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Iowa teachers' perceptions regarding the effectiveness of agriculture teacher education programs in addressing teaching standards and criteria

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DEDICATION

To

my grandmother,

Bukhwabuli Bawanani Hulela,

who lived from 1905 to 2007,

and passed at the age of 103.

She cared for me since I was very young

and lived to see me

complete my educational studies.

May I one day follow

in her footsteps.

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ABSTRACT

The purpose of this study was to explore and describe perceptions of secondary school-level teachers of agriculture in Iowa regarding the effectiveness of agricultural education teacher preparation programs in addressing education licensure standards and criteria, and subject content in agriculture during teacher preparation. Standards have been introduced in education to serve as guiding principles for the content and procedures in preparing teachers.

Formalized standards-based education has been in place since 2001, yet little is known about teacher perceptions regarding standards, particularly in agricultural education. This research study was descriptive, and used quantitative and qualitative data. An online questionnaire was used to survey a census of 96 agriculture teachers who started teaching between 1995 and 2006 in secondary schools in the state of Iowa. Usable data for this study was 62. Teachers perceived agricultural education programs to be generally effective in addressing standards and moderately effective in addressing criteria and the agriculture science subject content. It was also found that teachers perceived standards, criteria, and subject content addressed during preparation to be very important in their teaching profession. The professional development activities teachers attend during teaching were perceived to be moderately influential to their professional development.

There was no statistically significant difference between the group of teachers who started teaching before and those who started teaching after standards were introduced on perceived effectiveness, importance, and influence of professional development. Female teachers perceived professional development activities to be more beneficial for their

teaching compared to male teachers. The Pearson correlations revealed both positive and negative negligible to low relationships between teachers' experience and the three concepts, and also with the final GPA scores. Cramers' V indicated a substantial relationship between teachers who trained at other universities and the teaching of agricultural mechanics.

It was recommended that there is a need for more course work in agricultural mechanics at ISU. Further research should be conducted to identify additional standards related to agricultural education and on how standards were implemented. Professional development workshops should be conducted to provide content in agriculture alongside with a module on how to teach it.

CHAPTER I. INTRODUCTION

The profession of teaching in education "… requires a long, specific program of preparation in higher education and uses a code of ethics to guide the conduct of individuals in the profession" (Talbert, Vaughn, & Croom, 2005, p. 9). How effective are teacher education programs in addressing current standards to prepare teacher professionals? This is an important question because standards are increasingly being used in education programs in many states. This research study investigated the effectiveness of programs in preparing teachers by surveying teachers of agricultural education in Iowa secondary schools who started teaching between 1995 and 2006. The purpose of the study was to explore and describe the perceptions of both teachers who started teaching between 1995 and 2000, before the introduction of standards, and those who started between 2001and 2006 after standards were introduced. Knowing the opinions of teachers as practitioners about their preparedness on standards and their readiness to teach agriculture course content in schools, as well as their views about the influence of in-service programs in their teaching profession, may provide stakeholders and policymakers with insights about the effectiveness of programs that supply teachers to schools in Iowa.

Background of the study

Effective programs prepare teachers who are capable of demonstrating competencies in the profession of teaching by ensuring, among other factors, improved student learning (Harman, 2001). Over the past 50 years, teacher education programs nationwide have changed to include standards (Cochrain-Smith, 2005; Morris, 2004; Connors & Mundt, 2001). The change has been prompted by several factors, including the demand for

competencies and other requirements for certification of professionals in teaching (Morris, 2004). At present, the focus in education is on programs' impact, or effectiveness, particularly for teachers to demonstrate their knowledge and skill application (Harman; ISU Catalog, 2007). In the past, emphasis in education was placed on efficiency of the program input, or how inputs support teaching and learning (Allen, Ramaekers, & Van der Velden, 2003). This has changed; quality is now important because standards are being used in different areas of education, including preparing teachers to create a shift from the emphasizing process to the emphasizing program outcomes (Luft, 2004). Standards, as described by the Research Advisory Committee of the National Council of Teachers of Mathematics (1988), are "recommendations and principles" (p. 341) used to guide and support education processes by describing what people should be able to accomplish in what they do (Harman, 2001; Oregon Department of Education, 2006). Therefore, standards have been introduced in education to serve as guiding principles for the content and procedures teachers need as they prepare to become effective teachers after graduation (Morris, 2004). These statements, called standards, are perceived as policies that are provided by educators, in collaboration with the public and the policymakers, at the national and state levels to influence the outcomes and accountability of the education systems (Camilli, 2006). During teacher preparation these standards are used as the point of reference to guide the facilitation of teacher development and, when the prospective student teachers go out into classrooms as teachers, the standards serve as a means of evaluating job performance (ISU teachers' handbook, 2008). Therefore, understanding the effectiveness of standard-based education programs in preparing teachers is important (Close, 1996; Yasin, 1999).

Generally, standards have become a requirement for teacher education programs. For example, at Iowa State University potential teachers are expected to meet state standards as a requirement of their teacher education certification programs. Education programs are expected to prepare students to develop the competencies needed to teach in line with the standards. The effort to further evolve agriculture teaching/education as a professional discipline may be another challenge for stakeholders, as it will require effective education programs to prepare teachers to be competent in teaching required agriculture education courses (e.g., agriculture mechanics, plant science, agronomy, etc.). Therefore, knowledge about how effective agricultural programs in higher education in preparing teachers can shed light on current strategies as well as strengths and weaknesses. Efforts to plan for the future of agricultural education by educators and practitioners in the state of Iowa are also in progress as indicated by Martin (2007). These plans may also lead to the increase or demand for more quality agricultural education teachers (Conroy & Kelsey, 2000).

It is projected that, in the United States, over 2 million people are likely to enter the field of teaching in the next ten years (Yasin, 1999). Thus according to Yasin's projection by 2009 the number of teachers in schools will have increased from 3.1 to over five millions. To prepare for this anticipated increase in the number of teachers, the number of students seeking training in teacher-education programs will also increase. Increased enrollment will influence the assessment of quality and effectiveness of teacher training programs; therefore, frequent evaluation will need to be conducted to determine the degree of change in the effectiveness of these teacher-preparation programs.

In the United States, the federal government encourages the adoption of advanced teacher preparation standards by all states (Halliman & Khmelkov, 2001), and the

government policies such as the *No Child Left Behind* Act demand that teachers be well qualified to teach in U.S. schools (U.S. Department of Education Office of Postsecondary Education, 2002; Greenberg, Rhodes, Ye, & Stancavage, 2004). A well-qualified teacher in this context refers to one who is a college graduate, is knowledgeable in the subject he or she teaches, holds a license from a recognized state institution, and has the capacity to fulfill all the state-legislated standards for teacher education (Administrative Code of Iowa § 282 8/17/05-1/10/06). Therefore, the demand for accountability in teacher performance (Flowers, 1990; Luft, 2004), the need for well-qualified teachers in schools (Kaplan & Owings, 2003), the need to accomplish specific outcomes associated with education standards (Cochran-Smith, 2006), and "teacher professionalism" (Barton,Barrett, Whitty, Miles, & Furlong, 1994), all have contributed to the inclusion of standards in pre-service teacher education (Malan, 2000). There seems to be a belief that when standards are used in education, programs will be effective in preparing people who are accountable, and the tendency today is to invest on resources in education that produce results which are observable. It is for this reason that teacher effectiveness has become an important focus in education (Markley, n.d). Thus, effectiveness of education program in agricultural education has become imperative (Luft, 2004).

A structured teacher-training program focuses on training and graduating teachers who are qualified to enter the teaching profession, and it also further rigorously advances the profession of teaching. These programs of standard-based education and policy-guided education have been debated for some time, with questions surrounding the improvement of how teachers should be prepared so that they meet the requirements of the education system (Gore, 2001; Kosar, 2006). So, programs of education need to be assessed for their

effectiveness in preparing teachers and, further assess the quality of their outcomes (Darling-Hammond, 2006). What education outcome programs encompass as a product of standards-based education is subject to further research (Raths & Lyman, 1996), but this assessment may have implications for teaching and learning (Raths & Lyman).

The standards-based approach for preparing teachers is characterized by being performance-based, as opposed to the traditional norm-referenced and teacher-centered system. The current trend is to prepare teachers in programs that use standards to direct their action to realize the expected outcome (Cochrain-Smith.

One of the important requirements to teach in schools is to be appropriately licensed by the authorized state institution. According to Berliner (2005), all states require teachers to be licensed to achieve the goal of quality education emphasized through standards. Teachers obtain their initial teaching licenses when they have successfully completed the minimum education qualification for a bachelor's degree. Thus, graduates of teacher education should have acquired the relevant "knowledge, skills, abilities" or "competencies (Lindner & Dooley, 2002, p. 57) or reached levels of performances the standards set for their preparation to qualify for teacher certification. Teacher preparation programs in colleges and universities have been designed to address the need for standards; most agricultural education programs are standards-based and lend themselves to approaches that emphasize outcomes (Luft, 2004).

This research study focuses on agricultural education. As the use of standards in U.S. schools of education is increasing, and programs continue to prepare teachers under the auspices of standards-based education (Conroy & Kelsey, 2000). Consequently, effectiveness of these agricultural education programs is very important. In Iowa, education in and about

agriculture is crucial because Iowa is an agriculture-oriented state; therefore, establishing the effectiveness of the programs that prepare teachers of agriculture in secondary schools in the state is important.

Currently, teachers are educated and accredited in programs established in higher education institutions (Long & Reigle, 2002). These programs prepare teachers to meet educational qualifications and specified requirements for their profession. Meeting these requirements enables prospective teachers to apply for licensure in their states of residence. The procedures for preparing teachers, as described in Van Scotter et al. (1979), appear to be consistent among public education universities across the United States: students enroll in undergraduate teacher education programs and graduate with a bachelor's degree in the subject area of interest after meeting teacher licensure requirements. This process enables graduates to apply for a teaching license per the state's laws and regulations (Sadker & Sadker,).

There are five conditions to be fulfilled for one to obtain an endorsement for a license to teach in the state of Iowa (Administrative Code of Iowa § 282 8/17/05- 1/10/06). These include: (1) holding a bachelor's degree from an "accredited" university; (2) completing an "approved human relation component;" (3) completing the "exceptional learner program" for "the handicapped" and exceptionally capable students; (4) completing a "professional education core;" and (5) possessing knowledge of the subject content. According to the Administrative Code of Iowa § 282 8/17/05- 1/10/06, having knowledge of the subject of specialization further demands one to develop competencies in 13 areas, which are: (1) how students learn; (2) diversity of "learners"; (3) "instructional planning"; (4) appropriate "instructional strategies"; (5) "learning environment/classroom management"; (6)

"communication"; (7) "assessment"; (8) "foundations, reflection, and professional development"; (9) "collaboration, ethics, and relations"; (10) "computer technology" in instruction; and (11) "methods of teaching" in the subject area, along with completing the tasks of a pre-student teaching field-based experiences and student teaching (Administrative Code of Iowa § 282.14.123(4) p. 8).

According to the Administrative Code of Iowa § 282 8/17/05-1/10/06, the beginning teacher induction program includes eight standards and 42 criteria (Appendix A-5). These formalized standards and criteria-based educator requirements in Iowa have been in place since 2001, yet little is known about how current teachers view the state's education standards for teaching. As indicated in the ISU student teaching handbook, there are ways to assess for competency acquisition during student teaching (ISU, 2008).

Statement of the Problem

Currently, few studies have assessed teachers' perceptions regarding the effectiveness of standards-based teacher certification programs in agricultural education. This study explored the effectiveness of the standards-based agricultural teacher preparation programs addressing teaching standards.

Objectives of the Study

The following objectives were used to carry out the study:

1. Describe the demographic characteristics of Iowa secondary school agriculture teachers who began teaching between 1995 and 2006.
2. Describe how these teachers perceive:

a. the effectiveness of teacher education programs in addressing state standards, criteria, and subject matter;
b. the importance of teacher preparation standards, criteria, and subject matter to teach agricultural education in schools; and
c. the influence of professional development activities.

