale; 1 = Strongly Disagree, 6 = Strongly Agree

Results for objective 3: Describe the perceived impact of identified teacher development experiences on early career agriculture teachers in five western states.

Respondents to this questionnaire identified student teaching as the most influential agriculture teacher development experience in the following areas: classroom management, instructional strategies, leadership of students, ability to teach science and ability to teach math. Agriculture teacher preparation was identified as the least impactful experience for respondents' classroom management, instructional strategies, leadership of students and ability to teach science. Table 6 shows respondents average impact score based on a six point scale.

Table 6

Perceived Impact of Teacher Development Experiences on Respondent's Teaching Strategies (*N* = 150)

	Agriculture Teacher Preparation	Student Teaching	Professional Development
Classroom Management	3.58	4.87	3.79
Instructional Strategies	4.30	4.99	4.50
Leadership of Students	4.20	4.94	4.45
Ability to Teach Science	3.77	4.34	4.27
Ability to Teach Math	2.45	2.61	2.25

Note. Teachers' perceived impact measured on a six point scale; 1= No Impact, 6 = Extreme Impact

Results for objective 4: Describe the relationship between teacher efficacy and career commitment for early career teachers in five western states.

The relationship between respondents' career commitment and teacher efficacy (Table 7) identified that classroom management efficacy had the strongest relationship with career commitment (ρ = .37, r^2= .14). Additionally, the correlation between instructional strategies efficacy (ρ = .33, r^2= .11), ability to teach science (ρ = .34, r^2= .12) and career commitment produced a medium effect size (Cohen, 1988, 1992). Significant relationships (small effect sizes) were also found between leadership of students efficacy and career commitment (ρ = .30, r^2= .09) as well as respondents' ability to teach math efficacy and career commitment (ρ = .20, r^2= .04).

The potential issue of multi-collinearity was checked using the Lewis-Beck (1980) method. Each independent variable was regressed against all other independent variables. The resulting r^2 values from each regression were not close to 1.0, (r^2 values ranged from .15 to .55) therefore multi-collinearity was not considered an issue among the independent variables used in objective 4. These conclusions are supported by Cohen & Cohen (1983) who advocate keeping independent variables separate if the research objectives require separate analyses of each independent variable and its relationship with the dependent variable.

Table 7

Correlations of Teacher Efficacy Variables and Career Commitment

	1	2	3	4	5	6
1. Classroom Management Efficacy	--	.65	.67	.39	.20	.37
2. Instructional Strategies Efficacy		--	.61	.49	.38	.33
3. Leadership of Students Efficacy			--	.45	.21	.30
4. Ability to Teach Science Efficacy				--	.30	.34
5. Ability to Teach Math Efficacy					--	.20
6. Career Commitment						--

Note. Spearman's correlation coefficients (ρ) reported (N = 150)

Results for objective 5: Describe the relationship between teacher efficacy and the perceived impact of teacher development experiences for early career teachers in five western states.

Potential multi-collinearity issues between the independent variables (teacher development experiences) for each cluster of teacher efficacy were checked using the Lewis-Beck (1980) method. The resulting r^2 values from each set of regressions ranged from .12 to .46, therefore multi-collinearity was not considered an issue among each set of independent variables used to complete objective 5. These conclusions are supported by Cohen & Cohen (1983) who advocate keeping independent variables separate if the research objectives require separate analyses of each independent variable and its relationship with the dependent variable.

The relationship between respondents' classroom management efficacy and perception of the impact of three teacher development experiences: agriculture teacher preparation, student teaching and professional development experiences are shown in Table 8. Two teacher development experiences were identified as having a significant relationship with respondents' classroom management efficacy: agriculture teacher preparation (ρ = .25, r^2= .06) and student teaching (ρ = .28, r^2= .08). The relationship between respondents' classroom management efficacy and their perception of professional development experiences was not significant (ρ = .07, r^2= < .01).