3. Compare Iowa secondary school agriculture teachers who began teaching between 1995 and 2000 and those who began teaching between 2001 and 2006 on
   a. their perceptions of the effectiveness of teacher education programs in addressing standards, criteria, and subject matter;
   b. their perceptions of the importance of teacher standards, criteria, and subject matter to the teaching of agriculture in schools;
   c. their perceptions of the influence of professional development activities; and
   d. their participation in professional development workshops.
4. Determine if teachers' perceptions regarding effectiveness of teacher education programs, importance of what is learned in these programs, and the influence of the professional development activities on teaching, are associated with demographic characteristics.
5. Describe the views of agricultural education teachers regarding the role of standards in their preparedness to teach and professional development.

Significance of the Study

Perceptions of secondary-school agriculture teachers regarding teacher education programs might be an appropriate determinant of the effectiveness of standards-based teacher

education programs. Specifically, gathering teacher feedback and perceptions regarding these programs might serve to evaluate the effectiveness of teacher education programs that were implemented by the state of Iowa in 2001 in response to the *No Child Left Behind* Act.

Because the study was conducted prior to the next five-year period review of the Department of Agricultural Education and Studies at Iowa State University, it may be an important resource for the department to use in reviewing the teacher education program. The study may also be of significance to other stakeholders in agricultural education teacher programs, such as policymakers, educators or instructors, and may provide a forum for discussing methods of teaching and issues related to curriculum. This study can serve as a medium for agriculture teachers to contribute to discussions on and reflect on their own preparedness for teaching. Soliciting timely feedback from teachers regarding their training can lead to improvements in the preparation of future educators.

Assumptions

In this study, it was assumed that all teachers currently teaching agriculture in secondary schools in Iowa have met the state's standards and criteria. There is a possibility that some teachers were educated before the inception of the standards and that those who were educated in other states have not met the standards in Iowa.

Limitations

1. Lack of random sampling produced a non-representative group and reduced the external validity of the study.
2. While attempts were made to minimize the effect of researcher bias, the researcher's own interpretation of the qualitative data may have influenced the findings.

3. The lack of reliable e-mail addresses may have limited the number of subjects participating in the study.

Definition of Terms

The following operational definitions were provided for this study:

Competency: A knowledge, skill, or attitude toward work that are displayed by a person in the job or what the person is able to do.

Effectiveness: the level at which the programs attained or achieved results or outcomes in addressing a something (Curtin University of Technology Annual Report, 2006).

In-state teachers: Alumni of Iowa State University who completed their requirements for teacher licensure and are teaching agriculture in Iowa schools.

Iowa Association of Agricultural Educators: An organization for agricultural education wherein professionals submit their concerns and issues regarding the agricultural education in the state of Iowa with the aim of developing agricultural education.

New teachers: Iowa secondary school agriculture teachers who began teaching between 2001 and 2006.

Out-of-state teachers: Alumni of any university other than ISU who completed the requirements for teacher licensure and are teaching agriculture in Iowa schools.

Teacher education: "… a series of educational experiences" designed to prepare people who apply to enter the career of teaching and also designed to keep maintaining and reviving the education "for those already engaged in teaching" (Hallinan & Khmelkov, 2001, p. 175). This definition encompasses both pre-service and in-service education activities for teachers (Hallinan & Khmelkov).

Standards: Principles or statements that facilitate the demonstration of abilities, skills, attitudes, and knowledge and are agreed upon by educators, policymakers, politicians, researchers, and professionals to serve as a guide in an outcomes-based education model.

Dissertation Organization

The purpose of this study was to describe the perceptions of teachers of agriculture currently teaching in Iowa secondary schools regarding the effectiveness of teacher education programs in addressing standards, criteria, and subject content. This dissertation consists of five chapters. Chapter 1 presents the introduction of the study from the basic understanding of the current status of standards and standards-based education. The problem statement, objectives, and significance of the study are outlined. Chapter 2 presents a literature review of related studies and findings of the previous research and how they relate to this current research. The need for this study is also presented in Chapter 2. Chapter 3 presents and describes the methodology and design of this study regarding how data were collected and analyzed. In Chapter 4, the qualitative and quantitative results are presented. Chapter 5 summarizes the findings and relates them to previous studies. Recommendations for practice and future research are also presented in Chapter 5.

CHAPTER 2. LITERATURE REVIEW

Following the introduction of standards in Iowa schools in 2001, few studies have assessed teachers' perceptions regarding the effectiveness of the programs in addressing standards, particularly in agricultural education. Perceptions of teachers are important to evaluate education programs of teaching effectiveness (Darling-Hammond & Wise, 1985). This chapter investigates the literature regarding effectiveness of teacher education programs. Included in the literature review are areas pertinent to the objectives of this study. Areas investigated include: standards in education, teacher education programs, and previous research on, demographic characteristics, mixed methods research, and current strategies for agricultural education in Iowa. Finally, the chapter ends with a map summary of findings from the literature reviewed and restates the need for the study.

Effectiveness in Educational Programs

Effectiveness is currently the focus for most educational programs as it has been necessitated by outcomes-based education (Imig & Imig, 2006; Luft, 2003). Central to effectiveness is the goal of developing teachers to be competent in order to become successful in their profession of teaching (Masci & Stotko 2006; Morkowitz, 1976). Ashton (1984) stated that an effective teacher is one who is motivated. According to Ashton, unless a person is motivated, he or she may not be effective. In addition, as indicated by Ashton, effectiveness in teaching goes with one's beliefs.

According to Luft (2003), Adams and Pierce (n.d), and Borich (1994), although there is no single definition of an effective teacher, there are certain characteristics that describe one who is effective in teaching. For example Luft perceived effectiveness in terms of being

held accountable in what you do. Adams and Pierce (n.d) and Borich (1994) also noted some factors that one considers for effective teaching. For example, according to Adams and Pierce effectiveness considers one's preparedness and ability to converse or communicate, having required application skills, "motivation", "classroom climate", (p. 103) and activeness. Borich (1994) described eight characteristics of effective teaching in the classroom to include: (1) conducive situation that allows interaction between and among learners and instructors; (2) well set classrooms that provide an opportunity to observe student behavior; (3) clear lesson presentations; (4) variations of instruction to cater for different types of leaders; (5) task oriented; (6) students' active involvement in learning; (7) student reflection of their learning; and (8) higher order thinking, reasoning, and task activities. When a program prepares people to increase the most wanted talents it is viewed effectiveness (Phipps and Osborne, (1988).

Cohen (1994) described effectiveness in education as the capability of the institution to effect change in potential teachers. McLarty (1989), and Ayers and Berney (1989) described effectiveness as the level of graduates' performance to demonstrate quality competencies in their careers assessed in terms of meeting the goals of the programs. Luft (2003) stated that effectiveness in teachers "is all about obtaining results in the form of student achievement" (p. 24). According to Luft (2004), programs in teacher education require people who opt for teaching to be well-qualified for their teaching jobs. To achieve this goal of education, standards are used to guide the preparation of teachers as a strategy for preparing qualified effective teachers (Harman, 2001). Harman perceived using standards as one way for professionalizing teaching through certification which also impacts on teacher

quality. Generally, in education the focus is to develop people's competencies in order to enhance their abilities in what they know and do.

Preparing teachers is crucial in teacher education. According to the Curtin University of Technology Annual Report (2006), the effectiveness of an institution of education to prepare teaches may be viewed from the "extent to which outcomes have been achieved" (p. 50). Students' performance in their academic work may serve as one form of defining effectiveness of an institution (McGhee & Cheek, 1988). Therefore, effective teaching is the ability of a program of education to prepare people who are more answerable (Luft, 2004).

Currently, several organizations are involved in standards including (a) INTASC, for new teachers; (b) NBPTS, for experienced teachers; and (c) NCATE, for teacher certification as stated by the National Research Council (NRC; 2001, as cited in Goldhaber, 2003a). These organizations provide direction to educators on teacher preparation, monitored in their job, appraised, and accredited in terms of what to teach and how to teach it by standards in education. Each of the organizations ensures teachers are prepared according to approved standards. According to the NRC, the goal of quality in education may be achieved when teachers are fostered to understand and teach content to be learned by their students, committed to life-long learning, have a profound knowledge of the subject matter they teach, comprehend how people learn, have knowledge of inquiry methods, and manage and monitor students' educational activities (Goldhaber, 2003a). These conditions provide educators with a framework that forms the basis for national standards for each state to apply in formulating its own standards.

A program is determined to be effective when its graduates are able to demonstrate the competencies they gained through learning. Goldhaber's (2003b) analysis of previous

research articles provided supportive evidence to help understand relationships that exist between the characteristics of individual teachers and the quality of their teaching. Goldhaber also revealed that the personal characteristics of teachers can negatively [as well as positively] influence classroom behavior, as well as the effectiveness of "classroom performance" and the correlation between teacher effectiveness and student achievement. In the same analysis of correlational research studies between teacher demographics and qualities as indicators to determine effectiveness, Goldhaber revealed that: (a) teachers having a qualification beyond the subject they teach tend to have a negative relationship with performance of the students they teach; (b) an advanced degree influences learning in the related area; (c) "the magnitude of the experience effect, should it exist, is not terribly large" (p. 2); and (d) the "measure of teacher academic proficiency represents one of the best predictors of the teacher quality" (p. 2).

According to Moskowitz (1976), several universities have introduced performance-based, accredited teacher education programs that enable them to monitor the competencies of their students. To assess teacher education programs, several studies gathered data from agricultural education alumni to evaluate the effectiveness of their teaching preparedness. For example, Osmond and Hoover (1995) reported that alumni of a graduate program at University of Florida rated the program as equipping them with relevant professional teaching competencies to use during their teaching. The Osmond and Hoover study also indicated that respondents' satisfaction with the college curriculum, in general, prepared them for their agricultural teaching career.

Similarly, Dormody, and Torres (2001) surveyed former students of teacher education undergraduate program of New Mexico State University in the period between 1990-2001 on

competencies they developed from the program and from the experience in the field using the university's competencies statements. The authors revealed that participants were pleased with the experiences obtained from their teacher education preparation and have increased since they started the teaching career as a results of professional development activities they were exposed to since they started teaching. The activity, "on-the-job experience" (p. 33), was highly-ranked as influential in their teaching. The authors concluded that teacher participants who were mainly males, perceived both the undergraduate program at New Mexico State University and the professional development in the field to have contributed effectively to their teaching competencies. A study by Belcher, McCaslin, and Headley (1996) that investigated "performance measures and standards" (p. 1) adopted for appraisal of the programs in agricultural education concluded that there was a need for people to be educated regarding factors concerned with "outcomes" in education since it has become popular.

Studies by Osmond and Hoover (1995), Randavay (1990), and McGhee and Cheek (1990) concurred that programs of education play an important role in preparing teachers for their teaching careers. Research studies have concluded that people make use of the knowledge, and content materials acquired during preparation periods in their careers. Thus, there is an association between college education programs and professional teaching competencies following graduation (McGhee & Cheek, 1990; Osmond & Hoover, 1995, Randavay. 1990). However, less is known about the subject of inclusion of standards in the programs of study of teacher education institutions, particularly related to agricultural education in the state of Iowa.

Finally, "effectiveness is all about obtaining results …" (Luft, 2004, p. 2) in education. As indicated by Luft (2004), Borrich, (1994), and Orlich, Harder, Callagan, and Gibson (2001), the personal characteristics of individuals may influence the effectiveness of a program. Several factors contribute to effectiveness.

Standards in education

Standards are currently applied in programs of teacher education, and they are found in almost all classrooms (Thomas, 2001). Standards are statements describing the level of excellence at which teachers are expected to perform in their teaching (California Commission in Teacher Credentialing, 1999). They also describe the quality of work to be achieved (Glass, 1978), hence they have also been defined as statements describing one's "mastery level" of a concept learned (Glass, p. 237). Standards, as they pertain to evaluation of programs in education, can be defined as "principles mutually agreed to by people engaged in a professional practice that if met will enhance the quality and fairness of that professional practice" (Sanders, 2001, p. 2).