Table 8

Correlations of Teacher Development Experiences and Classroom Management Efficacy

	1	2	3	4
1. Agriculture Teacher Preparation	--	.42	.43	.25
2. Student Teaching		--	.23	.28
3. Professional Development			--	.07
4. Classroom Management Efficacy				--

Note. Spearman's correlation coefficients (ρ) reported (N = 150)

Two significant relationships were identified between respondents' instructional strategies efficacy and their perception of agriculture teacher development experiences (Table 9). Agriculture teacher preparation (ρ = .18, r^2= .03) and student teaching (ρ = .24, r^2= .06) were both found to be significantly related to respondents' instructional strategies efficacy. The relationship between respondents' instructional strategies efficacy and their perception of professional development experiences was found to be non-significant (ρ = .11, r^2= .01).

Table 9

Correlations of Teacher Development Experiences and Instructional Strategies Efficacy

	1	2	3	4
1. Agriculture Teacher Preparation	--	.33	.28	.18
2. Student Teaching		--	.28	.24
3. Professional Development			--	.11
4. Instructional Strategies Efficacy				--

Note. Spearman's correlation coefficients (ρ) reported (N = 150)

Investigation into the relationship between respondents' perception of teacher development experiences and their leadership of students efficacy identified three significant relationships (Table 10). The strongest relationship was between respondents' perception of their student teaching experience and their leadership of students efficacy (ρ = .41, r^2= .17). The relationship between respondents' perception of professional development experiences (ρ = .32, r^2= .10) and agriculture teacher preparation (ρ = .27, r^2= .07) were also identified as significant when correlated with respondents' leadership of students efficacy.

Table 10

Correlations of Teacher Development Experiences and Leadership of Students Efficacy

	1	2	3	4
1. Agriculture Teacher Preparation	--	.52	.50	.27
2. Student Teaching		--	.46	.41
3. Professional Development			--	.32
4. Leadership of Students Efficacy				--

Note. Spearman's correlation coefficients (ρ) reported (N = 150)

The relationships between respondents' science teaching efficacy and their perception of three teacher development experiences were identified as significant for all three teacher development experiences (Table 11). The strongest relationship was identified between science teaching efficacy and respondents' perception of professional development experiences (ρ = .28, r^2= .08). Additionally, both agriculture teacher preparation (ρ = .20, r^2= .04) and student teaching (ρ = .20, r^2= .04) were identified as significantly related to respondents' science teaching efficacy.

Table 11

Correlations of Teacher Development Experiences and Ability to Teach Science Efficacy

	1	2	3	4
1. Agriculture Teacher Preparation	--	.30	.23	.20
2. Student Teaching		--	.34	.20
3. Professional Development			--	.28
4. Ability to teach Science Efficacy				--

Note. Spearman's correlation coefficients (ρ) reported (N = 150)

Three significant relationships were identified when investigating respondents' perception of teacher development experiences and math teaching efficacy (Table 12). The strongest relationship was found between respondents' perception of the agriculture teacher preparation experience and their math teaching efficacy (ρ = .42, r^2= .18). Respondents' perception of both student teaching (ρ = .33, r^2= .11) and professional development (ρ = .33, r^2= .11) experiences were also identified as being significantly correlated with respondents' math teaching efficacy.

Table 12

Correlations of Teacher Development Experiences and Ability to Teach Math Efficacy

	1	2	3	4
1. Agriculture Teacher Preparation	--	.61	.60	.42
2. Student Teaching		--	.60	.33
3. Professional Development			--	.33
4. Ability to teach Math Efficacy				--

Note. Spearman's correlation coefficients (ρ) reported (N = 150)

Chapter 5: Conclusions, Discussion & Recommendations

Conclusions

Conclusions of objective 1: Describe the demographic characteristics of early career agriculture teachers in five western states.

Based on the demographic findings of this study the researcher can conclude that the majority of agriculture teachers in their first five years of teaching in California, Idaho, Oregon, Utah and Washington are between 23 and 28 years old. The average early career agriculture teacher in these five western states is a female with a bachelor's degree who went through an agriculture program as a high school student. The typical program of an early career agriculture teacher consists of: 280 students, 2 to 3 teachers, 65 minute class periods, just over one agri-science lab per week in each class and opportunities for students to receive science credit through the agriculture program.