In this regard, standards are seen as rules to give directions to education (Darling-Hammond & Wise, 1985) and define the quality in education (Ministerial Council of Education, Environment training and youth affairs, MCEETYA), 2003). Based on definitions by California Commission in Teacher Credentialing (1999), Glass (1978), Sanders (2001), and Darling-Hammond and Wise (1985), standards may be defined as principles of education guided by policies to describe what should be accomplished in the profession of teaching (Curtin University of Technology Annual Report, 2006).

Standards play a significant role in education. They provide the frame upon which to base the curriculum, assessment goals, instructional basis and other areas relevant for all kinds learning in the program (American Association for Agricultural Education, 2001). For example, they help to move stakeholders from focusing on what people think should be taught and the time they perceive should be allocated to teach what is to be taught, to "… what people think they know, what they are able to do, and how they comport themselves as they serve the public" (Standards for the Education, Competence and Professional Conduct of Educators in British Columbia, 2004, p. 4). Because standards in education have resorted to "telling teachers what to do," they have revolutionalized programs of education into a business-like system where people want to see the results or outcomes and performance indicators in their work (Porter, 1989, p. 343). Furthermore, standards may be of help in organizing educational activities in order to promote articulation of ideas which may make programs effective in educating learners, thus making teachers effective in their careers (Talbert, Vaugn, & Croom, 2005).

A standard contributes positively to a conducive and "high-quality learning" situation for both the learner and the educator (Standards for the Education, Competence and Professional Conduct of Educators in British Columbia, 2004, p. 4). Standards may guide classroom discussions to achieve the goal set (Coffey & Pieter, 2004). In this manner, standards may result in teaching that is matched with standardized tests (Thomas, 2001). A standard is one aspect that may help to support the goals of a society formulated that are into broad educational aims or visionary statements or ethics (Fortier, Albrecht, Grady, Gagnon, Wendt, & Benson, 1998). According to Coffey and Pieter (2004), the role of programs of

teacher education during preparation is to provide awareness on potential teachers of agricultural education about the existence of standards.

In *National Sciences Education: An Overview* (http://www.nap.edu/readingroom/books/uses/overview.html#teaching), it was indicated that standards in education are science-oriented. That is, the National Science Education encourages incorporation of science in education, thus suggesting the type of teaching that uses investigative instruction, asking questions, and conducting experiments. Therefore, collaborative efforts must occur among stakeholders of agriculture and other sciences (Balschweid, 2004). In the *National Sciences Education: An Overview*, it was further indicated that standards are grouped to describe the subject content to be taught, professional ethics, sciences, and education systems criteria. Standards are also test or examination-oriented (Darling-Hammond, 2004). Further, it is through testing and giving an examination that instructors may know what people know and able to do.

Last but not least, standards also support the incorporation of technology in teaching for instructional purposes (Hernderson & Scheffler, 2003). Use of technology implies the need for hands-on application to demonstrate understanding of the concepts in real-world situations thus improving student achievement (Dyer, Reed, & Berry, 2006).

Finally, standards are not only viewed as positive. Thomas (2001) posited that currently standards are found in every aspect of educational settings but argued that, for English, the use of standards is no longer has genuine "purposes for both reading and writing in classrooms at grade levels" (p. 64). Thomas perceived the use of standard-based "instruction and assessment" (p. 64) as not benefiting the learners. Generally, Thomas's belief is that using standards prevents the learner from gaining a broad understanding of the

concept being learned; rather, it promotes narrow and surface knowledge of the person. The same sentiments were shared by Imig and Imig (2006) who perceived that a certain group of stakeholders has dominated the education programs that have influenced the education system in the United States. Despite their views regarding standards, the authors share the feeling that "students performance is now not only the condition that judges the definition of teacher effectiveness but also the measure that ultimately will decide whether one form or another of teacher preparation or professional development will prevail" (p. 177). As indicated on the literature, standards have a practical and significant role in education as it contributes to a new model of education.

Standards-based education

The new model of education is basically comprised of standard and criteria statements (Glass, 1978). These statements called standards are, therefore, influential to standard-based education (Darling-Hammond & Wise, 1985; Malan, 2000). Standards-based education is generally the current reform that drives most educational activities (Malan, 2000). It was started in the mid-1980s (Taylor, Shepard, Kinner, & Rosenthal, 2002) following the publication of a report called *A Nation at Risk* in1983 whose emphasis was on nationwide compulsory learning activities for schools (Brown, 2006). Standard-based education is facilitated by standards (Standard for the Education, Competence and Professional Conduct of Educators in British Columbia, 2004), it is outcome-based (Wilson, Flowers, Croom, & Gary, 2004), and it demands very well-informed teachers (Taylor & Williams, 2003).

In this kind of education, a standard expresses "an overarching image of the work of professionals"(Standards for the education, competence, and professional conduct of education in British, 2004, P 6). Thus, criteria provide descriptions of simple ways to achieve the goal set by the standard, making standards practicable According to the Standards for the education, competence, and professional conduct of education in Briti*sh, the* criteria serve as descriptors to simplifying the broad standard. In a typical standard-based education program there should be a general task, the practices, and evidence of activities given to students in teaching (Iowa Braille School, 2006). Programs of education therefore should prepare teachers to demonstrate quality characteristics in their teaching as specified by the standards (Darling-Hammond & Wise, 1985).

As pointed out by Porter (1989), setting standards has enforced a notion of what should be done [physically] and achieved in education (i.e., what one does is, directly relates to what one knows). For example, teachers of agriculture who are knowledgeable in a 4-cylinder diesel tractor engine should be able to set an appropriate problem solving situation for their students to analyze (Jamentz, 2001). Inadequate knowledge for teachers will limit the teachers' capacity to excel in teaching the topic such as that of an engine in agricultural mechanics. Thus, people who support the idea of standards in education see standards as a way to empower teachers in the profession, thus helping to improve accountability of teachers in education (Flowers, 1990). Nevertheless, when standards impose the notion of "telling teachers what to do" (Porter, 1989, p. 341), some stakeholders may interpret them negatively as it may limit teacher creativity in their job (Porter). This may lead to a failure to reach consensus on the expected outcomes by stakeholders and create a void regarding the characteristics of effectiveness in teaching (Porter).

In a study conducted by Snow-Renner (2001) to assess the view of teachers in math and arts subjects' regarding the components of a standards-based education a positive relationship was found between the use of scores in teaching and students' learning. There was also a significant difference between the group of teachers who were from poor-performing schools and those who were from high-performing schools on whether it is effective to use results to improve teaching instruction in the classroom. Teachers in the poor-performing schools believed results could be used to improve learning while teachers from the high performing schools were not in favor of using the test scores (Snow-Renner). In addition, an analysis conducted by Lauer, Snow, Martin-Glenn, Van Buhler, Stoutemyer, and Snow-Renner (2005) to assess usefulness of standards on students' learning in schools indicated a positive relationship. This shows that assessment is an important factor in learning (Goldhaber & Brewer, 2000)

Standards may be viewed as "public policy" procedures in education (Cochran-Smith, 2005; Darling-Hammond, 1985). As policy procedures, they are derived from multiple sources including research and societal needs (Cochran-Smith, 2005) and also subjected to lengthy discussions (Camilli, 2006; Cochran-Smith, 2005). Since standards have policy implications, they serve as a guide for newly trained and qualified teachers because they are linked with "teaching and learning approaches" (Malan, 2000, p. 1). They described what is studied and how much will be studied by learners (Porter, 1989). For example, in the U.S. some states utilize the Interstate New Teacher Assessment and Support Consortium (INTASC) standards jointly as a policy tool to guide the development of how teachers teach and for the process of licensing teachers. Iowa is one of the states that use the INTASC standards. According to Berry, the current debate in preparation of teachers is also centered

on whether to use standards (standards based) education as opposed to "professionalism" (P. 273)

Additionally, as a policy procedure, the National Board for Professional Teaching influences standards in education (NBPT, 2007). Standards at the national level suggest five major areas or conditions which provide guides for what teachers are expected to do, thus providing a framework for standards in different states. The conditions as outlined in the NBPT, (2007) at http://www.nbpts.org/the_stndards/the_five_core_proposition, can be summarized to include teacher's: (a) commitment to students' in education; (b) expertise in what he or she should teach and "how to teach" the subject matter; (c) management of students; (d) systematic thinking and practices; and (e) membership in learning communities. From this framework, some states develop their own standards. Standards in other states are basically similar but may be stated differently; some define the content to be learned and performed, while others are concerned with how learners will show or demonstrate the degree to which they have met the standards (Fortier, Albretch, Grady, Gagnon, & Wendt, 1998). At the state level, the Iowa Teacher Education standards are designed to guide pre-service and in-service within the state (ISU teacher handbook, 2008). Nevertheless, the Iowa agriculture standards are designed to guide the content that is taught.

In the U.S., to ensure that public organizations place emphasis on outcomes, the government encourages federal organizations to set goals for their programs (USGAO, 1996, as cited in Hoofman & Grabwski, 2004). Goals are developed into educational standards. As a result, programs in agricultural education have transformed and continue to transform Myers and Dyer (2004). New educational directives include the emphasis on "student achievement (Luft, 2004, p. 2), "accountability", and standards-based instruction in the

classroom" and "assessment" of "high-stake tests" to educate competent teachers (Edwards, Leising, & Parr, 2002, p. 1; Goodwin, 2003; Luft, 2004). These provide framework to understanding and assessing effectiveness of programs of education.

Finally, why are standards needed today in education? How did education standards evolve into education programs? As indicated by Brown (2006), several factors supported standards; the *Nation at Risk* impacted the need to be addressed through introducing standards in education. In a study to assess teachers' views about the history of standards in education in the Midwest region of the U.S., Marzano and Kendall (1996) revealed four reasons for the introduction of standards in education. First, there was a belief that standards will improve the existing school curriculum. Second, standards were also a way to find a solution to the "grading systems" that existed among schools. Third, standards were introduced as one way to give emphasis to the importance of "education output." Last, standards were formulated to serve in the drive for a national curriculum in order to improve their programs. According to Marzano and Kendall, standards in education are of different types: content, performance, and curriculum.

Teacher education: Pre-service and in-service

Generally, teacher education is a program offered in institutions of higher education. Teacher education programs admit and prepare people for a career in teaching and also provide services for current teachers who must upgrade or renew their teaching licenses (Hallinan & Khmelkov, 2001). Thus, teacher education accommodates both the group of people currently in training to become teachers (pre-service) and the group of teachers in schools who seek to advance professionally in teaching (in-service) (Hallinan & Khmelkov).

Research has shown that the role of teacher education is to prepare those people choosing teaching in order to become knowledgeable to contribute effectively in teaching (Bercaw & Stooksberry, 2004, Coffey & Pieter, 2004). Therefore, there are two broad types of teacher education: pre-service and in-service (Long & Reigle, 2002).

Pre-service

Pre-service teacher education is regarded as the typical route to entering the profession of teaching. Pre-service teacher education is the kind of education offered to people planning to become teachers as opposed to the subsequent education of a teacher that follows the training (in-service) (Long & Reigle, 2002). Pre-service is, therefore, the kind of preparation that takes, on average, four years (Myers & Dyer, 2004), during which the program exposes potential teachers to a variety of strategies and approaches of teaching (Goldhaber, 2003, p. 2). In a study conducted by Nazri and Barrick (1990), the findings supported the hypothesis that pre-service education "could offer a plausible explanation for the higher competence in the professional knowledge of teachers." (p. 53). With regard to pre-service agricultural education program location, Myers and Dyer (2004) found they are located in different colleges of universities; however, the majorities are found in colleges of agriculture.

As indicated by Goldhaber (2003), pre-service teacher education, prepares potential teachers to have the knowledge and comprehend what they will be able to do; therefore, they must "demonstrate high level of performance" (p. 3) upon completion of the program. Included in the pre-service education curricula for teachers are practical experiences for

potential teachers acquired through practice teaching, early experiences, technical agriculture courses, educational foundation courses to offer ethics of the profession (ISU catalog, 2007).

Pre-service is one way to develop specialized competencies of a career in the teaching of agricultural education. Pre-service education provides an opportunity for prospective teachers to develop knowledge, skills, and attitudes through taking courses designed for the program as well as through student teaching. Pre-service provides initial training of potential persons to become teachers, while in-service education is the subsequent educational preparation of teachers who have already begun as teaching professionals (Long & Reigle, 2002). Pre-service education also prepares teachers to develop competencies that enable them to demonstrate effectiveness in teaching.

The teacher preparation programs currently require future educators to develop a variety of skills and competencies to ensure quality teaching (UNESCO, 2006). According to UNESCO, teacher preparation contributes to quality education that "produces good learning outcomes" (p. 49). The concern in preparing teachers is to supply well-trained human resources (Conroy, 2000, p. 73). With the *No Child Left Behind* (NCLB) Act in place, an ultimatum has been set wherein visible outcomes should be demonstrated. According to Scanlon, Radhakrishna, and Hoover (2003), it is time for programs to prepare people who have broad knowledge, to meet the needs of different employees.

In a study conducted by Ball and Knobloch (2004) in which teachers in a pre-service program were assessed on an FFA task-oriented situation, the researchers examined complexity in decision making, coupled with deep learning for analyzing and assessing the problem. Ball and Knobloch concluded that teachers made advancement in solving students' problems that were complex. According to Wilson et al. (2004) programs of undergraduate in

agricultural education were positively preparing teachers to enter their teaching profession with self-assurance that they will teach except in the area where people need out of the ordinary education. Wilson et al. found that, in general, teachers were well-prepared to enter their careers in schools—that is, well-prepared in instructional skills; however, they were not as well-prepared with needed skills such as teaching students with learning and behavioral disabilities and determining performance within careers. In another study that attempted to determine if classroom performance of individuals can be used to forecast if a student is potentially a good teacher, Graham and Garton (2003) found that students who do well in class academically do not necessarily become good teachers. The findings further showed no relationship between class achievement and teaching performance (Graham and Garton).

In-service

In-service teacher education, as described by Long and Reigle (2002), is provided to "certified and employed" (p. 103) people who are already in their teaching career, as opposed to pre-service education. According to Long and Reigle, providing this kind of service is a necessity today because of the large number of teachers in the field. However, Long and Reigle also noted the different views of different scholars regarding in-service education. As noted by Long and Reigle, the different views are not only concerned with what in-service should offer but also with how in-service should be addressed for different teachers (Long & Reigle). Research studies conducted regarding in-service programs have concentrated on identifying needs of teachers in the field (Garton & Chung, 1997). Garton and Chung found that, of a total of 50 competencies, the Borich model and the Quadrant analysis model used did not differ in 28 needs essential for their teaching. Different methods or techniques may be

used to identify needs (Garton & Chung). In addition, in-service needs for teachers are different and may be technical knowledge or instruction related (Duncan, Ricketts, Peake, & Uesseler, 2006). In a study of in-service course content needed for agriculture teachers in the schools in Mississippi, Newman and Johnson (1994) found technical content such as biotechnology, computers, and mechanical/physical technology were needed by teachers already in the field.

Iowa educational policies

Current

The policy of the NCLB currently is being addressed nationwide. In the state of Iowa, eight overall standards and 42 criteria are implemented in higher education institutions for teacher education (Colbert, 2006). According to the Administrative Code of Iowa 282, Ch. 14.123, requirements for teaching licensure include a bachelor's degree from a recognized university, interpersonal skills, special education for the handicapped, education of the gifted and talented, educational foundations, and subject content knowledge. These areas as stated under the "issuance of practitioner's licenses and endorsements" [282-13.14.123(4)a-m] give teachers the skills to enhance students' academic performance, plan and prepare to teach, consider multicultural learning needs, vary teaching methods, exhibit skills in managing classroom environments, engage in scholarly work for development, and fulfill professional responsibilities that help improve their performance. Iowa State University's teacher education catalog for 2006/2007 follows the Code of Iowa to prepare teachers of different subjects, of which agriculture is one.

According to the Administrative Code of Iowa 282-14.101(272)1-3, qualified in-state and out-of-state prepared teachers who have no criminal record may apply for a two-year temporary permit (initial or probationary license) and thereafter can be assessed for a long-term professional license. As described by Sadker and Sadker (2000), initial licensure is the type of certificate issued to beginning teachers. Furthermore, the license is not renewable and awardees would have fulfilled the requirement of a bachelor's degree from an accredited university. To obtain standard or professional licensure, teachers need to complete two years of initial teaching in addition to their bachelor's degree requirements in their field. Other types of licensure are special as well as conditional (Sadker & Sadker). Emergency (temporary) licensure is issued to non-teachers where there is a shortage of qualified teachers. The licensure might enable a practitioner for a limited time to teach courses in agriculture, including horticulture, animal science, dairy science, and other technical courses in agriculture. Temporary licensure enables specialists in their field to be employed to teach without satisfying traditional teaching certification qualifications. Often temporary teaching licensure is issued to individuals when a teaching need arises, particularly in non-urban schools (Sadker & Sadker). Eventually, for those who want to continue teaching, they are generally given a certain period of time to complete their teacher education requirements, and many choose to take the required teaching courses in the evening during the school year or as concentrated courses taken during the shorter summer semester. The professional license is not issued until the qualifications are met, which include standards.

Teachers of agriculture who seek licensure generally study agricultural education at an accredited college or university. At Iowa State University prospective teachers follow the Agricultural Education curriculum with teacher certification (ISU catalog, 2007) program. To

complete the preparation process, potential teachers of agriculture are exposed to study a variety of core and elective technical agriculture course content, foundational education courses, curriculum and instruction, and student teaching (ISU catalog, 2007). During preparation, teachers are also exposed to community experiences such as attending workshops, professional conferences, and agricultural education organizations. According to the *ISU catalog* (2007), while pursuing the undergraduate bachelors' degree, potential agriculture science teachers should complete a total of 128 credits, of which 9.5 credits are in courses to help develop "interpersonal and public communication," "18-19 credits of Math, physical and life sciences" courses, 18 credits in "humanities, ethics, and social sciences," 37 credits in "agricultural science and economics" courses, 31.5 credits of "professional" courses, and 13-14 credits as free electives. Student teachers must graduate from ISU with a minimum grade point average (GPA) of 2.50 out of 4.0, to be awarded a Bachelor of Science (B.S.) degree in agricultural education with provisional teacher certification by the state of Iowa.

While in school, there are a number of technical, professional, and community activities in which both the instructor and the students become involved to promote the goal of the agricultural education program (Torres, 2007). As indicated by Torres, three of these multiple activities are major components of agricultural education in schools: (1) supervised agriculture experiences (SAE); (2) the national FFA organization; and (3) classroom instruction.

According to Croom (2007), these three components of agricultural education have a long history as part of the school agricultural education programs. Talbert, Vaughn, and Croom (2005) indicated that each component is important in contributing to the overall goal

of agricultural education. For example, the national FFA organization is concerned with preparing young people for leadership careers in agriculture, and SAE offers appropriate experiences to apply theory in the field, while laboratory or classroom instruction is concerned with the space available for experiments or instruction in agricultural concepts (Talbert, Vaughn, & Croom).

Agriculture is one of the 6 vocational subject areas in Iowa (Iowa Department of Education, 1999). According to the Iowa Department of Education (1999), the agriculture area is then divided into 7 career cluster areas: (a) agricultural business, service and supply, (b) agricultural production; (c) agricultural mechanics; (d) horticulture; (e) agricultural products and processing; (f) natural resources; and (g) technology. Furthermore, each of the seven technical career cluster areas of agriculture offers four categories of skills: occupational, leadership, job getting/keeping, and entrepreneurship (Iowa Department of Education, 1999). In each of these categories, a number of specific competencies have been identified. However, the same 10 entrepreneurship and 14 leadership competencies are identified as important for each of the four categories.

Effective since the late 1990s, the goal for agricultural education in the state of Iowa was to educate the people of Iowa about agriculture (The Governor's Council on Agricultural Education, 1998). At that time, the concern was to create awareness and also educate Iowans about aspects of the agriculture industry. Currently, as indicated by Martin (2007) in the report for the "Summit on School-Based Agricultural Education in Iowa" (2007), which was produced following a meeting in Des Moines in March 2007, 10 strategies were outlined to guide programs of agricultural education under the heading, "revitalizing agricultural education in Iowa." The following strategies, referred to as "Action steps," were identified as

areas where improvement is needed in agricultural education in the state of Iowa (Martin, 2007):

1. Adoption of the "The three-tier model:" A strategy which is planned for career awareness, exploration, and development in the identified current 7 career clusters
2. Expand the teaching of agriculture to biology teachers and or others stakeholders with interests in the field through workshops. This will be achieved through workshops for teachers who are not teaching agriculture.
3. Youth legislator education: Conduct seminars and workshops to guide students by connecting them with professionals in the field of agricultural education.
4. The advisory council enhancement: "develop and conduct enhancement programs."
5. "The Agricultural Education Advocacy Campaign" uses leadership in different sectors to voice the challenges of agricultural education.
6. The professional Education Internship: A 12-week summer professional internship program for students in teacher education at ISU.
7. "The Prospective Teacher Education Student Visitation Program," An effort to encourage people to consider teaching. The strategy is for professors to visit students at their homes to foster long-lasting relationships.
8. "The teacher recruitment incentive": A tool for "developing renewable scholarships to support teacher education students in agricultural education."

9. "The teacher retention incentive": tool for planning and developing programs to retain people in teaching. This includes identifying training and empowering people to supervise activities geared to new teachers.
10. Campaign for agriculture as a core subject in high schools: A strategy to set up strong plans and funding through different private business sources to make agriculture an applied science that deserves a place among other sciences.

As indicated by Martin (2007), the report of the Summit on School-Based Agricultural Education in Iowa, the 10 strategies were approved by the Governor's Council on Agricultural Education on June 4, 2007, and brought forward for further contributions prior to implementation. The strategies are meant to improve the quality of the education of agricultural educators in line with the goals set for the future of agriculture education.

Proposed

With the NCLB Act demanding quality education through "highly-qualified" teachers, the demand for schools may be complicated particularly related to achievement in agricultural education. As indicated by Torres, Ulmer, and Aschenbrener (2007), agriculture has several activities in which teachers are expected to be involved**.** The demographics of agricultural education are changing, as indicated in this review of literature; the demand for more qualified teachers will always exist. Hughes and Barrick (1993) identified several areas of agricultural education that are changing. Teacher education must include SA/SAE & FFA activities in their curriculum. Most of the literature reviewed was based on research from

other states than Iowa (e.g., California, Florida, and Missouri). There is little research on standards-based education in the state of Iowa; therefore, there is a need for more research.

Correlational research studies

Correlational research studies are concerned with describing relationships that are revealed between or among variables studied from the participants in a study (Ary, Jacobs, & Razavieh, 2001; Goldhaber, 2003). As stated by Ary, Jacobs, and Razavieh (2001), correlations use numerical data to explain the strength and direction of these relationships. In a positive correlation, higher (lower) values of one variable, such as the final GPA of a person obtained in the program of study, tend to occur with higher (lower) of the other variable, such as his or her performance in teaching a course. In a negative correlation, when one variable increases the other variable tends to decrease (Ary, Jacobs, & Razavieh).

According to Ary, Jacobs, and Razavieh (2001), correlational research studies are beneficial in education programs as they help educators make helpful predictions in academic and professional careers, describe situations, explaining associations that may be of great value to teacher education programs (Ary, Jacobs, & Razavieh). They may also be useful in educational issues related to policy formulation (Wayne & Youngs, 2003). Furthermore, Miller (1994) put forward that correlations were important for educators to understand, make predictions, explain, and describe situations in agricultural education. Therefore, there is need for more correlation studies in standard-based agricultural education.