The majority (61.33%) of respondents were either highly confident or extremely confident they would be teaching school-based agriculture in five years. When asked their confidence level towards teaching school-based agriculture in ten years fewer teachers were as confident they would still be teaching agriculture. No respondents indicated "no confidence" when asked if they would be teaching school-based agriculture in five years, only four teachers (2.67%) indicated no confidence towards teaching school-based agriculture in ten years. Based on these findings the researcher can conclude that the typical early career teacher in these five western states is highly confident they will be teaching school-based agriculture in five years and moderately confident they will be teaching school-based agriculture in ten years.

Conclusions of objective 2: Describe the teacher efficacy of early career agriculture teachers in five western states.

Respondents to this study indicated the strongest teacher efficacy in classroom management with an average construct score of 5.01 on a six point scale. Respondents felt similarly efficacious in the instructional strategies and leadership of students constructs, averaging a 4.90 and 4.80 respectively. Respondents identified the two constructs related to STEM education as the two constructs they were the least efficacious in. Respondents' ability to teach science efficacy yielded an average construct score of 4.20. The lowest efficacy score was found in the ability to teach math efficacy construct which averaged a 4.04, nearly a whole point less than the highest efficacy construct, classroom management efficacy. These findings indicate a potential need for an increased focus on math and science teaching skills throughout early career teachers' development.

Conclusions of objective 3: Describe the perceived impact of identified teacher development experiences on early career agriculture teachers in five western states.

In the area of classroom management respondents identified student teaching as the most impactful experience towards their current classroom management strategies. Student teaching (4.87) averaged over a point higher than the two other experiences: professional development experiences (3.79) and agriculture teacher preparation (3.58). These findings indicate the potential to increase classroom management focus during agriculture teacher preparation as well as professional development experiences.

Student teaching was again rated as the most impactful experience towards these early career teachers' instructional strategies. The discrepancy between student teaching (4.99), professional development experiences (4.50) and agriculture teacher preparation (4.30) was not as prevalent though, indicating that each experience had a similar impact on these early career teachers' instructional strategies.

In the leadership of students and ability to teach science constructs student teaching was again rated as the most impactful experience. In each of these areas, professional development experiences were rated as the second most impactful experience, followed by the agriculture teacher preparation experience.

The ability to teach math impact scores identifies an alarming gap in early career teachers' perception of the impact of these three teacher development experiences. The student teaching experience was rated as the most impactful experience towards respondents' ability to teach math, but was only rated a 2.61 on a six point scale, more than two points lower than the average student teaching impact score. Likewise, agriculture teacher preparation (2.45) and professional development experiences (2.25) were identified as extremely low influencers towards respondents math teaching strategies. These abnormally low math teaching impact scores identify a potential lack of useable math teaching experiences in the three identified teacher development experiences.

Conclusions of objective 4: Describe the relationship between teacher efficacy and career commitment for early career teachers in five western states.

The investigation into the relationship between respondents' teacher efficacy and career commitment identified five significant relationships. The strongest relationship was found between classroom management efficacy and career commitment (r^2= .14*)* which indicates that 14% of the variance in career commitment can be explained by respondents' classroom management efficacy. Ability to teach science efficacy was identified as having the second strongest relationship with respondents' career commitment, explaining 12% (r^2= .12) of the variance in career commitment. Additionally, instructional strategies efficacy explained 11% (r^2= .11) of the variance in career commitment, leadership of students efficacy explained 9% (r^2= .09) of the variance in career commitment and respondents' ability to teach math efficacy explained 4% (r^2= .04) of the variance in career commitment. These findings support the research completed by Blackburn and Robinson (2008), Knobloch and Whittington (2003a), Swan (2005) and Whittington, McConnell and Knobloch (2006) which also found a positive relationship between career commitment and teacher efficacy among agriculture teachers.

Conclusions of objective 5: Describe the relationship between teacher efficacy and the perceived level of impact for early career teachers in five western states.

Two significant relationships were found between respondents' perception of agriculture teacher development experiences and their classroom management efficacy. Respondents' perception of the impact of the student teaching experience was found to explain 8% (r^2= .08) of the variance in classroom management efficacy. Additionally, 6% (r^2= .06) of the classroom management efficacy was explained by respondents' perception of the impact of professional development experiences.

Respondents' instructional strategies efficacy was found to significantly relate to their perception of the impact of all three teacher development experiences. Student teaching explained 6% (r^2= .06) of the variance in instructional strategies efficacy. The agriculture teacher preparation experience explained 3% (r^2= .03) of the variance in instructional strategies efficacy, respondents' perception of professional development experiences explained 1% (r^2= .01) of the variance in instructional strategies efficacy.

Respondents' leadership of students efficacy was found to be significantly related to their perceived impact of the three identified teacher development experiences. The strongest relationship was found with respondents' perception of the impact of student teaching which explained 17% (r^2= .17) of the variance in leadership of students efficacy. Additionally, 10% (r^2= .10) of the variance in leadership of students efficacy was explained by early career teachers' perception of the impact of professional development experiences and 7% (r^2= .07) was explained by early career teachers' perception of the agriculture teacher preparation experience.

Investigation into the relationship between respondents' perception of the impact of teacher development experiences and their science teaching efficacy revealed three significant relationships. The perceived impact of professional development experiences explained 8% (r^2= .08) of the variance in science teaching efficacy. The perceived impact of the agriculture teacher preparationaration experience and the student teaching experience explained 4% (r^2= .04) and 4% (r^2= .04) of the variance in early career teachers' science teaching efficacy respectively.

Respondents' math teaching efficacy was found to have the strongest overall relationship with early career teachers' perception of the three identified teacher

development experiences. The strongest relationship was found between respondents' perception of the impact of agriculture teacher preparation, which was found to explain 18% (r^2= .18) of the variance in math teaching efficacy. Additionally, the perception of the impact of student teaching was found to explain 11% (r^2= .11) of the variance in math teaching efficacy. A total of 11% (r^2= .11) of the variance in math teaching efficacy was explained by respondents' perception of professional development experiences.

Discussion & Recommendations: Classroom Management Efficacy

Like the majority of recent research into agriculture teachers' efficacy, respondents to this study felt the most efficacious in their classroom management abilities (Blackburn & Robinson, 2008; Roberts et al., 2007; Wolf et al., 2010). This study identified that of the three identified teacher development experiences, student teaching was identified as having the highest impact on early career teachers' classroom management strategies. The student teaching experience was also found to have the strongest relationship with classroom management efficacy, explaining 8% of the variation. These findings are consistent with Bandura's (1977a) conceptualization of the development of efficacy. Student teaching offers pre-service teachers the first opportunity to gain substantial mastery and vicarious experiences managing a classroom.

The relationship between career commitment and early career teachers' classroom management efficacy identified that 14% of the variation in career commitment could be explained by classroom management efficacy. These findings provide evidence towards the importance of classroom management efficacy to the retention of early career agriculture teachers. The strong relationship found between career commitment and

classroom management efficacy paired with the significant relationships between respondents' perception of the student teaching experience as well as respondents' perception of the agriculture teacher preparation experience allow the researcher to make two recommendations. First, it is recommended that classroom management focused, vicarious experiences, such as showing pre-service students effective classroom management strategies being executed by an early career teacher be included and/or increased in agriculture teacher preparation classes. Likewise, encouraging cooperating teachers to emphasize effective classroom management strategies during the student teaching experience is recommended.

Discussion & Recommendations: Instructional Strategies Efficacy

Concurrent with past research this study found that agriculture teachers have a high instructional strategies efficacy (Blackburn & Robinson, 2008; Roberts et al., 2007; Stripling et al., 2005; Swan et al., 2011; Wolf et al., 2010). The development of these early career agriculture teachers' instructional strategies efficacy was evaluated through their perception of three early career development experiences. Student teaching was rated as having the highest impact on respondents' current instructional strategies. Unlike classroom management, respondents indicated a similar impact score for both agriculture teacher preparation classes and professional development experiences. These findings indicate a balance between agriculture teacher preparation, student teaching and professional development experiences as they relate to the development of instructional strategies.

The relationship between respondents' perception of student teaching, agriculture teacher preparation and professional development and their instructional strategies efficacy revealed two significant relationships. Student teaching and agriculture teacher preparation were identified as significantly related to respondents' instructional strategies efficacy. Although these experiences were identified as significant, they were not as strong as the relationships found in other efficacy areas. These findings indicate that other experiences, most likely mastery experiences completed while teaching, have a stronger impact on respondents' instructional strategies efficacy.