In a study to investigate interaction between two personality characteristics of teachers, and "student achievement" (p. 67), Edwards and Briers (2002) revealed that providing teachers in-service helps to improve teaching thus having positive impact on

results. That means, in-service programs improve results in the classroom. Purser (1987) reported no relationship among teacher effectiveness and demographic characteristics such as (race, sex, level of certification, area of certification, or years of experience). A few correlational studies have addressed standards in education in agricultural education regarding program effectiveness (Wayne & Youngs, 2003).

Mixed-methods research

The mixed methods research is now being used in social sciences (Tashakkori & Creswell, 2007). Currently, there are different views regarding what constitutes the definition of mixed methods in research (Peter & Gallivan, 2004). However, the most widespread definition of mixed methods is that it combines "qualitative and quantitative" research data (Adamson, 2003; Johnson & Anthony, 2004; Shaffer & Serlin, 2004). In the past, qualitative and quantitative research methods often were viewed as autonomous and not combinable, and research studies tended to employ one method or the other (Bryman, 2007).

Rocco, Bliss, Gallagher, and Perez-Prado (2003, p. 22) identified five reasons for mixing research methodologies to as "triangulations", "complementary", "development", "initiation", and "expansion". In this research study, "triangulation" was used to gather quantitative and qualitative data. Different methods have been triangulated to collect and analyze information gathered from participants (Crabtree & Miller, 1992). This is perceived by other researchers as a complete mixed method on its own, as it increases the validity and "worthiness" of the study (Peter & Gallivan, 2004, p.). The use of a paper survey and an online questionnaire in this study to gather qualitative and quantitative data is an example of triangulation to improve response rates (Dillman, 2000).

According to Peter and Gallivan (2004), research studies that use mixed methods may be conducted with the notion that one part complements the other. This is true with this research study, as two types of data were collected using two methods simultaneously, but with one method serving as the primary method (quantitative) while the other (qualitative) helped to extend the understanding of the research (Peter & Gallivan, 2004). Combined research can be used to advance results to the next research study. Rossman and Wilson (1985) as cited in Peter and Gallivan also stated that combined research can be used to "uncover paradox and contradicting" data, to understand the problem. Finally, using different methods in research, helps to "expand the scope and breadth of the problem" being studied (Peter & Gallivan, p. 6).

Few mixed methodology research studies have been conducted in agricultural education. Miller (2006) challenged programs of agricultural education to consider using both methods to address the effectiveness of their graduate education programs. Different statistical analysis was also applied in this study. For example, this study utilized *t*-tests, Pearson correlations, and analysis of variance (ANOVA) as tools to understand data and make inferences (Miller, 1994).

Research on Demographics

Demographics refers to the "physical characteristics of a population, such as age, sex, marital status, family size, education, geographic location, and occupation" (accessed at http://www.learnthat.com/define/view.asp?id=136), and are important in agricultural education. Several demographic research studies have been conducted specifically to identify and understand, among others, the physical demographic characteristics (i.e., educators,

gender, programs, responsibilities of teachers, student selection, curriculum, program models, and field experiences) in agricultural education (Hughes & Barrick 1993; Myers & Dyer, 2004), "philosophical framework" of agricultural education (Miller, 2006), chronological development of agricultural education (Hillison, 1989), effectiveness of the agricultural education programs (Luft, 2004), and relationships of demographics and other variables in agricultural education (Wayne & Youngs, 2003).

Demographic characteristics of a program identified by Myers and Dyer (2004) have implications for agricultural education that have numerous positive contributions to effectiveness in teacher preparation. Also, using the different demographic elements identified by Myers and Dyer, educators may predict the needs of the program for it to prepare teachers effectively. For example, demographics may help explain gender trends in agriculture, changes in programs of agricultural education, and goals of programs (Myers & Dyer). They may also help to predict situations in program development and evaluation, to establish their weaknesses and strengths (Myers & Dyer, 2004; Wayne & Youngs, 2003). Myers and Dyer (2004) concluded that agricultural education, on average, is a four-year program that is "dominated by white males" (p. 49), and offers courses in technical agriculture, planning, and educational foundation.

Demographic characteristics of teacher educators also have been used to reveal historical development, changes, and progression of the agricultural education from its establishment in the land grant colleges up to the present (Hillison, 1998). In a paper presented at an AAAE annual meeting in 1997, Hillison (1998) outlined the importance of demographic studies tracing the history of teacher educators. The paper also educates readers on the connection of agricultural education programs which are basically comprised of three

elements: classroom laboratory instruction; supervised occupational experiences (SOEs), now called agricultural education experiences; and membership in the FFA (now called national FFA). According to demographic studies, on average, the length of bachelor's degree programs in the U.S. is currently four years. New teachers seem to have more needs than do in-service teachers (Garton & Chung, 1996). Relational studies tend to contribute relevant information to help improve programs (Myers & Myer, 2004).

On yet another factor related to demographics, programs of agricultural education have been challenged to consider both qualitative and quantitative research, to prepare broad-minded teachers (Miller, 2006). The philosophical framework discussed by Miller pointed out that it is time educators in agricultural education consider changing from single track positivism research to involving interpretive ways of knowing, thus broadening the scope and also encouraging ways to find solutions to problems that seem to be complex (Miller).

Other research studies have incorporated demographics of agricultural education in their investigations (Wayne & Youngs, 2003). Demographic studies may provide an opportunity for educators to relate their personal and educational characteristics (Wayne & Youngs). A study that seeks to establish relationships between people's characteristics and their classroom performance may contribute positively to improvement of agricultural education programs such as curriculum content, test procedures, guidelines, and development (Wayne & Youngs).

Demographics may also provide a statistical awareness about, i.e., preferences of male and female teachers in their teaching career as well as establishing the numbers of each group in the profession (Kantrovich, 2007; Kesley, 2006). McLees (n.d), Myers and Dyer (2004), and Ulrich et al. (2005) revealed a lesser number of women than men in agricultural

education and related sciences. According to Kesley (2006), there are generally many women in teaching as a whole but few are in agricultural education and other sciences. However, an increase in the number of female students taking animal science, a core course for students of agricultural education, has been observed in a study conducted by Beck and Swanson (2003), which may suggest a rise in female agricultural educationists. According to a book review by Hammerness (2006), there are more "career opportunities" (p.431) than there were before for the new generation, especially for female teachers, as a result people have a variety of choices. However, Hammerness appealed to programs preparing teachers to address strategies to help new teachers meet the challenges in the first few years of their teaching and also argued that schools need to improve their situation in order to keep teachers. Although the focus in teaching seems to have shifted (Gende, 2006), people enter teaching for different reasons (Swortzel, 1998).

For example, a study of a "Rodeo Agriculture Mechanics Project Show" by Ulrich, Pavelock, Muller, and Harren (2005), served as an eye-opener to educators and policymakers in emerging agricultural education. Research on demographics, therefore, is important because it helps to understand new directions in agricultural education (National Academy of Science, 1988). With the changes brought about by the advancement of technology and other factors, there needs to be an understanding of demographics (Hillson, 1998; Myers & Dyer, 2004). Demographic characteristics, therefore, help to predict social and economic situations in education (Berson, 1997). Studies have revealed the demographic characteristics of standard-based education to include components such as standards and tests, but little research has been conducted on teacher perception regarding standards in education.

Summary

The review investigated the literature regarding effectiveness of teacher education programs. Figure 1 summarizes the reviewed literature. The review focused on effectiveness as influenced by education standards, standards-based education as a new model of education, practices, demographics and types of research studies as they pertain to teacher development. Current and proposed components and strategies used in Iowa agricultural education were presented. As posited by Luft (2003), several factors play a role in defining effectiveness. The literature revealed that effectiveness in teacher education may be considered in several aspects related to outcomes: policy, research and planning strategies. Hughes and Barrick (1993) summarized that agricultural education programs are designed to "develop the whole person by utilizing instructional activities which provide the technical, personal skills and qualities needed to obtain employment and establish a rewarding career" (p. 67). Finally, mixed methodology, and demographics provided background for the research methodology applied in this study, which is presented in the next chapter. However, no research was found on teacher perception regarding standards in agricultural education in Iowa.

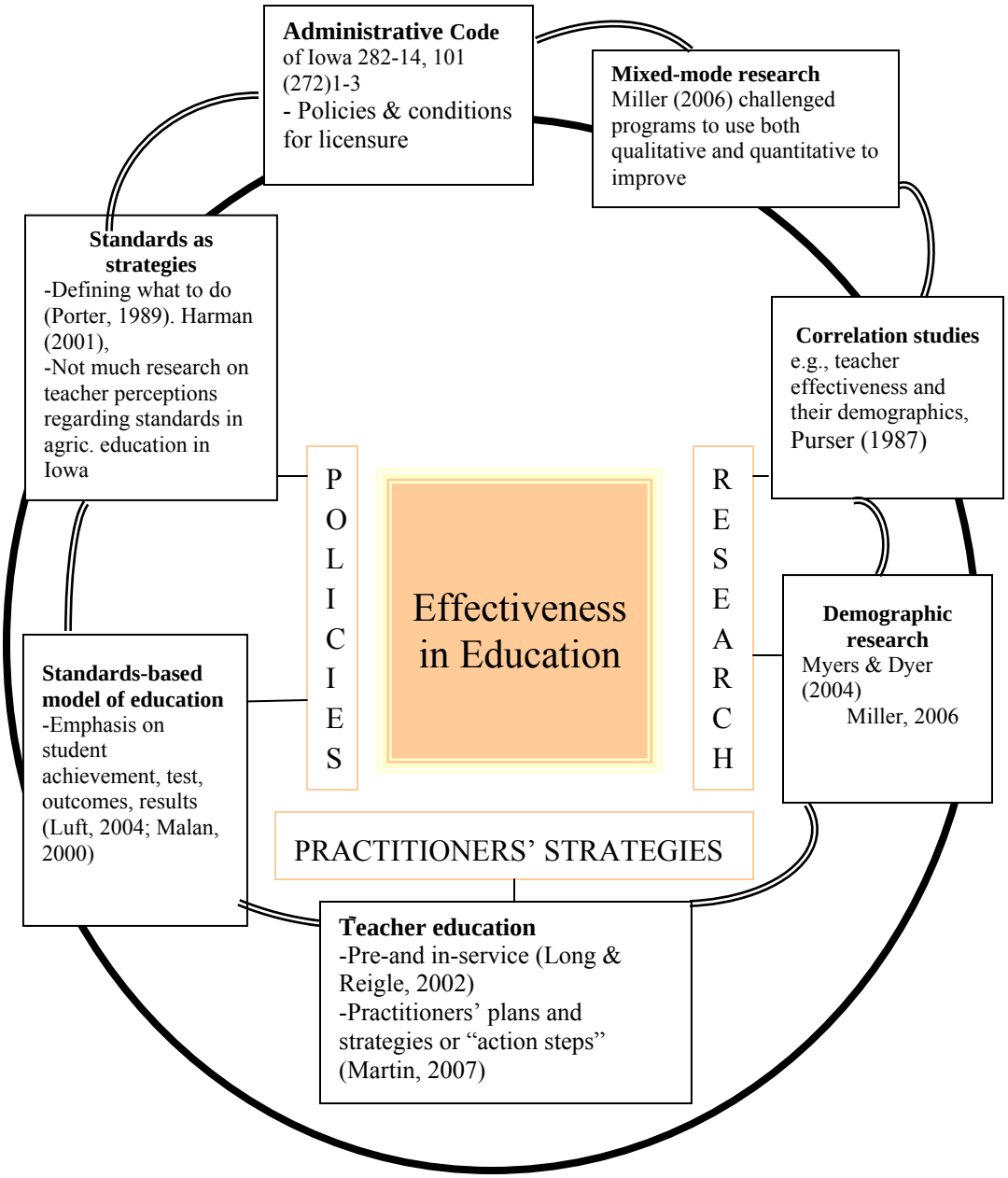


Figure 1. Summary of literature review

CHAPTER 3. METHODOLOGY

The purpose of this study was to explore and describe perceptions of Iowa secondary school agriculture teachers regarding the effectiveness of teacher education programs in meeting standards and criteria, and course content. This chapter identifies the qualitative and quantitative research procedures used in the study and describes the research design, population and sampling procedures, data collection, instrument validity, pilot testing, data collection, and data analysis.