A moderate, positive relationship was found between early career teachers' instructional strategies efficacy and their career commitment. These findings support the claims that higher efficacy leads to more persistence in a given task (Bandura 1977a). The balanced impact scores of the three identified teacher development experiences, paired with the high instructional strategies efficacy, indicate that the agriculture teacher development process, along with mastery teaching experiences during teaching, are producing teachers high in instructional strategies efficacy. Future research should investigate additional experiences of early career teachers with the goal of finding experiences that have a significant relationship with instructional strategies efficacy. This research will add to the understanding of which experiences have a significant relationship with instructional strategies efficacy.

Discussion & Recommendations: Leadership of Students Efficacy

Of the three newly researched efficacy areas: leadership of students, ability to teach math and ability to teach science, early career teachers felt most efficacious in their

leadership of students. The average leadership of students efficacy was just 0.10 points from respondents' instructional strategies efficacy score, the narrowest margin identified in this study. Respondents felt student teaching was the most impactful experience towards their ability to lead students. Further investigation into the relationship between respondents' perception of the impact of the student teaching experience and their leadership of students efficacy revealed that 17% of the variance found in leadership of students efficacy could be attributed to respondents perception of the impact of the student teaching experience. Furthermore, the perception of the impact of the agriculture teacher preparation experience and professional development experiences accounted for 7% and 10% of the variance in respondents' leadership of students efficacy respectively. These findings provide evidence that each of the three identified teacher development experiences have a significant influence on early career teachers' leadership of students efficacy.

This study indicates that leadership of students efficacy has a significant relationship with early career teachers' career commitment. A total of 9% of the variance found in career commitment was attributed to leadership of students efficacy. These findings provide evidence that increased focus on strategies for leading students during student teaching, agriculture teacher preparation and professional development experiences have the potential to increase early career teachers' leadership of students efficacy and in turn their career commitment. Based on these findings the researcher recommends that pre-service teachers be encouraged to coach a variety of career development events during the student teaching experience to gain efficacy building mastery leadership experiences. Additionally, it is recommended that agricultural

education based professional development experiences as well as agriculture teacher preparation classes include leadership workshops where pre-service and current teachers can learn effective strategies for leading high school students. These strategies have the potential to increase early career teachers' leadership of students efficacy.

Discussion & Recommendations: Ability to Teach Science Efficacy

Early career teachers' ability to teach science was found to be the second lowest efficacy area identified in this study. Respondents identified student teaching as the most impactful experience towards their science teaching ability, the experience with the lowest science teaching impact score was agriculture teacher preparation classes. Although student teaching was identified as the most impactful teacher development experience towards early career agriculture teachers' ability to teach science, it did not have the strongest relationship with higher science teaching efficacy, explaining just 4% of the variance. The teacher development experience with the strongest positive relationship with science teaching efficacy was professional development experiences, which accounted for 8% of the variance in science teaching efficacy.

The relationship between science teaching efficacy and career commitment was significant. This study found that 12% of the variance in career commitment was explained by science teaching efficacy, the second strongest relationship behind classroom management. The significant relationship between science teaching efficacy and career commitment combined with the significant relationships found between science teaching efficacy and all three agriculture teacher development experiences identify the potential benefits for increased science integration throughout the agriculture

teacher development process. The researcher recommends science teaching based mastery experiences (agriculture teachers successfully executing agri-science labs) be included or increased in student teaching, agriculture teacher preparation and professional development experiences.

Discussion & Recommendations: Ability to Teach Math Efficacy

The lowest efficacy area identified by this study is math teaching efficacy, falling almost a whole point below classroom management efficacy on a six point scale. Investigation into the development of math teaching efficacy identifies that respondents feel very little math teaching impact during student teaching, agriculture teacher preparation and professional development experiences. Although the average level of impact is quite low the relationship between respondents' perceived impact of teacher development experiences and math teaching efficacy was strong. This study identified that 18% of the variance in math teaching efficacy could be attributed to respondents perception of the impact of agriculture teacher preparation. Additionally, student teaching and professional development experiences both accounted for 11% of the variance in math teaching efficacy. These findings indicate the tremendous potential to increase agriculture teachers' math teaching efficacy.

Investigation into the relationship between math teaching efficacy and career commitment identified that 4% of the variation in career commitment could be explained by math teaching efficacy, the weakest relationship identified through this study. Although the relationship between math teaching efficacy and career commitment is low it is still recommended that increased math integration experiences permeate the

agriculture teacher development process in order to meet the demands of STEM integration in agricultural education. The researcher recommends that math teaching workshops become a part of the agriculture teacher preparation, student teaching and professional development experiences.

Summary of Recommendations

The researcher recommends that…

1.) Vicarious experiences, such as showing pre-service students effective classroom management strategies being successfully executed by an early career teacher, be included and/or increased in agriculture teacher preparation classes.
2.) Professional development experiences that include early career teachers contain opportunities for teachers to see and discuss footage of "real-world" classroom management strategies being executed.
3.) Cooperating teachers be encouraged to emphasize effective classroom management strategies during the student teaching experience.
4.) Pre-service teachers be encouraged to coach a variety of career development teams during student teaching.
5.) Agricultural education based professional development experiences as well as agriculture teacher preparation classes include leadership workshops where pre-service and current teachers can learn effective strategies for leading high school students.
6.) Science teaching based mastery experiences, agriculture teachers successfully executing agri-science labs, be included or increased in student teaching, agriculture teacher preparation and professional development experiences.
7.) Math teaching workshops become a part of the agriculture teacher preparation, student teaching and professional development experiences.
8.) Math and science integrated lesson plans be facilitated by pre-service students during peer-teaching.

Recommendations for Further Study

1. Continued research into the development of teacher efficacy among early career agriculture teachers.
2. Continued research into the effects of teacher efficacy on agriculture teachers' career commitment.
3. Longitudinal studies of agriculture teacher efficacy to evaluate the change in teacher efficacy over the first five years of teaching school-based agriculture.
4. Investigation into the teacher efficacy of those individuals who choose not to enter the agriculture teacher profession as well as those individuals who choose to leave the agriculture teaching profession.
5. Future research should investigate what experiences have a significant relationship with instructional strategies efficacy and classroom management efficacy.
6. Future studies of agriculture teacher efficacy include leadership of students efficacy, math teaching efficacy and science teaching efficacy.
7. Additional studies in agriculture teacher efficacy that explore agriculture teachers' technology and engineering teaching efficacy to add to the professions' knowledge about STEM teaching in agricultural education.

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Appendix A

Questionnaire

Basic Teacher Information

Answer the following questions by circling the response that best answers the question.

Are you currently a school-based Agriculture teacher? *(Please circle your answer)*	Yes	No

If "No" is selected, then skip to the end of survey

Answer the following questions using the scale provided. *(Please circle your answers)*	No Confidence	Low Confidence	Slight Confidence	Moderate Confidence	High Confidence	Extreme Confidence
How confident are you that you will be a school-based Agriculture teacher in five (5) years?	1	2	3	4	5	6
How confident are you that you will be a school-based Agriculture teacher in ten (10) years?	1	2	3	4	5	6

What year of teacher school-based Agriculture are you currently in? *(Please circle your answer)*

First Year	Second Year	Third Year
Fourth Year	Fifth Year	Sixth Year or Higher

If "Sixth Year or Higher" is selected, then skip to the end of survey

Impact on Teaching

Please indicate the degree to which each of the following had an impact on your <u>instructional strategies</u>. *<u>Instructional Strategies</u>: the approaches teachers take to achieve the learning objectives. (examples: group work, labs, debates)*	No Impact	Low Impact	Slight Impact	Moderate Impact	High Impact	Extreme Impact
Agriculture Teacher Preparation Classes in College	1	2	3	4	5	6
Student Teaching	1	2	3	4	5	6
Agricultural Education Based Professional Development	1	2	3	4	5	6

Please indicate the degree to which each of the following had an impact on your <u>classroom management</u>. *<u>Classroom Management</u>: The process you use to ensure classroom lessons run smoothly. (example: discipline methods, preventative strategies)*	No Impact	Low Impact	Slight Impact	Moderate Impact	High Impact	Extreme Impact
Agriculture Teacher Preparation Classes in College	1	2	3	4	5	6
Student Teaching	1	2	3	4	5	6
Agricultural Education Based Professional Development	1	2	3	4	5	6