Research Design

This research was descriptive, and used qualitative and quantitative data. The study used a questionnaire with qualitative and quantitative items to survey agriculture teachers who started teaching between 1995 and 2006 in secondary schools in the state of Iowa. The survey instrument was a modification of one used by Dormody and Torres (2002) to assess the perceptions of former students of the agricultural education program at New Mexico State University regarding competencies they gained during their training at the time of graduating with a bachelor's degree in agricultural education.

Population and Sampling Procedures

At the time of this study, 248 public secondary schools in the state of Iowa offered agricultural education. Agricultural education teachers in secondary schools in Iowa who started teaching between 1995 and 2006 were the target population for this study. This period encompassed the 6 years prior to and 6 years after the 2001 introduction of standards and criteria into Iowa's teacher education programs. The 96 teachers in the study met the

following criteria: (1) they had a valid e-mail address, to access the online survey; (2) they had started teaching in a secondary school in the state of Iowa between 1995 and 2006; (3) they had graduated with a bachelor's degree from an accredited university; and (4) they were currently teaching agricultural education in Iowa. No random sampling was conducted.

Participants' names and e-mail addresses were obtained from the Iowa Department of Education. The participants were expected to differ on many characteristics, including number of years in the field, FFA membership, recipients of FFA degrees, different universities from which they graduated, year of certification; year of graduation, teaching experience, SAE experiences and involvement, and GPA. Thus, teacher participants were expected to have different perceptions related to agricultural education program effectiveness.

Instrument

Data were collected using an online SurveyMonkey® instrument (Appendix B) with closed- and open-ended items to gather teachers' perceptions. A paper copy of the SurveyMonkey® instrument with a cover letter (Appendix B) was mailed to the participants who did not respond to their email. The questionnaire was adapted from the Dormody and Torres (2002) New Mexico State University study of similar characteristics. The existing questionnaire fits well with the state-mandated competency statements, course content, and professional development activities available to teachers in Iowa. The study was to assess teacher perceptions regarding their former program's effectiveness developing them at the time of graduation and the professional development gained from teaching. In the new instrument the competencies were replaced with the 8 overall standards and selected 16

criteria. Other sections of the instrument included 7 subject content areas and 10 professional development activities from Dormody and Torres (2002).

The questionnaire was self-administered online, followed up with a paper survey. The quantitative parts of the survey instrument used 4- and 5-point Likert-type items to rate perceived (1) effectiveness of the program in preparing teachers, (2) importance of the standards and criteria, and (3) influence of the professional development activities in teaching. Part 1 of the instrument consisted of 7 statements about State of Iowa teaching standards, 16 selected criteria, and 7 areas of agriculture subject content, all anchored on 5-point Likert-type scales. Only 7 of the 8 standards were evaluated in this part of the study, while all 8 standards were studied regarding importance of the program. The omission was not noticed during the development of the instrument and also went unnoticed during the evaluation of the instrument. The items in part 1 used 5-point Likert-type items. The range was 1 = ineffective; 2 = least effective; 3 = moderately effective; 4 = effective; and 5 = very effective. In part 2, 4-point items were used to measure perceptions regarding importance of the standards and criteria in teaching anchored as follows: 1 = not important; 2 = least important; 3 = moderately important; and 4 = very important. In Part 3a, dichotomous items anchored as 1 = “Yes” and, 2 = “No” were used to measure teachers’ participation in 10 professional development activities.

In part 3b, 4-point items were used to rank the influence of 10 professional development activities, where 1 = no influence; 2 = slight influence; 3 = moderate influence; and, 4 = strong influence. In part 4, responses were gathered in narrative form outlining 3 areas of program strengths (question 1), areas to be improved on teacher education (question 2), standards to be improved (question 3), usefulness of subject content (question 4), and

comparison of college preparation and professional development (question 5) in teaching. In Part 5, items were structured to solicit information regarding demographic information including gender, teaching experience, teaching certification, year of undergraduate graduation, final GPA, high school FFA membership, highest degree attained, and participation in SAE.

Validity

Several techniques were used to assess the reliability and validity of study data. First, the validity of the questionnaire was reviewed and analyzed by a qualified four-member panel of professionals at Iowa State University. The panel included two professors of agricultural education, Drs. Robert A. Martin and Gregory S. Miller; one assistant professor of agricultural education, Dr. Levon Esters; and one professor of curriculum and instructional technology, Dr. Ann D. Thompson. The four professors work closely with Iowa teachers in schools, regularly conduct research in this area, and are knowledgeable about standards, criteria, and social science research methodology and the agriculture science subject content, as well as professional development activities. The three professors on the panel were also serving on the researcher's program of study (POS) committee. The panel reviewed the questionnaire for content validity, consistency with the problem investigated, and adequate coverage of selected standards, subject matter content, item clarity, face validity, and the scale used to measure teachers' perceptions. The panel also provided suggestions for modifying the survey instrument.

Pilot Testing

An additional step was taken to assess the questionnaire's consistency in measuring what it was designed to measure by conducting a pilot test. The survey instrument for data gathering was pilot tested with 10 senior undergraduate and graduate students in the agricultural education teacher program at Iowa State University. These students did not participate in the final survey.

Pilot participants were identified by sending an e-mail message to 10 agricultural education undergraduate seniors and graduate students with a letter attached to the e-mail similar to the one used for the final research (Appendix B). The letter, which was accessed online through a link in an e-mail, introduced the researchers and described the purpose and value of the research. The letter sent as an attachment to the e-mail message explained the voluntary and confidential nature of the research. It also explained that responses were analyzed as a group, and made clear the value of the research. Cronbach's alpha coefficient values were computed using pilot results for statements measuring program effectiveness and statements describing the influence of professional development activities. As indicated in McMillan and Schumacher (2001), an instrument with a reliability coefficient between .70 and .90 is considered to be reliable (Table 1).

Thus, the instrument for this study, with alpha values between .83 and .97, was judged to be reliable in measuring teacher perceptions regarding the effectiveness and importance of teacher education, and the influence of professional development activities in preparing teachers of agriculture. Based on feedback from the pilot study, changes were made to the instrument to include: (a) creating a section on importance in the instrument by systematic reduction of criteria items from 42 to 16 (choosing the first 2 criteria for each

Table 1. Internal consistency α values of the pilot test survey instrument

Section of the instrument	# of items	Cronbach's α
A. Program effectiveness in addressing		
42 teaching criteria	42	.968
overall teaching standards	8	.917
agricultural education course content	7	.885
B. Influence of professional development activities	13	.833

overall standard); (b) reducing the number of professional development activities items from 13 to 10 by removing items measuring one concept; and (c) using suggestions from piloting results to construct part 2 of the instrument using the same 8 standards and 16 criteria. The reliability coefficient values for the revised instrument are reported in Chapter 4. The revised questionnaire was re-submitted to the ISU Institutional Review Board (IRB) for approval (see Appendix C).

Data Collection

All 96 Iowa secondary school agriculture teachers who met the criteria for this study were contacted by an e-mail, notifying them that they would be receiving an online survey and that their responses would be important. Attached to the first e-mail message was a letter of introduction (Appendix C), signed by the major professor and principal researcher. The letter explained that the teachers had been invited to participate because they began teaching in Iowa between 1995 and 2006 and have valid e-mail addresses for accessing an on-line survey. The letter explained that their participation was voluntary, that their answers would

be confidential, and that participants' identifying numbers were automatically created by SurveyMonkey® software.

A second e-mail message was sent the next day that linked respondents to the survey questionnaire and directed them how to answer the survey online. Responses were recorded. Seven days later, a reminder e-mail was sent to non-respondents, again including the short introduction message and site link to access the survey. A second reminder to non-respondents was sent one week later, again with the introductory letter and questionnaire link. Two weeks later, a third reminder was sent to non-respondents at the beginning of the week, followed by a fourth reminder at the end of the week. These follow-up procedures to non-respondents were modeled after the survey procedures of Dillman (2001). The last e-mail contacts to non-respondents were sent two days after the others because Dillman (2000) indicated that reducing the time space between email contacts in online surveys tends to increase response rates. The final follow-up to non-respondents was a paper survey. Dillman also indicated that combining e-mails and a paper survey improves response rates. The paper survey comprised of a questionnaire, letter of introduction, and return stamped envelope.

Of the 96 survey questionnaires emailed, 83 (86.46%) responded, while 13 declined (13.54%). Of the 83 responses obtained, 8 (9.63%) were incomplete and three (3.6%) participants who taught before 1995 were not within the range required for this study. The usable responses represented 61 (63.54%) of the teachers surveyed. Responses collected from beginning February 1 to March 21, 2007 were grouped as early respondents ($n = 49$). Four follow-ups were made to non-respondents by online survey. The last follow-up survey was mailed to 13 teachers using the standard paper questionnaire. Of the 13 non-respondent

teachers who received a paper survey, one (7.69%) response was received. Responses received after March 21, 2007 were grouped as late respondents (n = 12).

T-tests were conducted to compare means of early and late respondents on the three principal concepts. No significant differences were found between the early and late groups; therefore all responses were combined.

Data Analysis

Two types of data were generated for this study—qualitative and quantitative. The development of data analysis methods was designed as described in the following subsections.

Quantitative

SPSS version 15 was used to compute descriptive statistics for parts 1, 2, 3, and 4 on perceived program effectiveness and importance, the influence of professional development activities variables for teachers, and demographic characteristics. Cronbach's alpha was calculated to establish the internal consistency of statements used in the study. *T*-tests were conducted to compare means of early respondents and late respondents and to compare means of teachers who started teaching in 2000 and before, to means of teachers who started teaching in 2001 and after the introduction of standards and criteria in teacher education regarding effectiveness of the programs on three principal concepts, or the dependent variables. Thus, *t*-tests were used to assess if there were differences between two groups of teachers on the three dependent variables. *T*-tests were also used to compare means for two-category independent variables, gender- males and females on three dependent variables. Pearson correlations were also used to determine if there are relationships among perceived

effectiveness, importance, and influence of the teacher preparation programs and FFA achievements in high school (independent variables). Other statistics used were Cramer's V, which was used to determine the relationship between the dependent variables and "to teach agricultural mechanics," and the analysis of variance (ANOVA), which was used to estimate between-groups and within-groups differences and for testing for the significance of main effects.

Descriptive statistics, including frequencies, percentage, means, and standard deviations, were used to summarize respondents' demographic characteristics. Similarly, responses from the qualitative data were quantified to analyze the frequency of teacher responses. In addition, descriptive statistics were used to measure teacher perceptions regarding effectiveness, importance, and influence of professional development.

Qualitative

Qualitative data in the form of descriptive statements were collected to answer objective 5, which sought to understand the teachers' perceptions of the use of standards in the teaching of agricultural education in schools and also assessed teachers' perceptions regarding the program effectiveness in addressing standards. Data were gathered using five open-ended questions which guided and structured the responses (Crabtree & Miller, 1992). The subjective text information gathered from teachers of agriculture through a survey instrument in the form of narratives, was assessed using the technique of "analytical styles" (p. 18) described in a continuum developed by Crabtree and Miller. The continuum has four parts in a straight line as diagrammatically illustrated by McMillan and Schumacher (2001) to have two opposite extreme ends one objective and the other one more subjective. The left hand of the scale requires the researcher to be more objective in analyzing data by

quantifying the themes that emerge from teachers' responses and or pre-determined themes (Crabtree & Miller, 1992). In the opposite end, on the right hand side of the scale, the analysis is based on how the researcher gained impression and understanding of the teachers' responses. The middle of the scale is anchored with a form or "template" (p. 18) providing a guide to manage the information, tallying, and enabling the researcher to identify key areas in order to analysis teachers responses. The part on "editing analysis" (p. 18) on the scale guides the interpretation and understanding what teachers say about the programs. Each of the points in the scale presents a different style of analyzing the teachers' qualitative data (Crabtree & Miller).