Please indicate the degree to which each of the following had an impact on your ability to teach <u>math</u>.	No Impact	Low Impact	Slight Impact	Moderate Impact	High Impact	Extreme Impact
Agriculture Teacher Preparation Classes in College	1	2	3	4	5	6
Student Teaching	1	2	3	4	5	6
Agricultural Education Based Professional Development	1	2	3	4	5	6

Please indicate the degree to which each of the following had an impact on your ability to teach <u>science</u>.	No Impact	Low Impact	Slight Impact	Moderate Impact	High Impact	Extreme Impact
Agriculture Teacher Preparation Classes in College	1	2	3	4	5	6
Student Teaching	1	2	3	4	5	6
Agricultural Education Based Professional Development	1	2	3	4	5	6

Please indicate the degree to which each of the following had an impact on your <u>ability to positively influence students</u>.	No Impact	Low Impact	Slight Impact	Moderate Impact	High Impact	Extreme Impact
Agriculture Teacher Preparation Classes in College	1	2	3	4	5	6
Student Teaching	1	2	3	4	5	6
Agricultural Education Based Professional Development	1	2	3	4	5	6

Teacher Sense of Self Efficacy Scale

Efficacy is the ability to produce a desired or intended result.
Answer the following questions by circling the response that best answers the question.

Instructional Strategies						
Answer the following questions using the scale provided.	Strongly Disagree	Moderately Disagree	Mildly Disagree	Mildly Agree	Moderately Agree	Strongly Agree
I can respond to difficult questions from my students.	1	2	3	4	5	6
I can gauge student comprehension of what I have taught.	1	2	3	4	5	6
I can craft good questions for my students.	1	2	3	4	5	6
I am able to adjust my lessons to the proper level for individual students.	1	2	3	4	5	6
I can use a variety of assessment strategies.	1	2	3	4	5	6
I can provide an alternative explanation when students are confused.	1	2	3	4	5	6
I am able to implement alternative strategies in my classroom.	1	2	3	4	5	6
I can provide appropriate challenges for very capable students.	1	2	3	4	5	6
Classroom Management						
I can control disruptive behavior in the classroom.	1	2	3	4	5	6
I can make my expectations clear about student behavior.	1	2	3	4	5	6
I am able to establish routines to keep activities running smoothly.	1	2	3	4	5	6
I can get children to follow classroom rules.	1	2	3	4	5	6
I can calm a student who is disruptive.	1	2	3	4	5	6
I can establish a classroom management system with each group of students.	1	2	3	4	5	6
I can respond to defiant students.	1	2	3	4	5	6
Math Teaching Efficacy						
I can give students concrete experiences in learning mathematics.	1	2	3	4	5	6
I am able to connect mathematics to literature.	1	2	3	4	5	6
I can teach basic concepts of fractions.	1	2	3	4	5	6
I am able to teach algebra.	1	2	3	4	5	6
I can develop number sense in students.	1	2	3	4	5	6

I can facilitate students' communication about mathematics (through journals, discussions, etc.).	1	2	3	4	5	6
I can locate resources for planning mathematics lessons.	1	2	3	4	5	6

Teacher Sense of Self Efficacy Scale Continued

Leadership of Students						
Answer the following questions using the scale provided.	Strongly Disagree	Moderately Disagree	Mildly Disagree	Mildly Agree	Moderately Agree	Strongly Agree
I can inspire students to do more than what is expected.	1	2	3	4	5	6
I can inspire students to perform at high levels.	1	2	3	4	5	6
I can convince students to change their behavior.	1	2	3	4	5	6
I can motivate students to achieve results.	1	2	3	4	5	6
I am able to bring out the strengths in students.	1	2	3	4	5	6
I can influence students to create change.	1	2	3	4	5	6
I am able to influence students to work as a team.	1	2	3	4	5	6
I am able to inspire students toward a shared goal.	1	2	3	4	5	6
Science Teaching Efficacy						
When a student does better than usual in science, it is often because the teacher exerted a little extra effort.	1	2	3	4	5	6
I am continually finding better ways to teach science.	1	2	3	4	5	6
When the science grades of students improve, it is most often due to their teacher having found a more effective teaching approach.	1	2	3	4	5	6
I know the steps necessary to teach science concepts effectively.	1	2	3	4	5	6
I am very effective in monitoring science experiments.	1	2	3	4	5	6
If students are underachieving in science, it is most likely due to ineffective science teaching.	1	2	3	4	5	6
The inadequacy of a student's science background can be overcome by good teaching.	1	2	3	4	5	6
The low science achievement of some students cannot generally be blamed on their teachers.	1	2	3	4	5	6
When a low achieving student progresses in science, it is usually due to extra attention given by the teacher.	1	2	3	4	5	6
I understand science concepts well enough to be effective in teaching science.	1	2	3	4	5	6
Increased effort in science teaching produces little change in some students' science achievement.	1	2	3	4	5	6