In this study, content analysis involved creating codes, quantifying teacher responses, and categorizing the data into pre-existing and emerged patterns (Crabtree & Miller, 1992). The ultimate desire is to interpret the results according to the purpose of the study (McMillan & Schumacher, 2001).

In question one, the respondents were asked to supply three strong areas of teacher education programs. In question two, respondents were to identify standards which need to be improved, while in question three they indicated the usefulness of standards, indicate whether subject content offered at college was important in teaching, and provided information designed to compare effectiveness of college preparation with professional development activities. There were no restrictions to responses to questions 2, 3, and 5, while question 4 asked respondents to indicate "yes" or "no" regarding participation. The teachers' responses were summarized to give statistical responses to the five open-ended questions

Table 2 illustrates the statistics to open ended questions. Close to two-thirds of teachers responded to question 1, in which each respondent identified one to three areas

perceived to be effectively addressed by teacher education programs. At least close to three-quarters of teacher participants responded to the second, third, and forth items. Data were

Table 2. Number of respondents who answered the questions (n = 62)

Question	n	Percentage
1. Describe three areas you perceive to be the strengths of the agricultural education teacher certification programs in addressing the standards during teacher preparation		
Responses	38	61.29
Non responses	24	38.71
Total	62	100.00
2. Suggest standards you think should be improved to strengthen the agricultural education teacher certification program of preparing teachers.		
Responses	43	69.35
Non responses	19	30.65
Total	62	100.00
3. Indicate whether standards in teacher certification program are useful or not useful in preparing teachers.		
Responses	46	74.19
Non responses	16	25.71
Total	62	100.00
4. Which one do you perceive more effective in preparing teachers: college preparation or professional development activities you attended during teaching?		
Responses	46	74.19
Non responses	14	25.81
Total	60	100.00

analyzed using different techniques of data analysis as described by Crabtree and Miller (1992) and the five ways of classifying knowledge by Mayer (2001).

Crabtree and Miller's (1992) data analysis techniques provided steps to go about manipulating data where as Mayer's (2001) classification of knowledge was used to categorize data according to what people think have learned. The following acronyms were used to illustrate coding of information (Mayer, 2001; Crabtree & Miller, 1992). The responses were gathered from teachers to indicate/describe what they learned during preparation (Mayer, 2001). They were in the form of:

- Information, facts, concepts, and schematics were grouped and coded as IFKC. For example responses such as, "*content knowledge*"
- Demonstration, and procedures or steps were grouped and coded DDEP, Example will be, "*using standards and benchmarks*". Thus, programs prepare teachers to use standards.
- Information providing opportunities to think and evaluate were coded as PT. Example will be "*looking for community support*".

Approximately 103 responses were gathered for question 1, of which 44 were categorized as IFKC, 16 as DDEP, and 29 as PT (Mayer, 2001). Responses to this question were further analyzed using common themes emerging from the data. Data were assessed for common themes, meaning, statements, and concepts and then they were grouped into nine areas (Merriam, S. B., & Associates, 2002). Nine themes emerged from the assessment of data for themes and were also statistically analyzed to compare the frequencies of each category.

In question 2, teachers' responses indicated standards that need to be improved, and five subheadings were found. Assessment of the information required the researcher to read and understand teachers' responses and made reference to Crabtree and Miller's (1992) "crystallization analysis style" (p. 18). In question 3, participants expressed their views in terms of "very useful," "somewhat useful," "not useful," and "no response". The subheadings partly emerged from wording of the survey question. Coding was therefore based on pre-existing guide to quantify the responses (Crabtree & Miller, 1992). In question 4, analysis of responses was based on three pre-determined groups: (1) college preparation (CP); (2) professional development (PD); and (3) combined (CP & PD). Analysis was based mainly on

patterns from the survey questions (Patton, 1990). Table 2 presents a summary of the frequency of the responses to four of the five open-ended questions answering objective 5 of the study.

Summary

This chapter identified the qualitative and quantitative research procedures used in the study. A description of the research design, population, and sampling procedures, and data collection instrument was provided. Techniques for determining instrument validity were discussed, followed by pilot testing, data collection, and data analysis methods. The following chapter presents the results of the study.

CHAPTER 4. RESULTS

This chapter presents the results regarding the perceptions of agriculture teachers at the secondary school level in the state of Iowa about the effectiveness of teacher-training education programs. Teachers were surveyed using an online and paper questionnaire designed based on a modified version of the data collection instrument used by Dormody and Torres (2002). Teachers' perceptions were measured using closed-ended and open-ended items. The statements in the closed-ended section were anchored on 4- and 5-point Likert-type items, and statements were about Iowa's 8 overall teaching standards, 16 systematically selected criteria of the 42, and 6 agricultural education subject content areas. Identified professional development activity descriptions were anchored on 2-level items, with "yes" denoting participation or "no" for non-participation. The statements were anchored further on 4-level Likert-type items to measure their level of influence on teachers' professional development. In addition, 5 open-ended items provided qualitative data to measure teachers' perceptions regarding the effectiveness of teacher education programs using descriptive text.

The specific objectives of this survey included the following:

1. Describe the demographic characteristics of Iowa secondary school agriculture teachers who began teaching between 1995 and 2006.
2. Describe how these teachers perceive:
    a. the effectiveness of teacher education programs in addressing state standards, criteria, and subject matter;
    b. the importance of teacher preparation standards, criteria, and subject matter to teach agricultural education in schools; and

c. the influence of professional development activities adapted from Dormody and Torres (2001).

3. Compare Iowa secondary school agriculture teachers who began teaching before 2000 and those who began teaching after 2001 based on:
   a. their perceptions of the effectiveness of teacher education programs in addressing standards, criteria, and subject matter;
   b. their perceptions of the importance of teacher standards, criteria, and subject matter to the teaching of agriculture in schools;
   c. their perceptions of the influence of professional development activities; and
   d. their participation in professional development workshops.
4. Determine if teachers' perceptions regarding effectiveness of teacher education programs, importance of what is learned in these programs, and the influence of the professional development activities on teaching, are associated with demographic characteristics.
5. Describe the views of agricultural education teachers regarding the role of standards in their preparedness to teach and professional development.

Analysis of the Data

Results of this study are presented in two parts. Part one presents quantitative results to describe teachers' perceptions using different statistics, and part two discusses participants' qualitative statements about their perceptions regarding the use of standards in teaching. The two types of results complement each other in describing the agricultural

education teachers' perceptions regarding effectiveness of teacher education programs. Results are presented in narratives, numeric information, and tables.

Part I: Quantitative

Presented in this part of the results are the reliability coefficients of the research instrument, *t*-tests comparing of the early and late respondents' group means, and the quantitative results of the study. Teachers of agriculture responded to closed-ended statements anchored on 4- and 5-point Likert-type options by checking the level of effectiveness of the program, level of importance of standards and criteria, and level of influence of professional development activities and their participation. Other statistical methods used were ANOVA, Pearson correlations, and Cramer's V. Respondents were also asked to supply their demographics with regard to gender, year of certification, university from which they earned their bachelor's degree, year graduated with bachelor's degree, number of years in teaching, GPA at graduation, membership in FFA at high school, and the highest degree obtained in FFA.

Reliability of the instrument

Several factors may influence the reliability of items in the instrument (Airasian & Gay, 2003). According to McMillan and Schumacher (2001), instrument reliability can be affected by both the character of a person and the environment; thus, reporting internal *consistency* of items in the instrument in measuring the required construct was deemed important. McMillan and Schumacher (2001) alluded to the fact that to measure people's characteristics one is likely to find errors or mistakes when the scores are obtained. Cronbach's α model was used to determine the reliability of the items in the instrument

which has 4- and 5-point Likert-type items measuring teachers' perceptions. Satisfactory coefficient values will range from .70 to .90, while above .90 will be closer to perfect, with fewer mistakes (McMillan & Schumacher, 2001).

Tables 3 and 4 provide the Cronbach's α reliability coefficient values for the revised data collection instrument following a pilot test. Table 3 presents the α coefficients for the grouped 30 statements measuring program effectiveness, 24 statements measuring importance of the programs in teaching, and 10 professional activities performed by teachers. In Table 4, the α values are presented for the selected 16 teaching criteria, 8 teaching

Table 3. Cronbach α reliability coefficients of response to grouped statements of the instrument

Teacher education program	Number of items	Cronbach's α
Effectiveness[1]	30	.947
Importance[2]	24	.947
Influence of professional development activities[3]	10	.855

[1]Program effectiveness measured by 16 criteria, 7 overall standards, and 7 course contents.
[2]Program importance measured by 16 teaching criteria and 8 overall standards.
[3]Influence of professional development activities represents a list of 10 activities.

Table 4. Cronbach α reliability coefficients of responses to individual items of the data collection instrument

Teachers' perceptions regarding:	Number of items	Cronbach's α
Effectiveness of selected teaching criteria[1]	16	.93
Effectiveness of overall teaching standards[2]	7	.80
Effectiveness of course content materials[3]	7	.87
The importance of criteria in teaching[4]	16	.93
The importance of overall teaching standards[5]	8	.88
Influence of 10 professional activities[6]	10	.86

[1]Effectiveness of agricultural education programs in preparing teachers on selected teaching criteria.
[2]Effectiveness of agricultural education programs in preparing teachers on overall teaching standards.
[3]Effectiveness of agricultural education programs in preparing teachers on course content materials.
[4]The importance of agricultural education programs on selected teaching criteria in teacher preparation.
[5]The importance of agricultural education programs' overall teaching standards on teacher preparation.
[6]Influence of professional development activities represents a list of 10 activities.

standards, and agricultural education course content to measure effectiveness. The α coefficient for the 16 teaching criteria items and 8 overall standards used to measure importance of the program were .93 and .88, respectively.

Comparison of early and late respondents

According to Ary, Jacobs, and Razavieh (2001), non-respondents may be a threat to the external validity of the study since results cannot be generalized to the entire group studied without the knowledge of the group that did not reply. According to Lindner, Murphy, and Briers (2001), there are three ways of managing non-respondents: comparing early to late respondents (p. 43), using "days to respond" (p. 43), and comparing "respondents to non respondents" (p. 43). In this study a *t*-test was used to compare means for early and late groups of teacher respondents. The results showed no statistically significant difference ($p > .05$) between the means of teachers who responded early ($n = 49$) and those who responded late ($n = 12$). Table 5 provides *t*-test results comparing the late and early respondents' mean perceptions regarding the effectiveness of their teacher education

Table 5. *T*-test results comparing group means for late and early respondents

Variable	*n*	Early respondents *M* (*SD*)	*n*	Late respondents *M* (*SD*)	*t*	Sig (2-tailed)	Mean difference
Program Effectiveness[1]	49	3.30 (.56)	12	3.25 (.45)	.29	.76	.051
Program Importance[2]	48	3.59 (.37)	11	3.37 (.39)	1.80	.07	.227
Influence of professional development activities[3]	48	2.84 (.40)	12	2.70 (.45)	1.03	.306	.137

[1]Program effectiveness: created from 16 criteria, 8 standards, and 7 course content areas measuring effectiveness.
[2]Program importance: created from 16 criteria and 8 standards measuring importance.
[3]Professional development activities influence: created from all 10 professional activity items.

programs, the importance of the program, and the influence of professional development activities.

Results

Objective 1: Describe the demographic characteristics of Iowa secondary school agriculture teachers who began teaching between 1995 and 2006.