The teacher is generally responsible for the achievement of students in science.	1	2	3	4	5	6
Students' achievement in science is directly related to their teacher's effectiveness in science teaching.	1	2	3	4	5	6

Demographic Information

For the following questions either write in or circle your response.

Please indicate your age:		
Please indicate your sex:	Male	Female
Were you involved in a school-based Agriculture program while you were in school?	Yes	No
What is the highest level of education you have completed?	Bachelor's Degree	Some Graduate Course-work
	Master's Degree	PhD
Did you receive your undergraduate degree in Agricultural Education? If no, please specify: _____ _____	Yes	No If no, please specify in the box to the left.
Are you certified to teach a CASE (Curriculum for Agricultural Science Education) course? If yes which course/courses: _____ _____	Yes If yes, please specify which course/courses in the box to the left.	No
How many teachers are in your local Agricultural Education program?		
What is the approximate number of students enrolled in the agriculture program during the 2012-2013 school year?		
Are students eligible to receive science credit for agriculture courses during the 2012-2013 school year?	Yes	No

What is the average class length (in minutes) for Agriculture courses you are teaching in the 2012-2013 school year?	
On average how many AgriScience labs do you complete per week per Agriculture course?	
Thank you for taking the time to complete this survey. Your responses will be vital for the research into how Agriculture Teacher education programs can better prepare Agricultural Educators to be successful in this profession. Thank you again for your time.	

Appendix B

IRB Notice of Approval

Institutional Review Board
Office of Research Integrity | Oregon State University
A312 Kerr Administration Building, Corvallis, OR 97331-2140
Telephone (541) 737-8008
irb@oregonstate.edu | http://oregonstate.edu/irb/

STUDY ID
5588

Notification Type	**EXEMPTION**		
Date of Notification	1/10/2013		
Study Title	Self Efficacy Study of Middle School and High School Agriculture Educators		
Principal Investigator	Jonathan Velez, PhD		
Study Team Members	Aaron McKim		
Submission Type	Initial Application		
Level	Exempt	Category(ies)	2
Number of Participants	500 *Do not exceed this number without prior IRB approval*		
Funding Source	None	Proposal #	N/A
PI on Grant or Contract	N/A		

The above referenced study was reviewed by the OSU Institutional Review Board (IRB) and determined to be exempt from full board review.

Expiration Date: 1/9/2018
The exemption is valid for 5 years from the date of approval.

Annual renewals will not be required. If the research extends beyond the expiration date, the Investigator must request a new exemption. Investigators should submit a final report to the IRB if the project is completed prior to the 5 year term.

Documents included in this review:

- ☒ Protocol
- ☐ Consent forms
- ☐ Assent forms
- ☒ Alternative consent
- ☐ Letters of support
- ☒ Recruiting tools
- ☒ Test instruments
- ☐ Attachment A: Radiation
- ☐ Alternative assent
- ☐ Project revision(s)
- ☐ External IRB approvals
- ☐ Translated documents
- ☐ Attachment B: Human materials
- ☐ Grant/contract
- ☐ Other:

Comments:

Principal Investigator responsibilities:

- Amendments to this study must be submitted to the IRB for review prior to initiating the change. Amendments may include, but are not limited to, changes in funding, personnel, target enrollment, study population, study instruments, consent documents, recruitment material, sites of research, etc.
- All study team members should be kept informed of the status of the research.
- Reports of unanticipated problems involving risks to participants or others must be submitted to the IRB within three calendar days.
- The Principal Investigator is required to securely store all study related documents on the OSU campus for a minimum of three years post study termination.