Demographics. Table 6 shows the demographic characteristics of the respondents. Of the 96 teacher participants, 13 (13.54%) declined, and 83 (86.46%) returned completed surveys. Of the 83 who returned the questionnaire, 8 (9.63%) were unused because the respondents did not complete more than half of the questionnaire including demographics, which showed who had taught before 1995 were removed from the study. Of the 13 non respondents who were contacted with both an e-mail message and a paper survey, only 1(7.69%) responded. The usable data for this study, therefore, came from 61(63.54%) completed surveys from 96 participants including the late respondents. Table 6 reveals that the proportions of male and female respondents were almost the same. Furthermore, 28% of respondents were certified to teach agricultural education prior to 2000, before standards' introduction, and 67% were certified to teach after 2001. A majority of respondents (65.6%) were Iowa State University alumni, while 13% graduated from other universities. About one-third of the respondents obtained their bachelor's degree in 2000 or before, while two-thirds (64%) graduated with a bachelor's degree in 2001 or after. In addition, 36.1% of the participants indicated that they have been teaching for 1 to 3 years; a similar proportion had taught in the state of Iowa between 4 and 7 years, with approximately one-quarter (25%) having taught 8 or more years.

Table 6. Demographic characteristics of participants

Characteristics	Frequency	%
Gender		
Male	30	49.2
Female	29	47.5
Missing	2	3.3
Year of certification		
Before / equal 2000	17	27.9
After / equal 2001	41	67.2
Missing	3	4.9
University obtained BS degree		
ISU	47	77.0
Other Universities	10	16.4
Missing	4	6.6
Year graduated with BS degree		
Before & including 2000	18	29.5
From 2001 - 2006	39	63.9
Missing	4	6.6
Years of teaching experience		
1 - 3 years	22	36.1
4 - 7 years	22	36.1
8 and more years	15	24.6
Missing data	2	3.3
GPA at graduation		
2.75-3.00	13	21.3
3.10 -3.50	27	44.3
3.51- 4.00	14	23.0
Missing	7	11.5
Membership to FFA at high school		
Yes	54	88.5
No	3	4.9
Missing	4	6.6
Highest degree in FFA		
None	6	9.8
Chapter degree	16	26.8
State degree	23	37.7
American degree	14	23.0
Missing	2	3.3
Is subject content offered important?		
Yes	53	86.9
No	3	4.9
Missing	5	8.2

At least 21% of teachers graduated with GPAs from 2.75 to 3.00, 44% with GPAs from 3.01 to 3.50, and 23% with GPAs between 3.51 and 4.00. A large majority of participants (89%) in the study were members of FFA during their high school education; only 5% were not. At least 10% indicated that they received no degree in FFA; 27% received a FFA chapter degree; approximately 40% received a FFA state degree; and 23% received a FFA American degree. The vast majority (87%) of participants indicated that the subject content offered at college level during their preparation for teaching was important, and less than 5% indicated that the subject matter offered in teacher education programs was not important.

Objective 2. Describe how teachers perceive: (a) the effectiveness of teacher education programs in addressing state standards, criteria, and subject matter; (b) the importance of teacher preparation standards, criteria, and subject matter to teaching agricultural education in schools; and (c) the influence of professional development activities adapted from Dormody and Torres (2001).

Tables 7–12 were constructed for objective 2, and appear at the end of this section. To answer objective 2, the percentages of respondents on levels of the Likert-type scale to each statement were calculated; means and standard deviations were also computed to determine perceived effectiveness of the teacher education programs in addressing the selected 16 criteria, 8 overall standards, and 7 agricultural education course contents. The following cutpoints were constructed based on the Likert-type results in the description of program effectiveness: 0.00-1.49 = ineffective; 1.50-2.49 = less effective; 2.50-3.49 = moderately effective; 3.50-4.49 = effective; and 4.50-5.00 = very effective. Similarly, frequencies, means, and standard deviations were computed to determine the perceived importance of the 16 selected criteria and 8 overall standards. The cutpoints on the importance scale were: 0.00-.1.00 = not important (NI); 1.99-1.01 = slightly important (SI);

2.01-3.00 = moderately important (MI); and .3.01-4.00 = very important (VI). Teachers' perceptions regarding influence of professional development activities were also determined in the study by computing percentage of responses for each level on the scale, means, and standards deviations. The cut-points on the influence scale were: 0.00-1.00 = no influence (NI); 1.01-2.00 = slight influence (SI); 2.01-3.00 = moderate influence (MI); and 3.01-4.00 = strong influence (SI). Furthermore, standards, criteria, subject course content, and the influence of professional development statements were ranked according to respondents' overall percentages and means to determine program effectiveness.

Perceived program effectiveness. Table 7 depicts teachers' perceived effectiveness of the education programs in addressing the selected 16 criteria during the teacher certification program. Approximately 43% percent of teachers perceived the program to be *moderately effective*, followed by 35.2% teachers who indicated the program to be *effective* in addressing the entire 16 criteria. The overall mean for the entire 16 teaching criteria statements based on the cutpoints created on a 5-point Likert-type range was also *moderately effective* (M = 3.35; SD = .57). The teaching criterion, *demonstrate professional and ethical conduct as defined by the state of Iowa and individual district policy,* had the highest mean (M = 3.78; SD = .804). The second highest mean score was obtained for *"Create a learning community that encourages social interaction, active engagement, and self-regulation for every student"* (M = 3.67; SD = .769). The third-highest mean score was on *"Work collaboratively to improve professional practice and student learning"* (M = 3.53; SD = .700). The lowest mean score among the 16 criteria was obtained for *"Use student*

achievement data, local standards, and the district curriculum in planning for instruction" (M = 3.03; SD =. 894).

Table 8 depicts teachers' perceived effectiveness of education programs in addressing 7 overall teaching standards. Results show that, generally, a plurality of approximately 40% of teachers perceived education programs to be *effective* in addressing the 8 standards, followed by 37.23% of teachers who indicated that programs were *moderately effective.* The overall mean for the entire 7 (of 8) teaching standard statements based on the cutpoints created on a 5-point Likert-type range was *effective* (M = 3.45; SD = .55) in addressing the criteria. Teachers of agricultural education, therefore, perceived the program to be effective in addressing overall standards. Out of 8 overall teaching standards, "*engage in professional growth"* had the highest mean (M = 3.72; SD =.790), followed by *"demonstrating competence in content knowledge appropriate to teaching position"* (M = 3.68: SD = .776). The third-highest mean score was on the teaching standard *"fulfill professional responsibilities established by the school district"* (M = 3.53; SD = .858). The teaching standard with the lowest mean was to "*demonstrate competences in classroom management"* (M = 3.12; SD = .984). Thus, teachers of agriculture in the state of Iowa perceived the program to be effective.

Table 9 depicts teachers' perceptions regarding program effectiveness in addressing agricultural education course content. The results in Table 9 shows a plurality (31%) of respondents perceived their college or university to be effective, followed by 22.96% who indicated that the programs were moderately effective, while 18.49% perceived the program to be less effective in addressing the agricultural education course content during teacher preparation. The overall mean for the 7 agricultural subject course content statements on a 5-

point Likert-type effectiveness range was M = 3.02 (SD = .81). Based on this, teachers perceived the teacher education programs to be moderately effective in addressing the subject content for agricultural education. The 7 statements describing subject contents were ranked according to the one with the highest mean to the one with the lowest mean as follows: "*animal science"* (M = 3.80; SD = 1.038), followed by *"plant science"* (M = 3.63; SD = 1.041), and *"soil science"* (M = 3.35; SD = 1.005). The lowest mean score obtained was on *"agricultural mechanics"* (M = 1.87; SD = 1.228). This suggests that teachers perceive teacher education programs to be less effective in teaching agricultural mechanics.

Perceived program importance. Table 10 presents the results of teachers' preparation regarding the importance of 16 teaching criteria (of 42) on teacher preparedness to teach in schools. The table shows that the majority of respondents (56%) categorized the 16 teaching criteria to be *very important,* followed by 36.67% who categorized the teaching criteria as *moderately important* in their teaching. Only 4.9% of the respondents indicated that the 16 criteria were *slightly important* in their preparation to teach. No respondents indicated that any of the teaching criteria were *not important*. The overall mean for the 16 selected teaching criteria on a 4-point Likert-type range (M = 3.53; SD = .568) indicated that the criteria were perceived to be *very important*.

The teaching criteria with the highest mean was *"creating, establishing, communicating, modeling, and maintaining standards of responsible student behavior"* (M = 3.73; SD =.485), followed by "*communicating high expectations for social, behavioral, and academic success of all students"* (M = 3.71; SD = .493). The third-highest mean was *"aligning classroom assessment with instruction"* (M = 3.66; SD = .545). The lowest mean

score on the importance scale was *"using student achievement data, local standards, and the district curriculum in planning for instruction"* (M = 3.22; SD = .671).

Table 11 depicts teachers' perceptions regarding the importance of 8 overall standards in teacher preparedness. At least 62.3% of teachers indicated that the 8 standards were *very important*, followed by 31.14% who indicated that standards were *moderately important*, and third were the 3.26% teachers who indicated that overall standards were *slightly important*. None of the teachers indicated that the standards were *not important*. The standards with the highest mean was *"demonstrate competence in content knowledge appropriate to the teaching position"* (M = 3.76; SD = .429), followed by "*use strategies to deliver instruction that meet the multiple learning needs of students achievement goals"* (M = 3.71; SD = .493). The third-highest mean was "*demonstrate competence in classroom management"* (M = 3.68; SD = .507). The lowest mean was *"demonstrating the ability to enhance academic performance and support for the implementation of the school district student"* (M = 3.47; SD = .537).

Participation and perceived influence of professional activities. Table 12 summarizes the teachers' perceptions regarding whether they participated or did not participate in professional development activities, and the perceived influence of the professional development activities on teacher development. Results show that the majority of the teachers indicated having participated in all 10 professional development activities. Results showed that *"district in-service"* was attended by 95.1% of respondents and was the most highly attended, with only 4.9% not attending, followed by *"professional development in-service"* (e.g., *"IAAE conference"* attended by 91.8%,

with 8.2% not attending. Third were "*on-the-job experience"* and *"formal local school performance evaluation"* each with 88.5% "yes" and 11.5% "no."

Results also indicated a plurality (35.57%) of respondents perceived the entire 10 professional development items to be of moderate influence, followed by 28.68%, who indicated that professional development activities have strong influence, and third was 19.18% who said they have slight influence. Approximately 14% respondents indicated that they do not have influence in their preparedness to teach.

Furthermore, the highest mean was observed in *"on the job experience"* (M = 3.63; SD = .780), followed by *"information by other teachers(s) in your discipline"* (M = 3.43; SD = .722). The third-highest mean was observed for *"materials acquired from the internet"* (M = 3.23; SD = .890). The lowest mean was on "*district in-service*" (M = 2.42; SD = .969).

Table 7. Level of teacher perceived effectiveness of teacher certification program in preparing teacher on 16 criteria (of 42)

How do you think the undergraduate agricultural education teaching criteria program prepared you to…	Level of effectiveness (%)[a]								
	1	2	3	4	5	Total	Missing	*M*[b]	*SD*
Provide evidence of student learning to students, families, and staff.	1.6	9.8	60.7	24.6	3.3	100		3.18	.719
Implement strategies supporting student, building, and district goals.	1.6	18.0	54.1	23.0	1.6	98.4	1.6	3.05	.746
Use key concepts, underlying themes, relationships, and different perspectives related to the content area.	1.6	9.8	36.1	42.6	9.8	100		3.49	.868
Use knowledge of student development to make learning experiences in the content area meaningful and accessible for every student.	1.6	16.4	39.3	34.4	6.6	98.4	1.6	3.28	.885
Use student achievement data, local standards, and the district curriculum in planning for instruction.	3.3	23.0	45.0	23.0	4.9	100		3.03	.894
Communicate high expectations for social, behavioral, and academic success of all students.	1.6	13.1	42.6	36.1	6.6	100		3.33	.851
Align classroom instruction with local standards and district curriculum.	1.6	18.0	41.0	31.1	8.2	100		3.26	.911
Use research-based instructional strategies that address the full range of cognitive levels.	1.6	18.0	49.2	24.6	6.6	100		3.16	.860
Align classroom assessment with instruction.	1.6	13.1	39.3	42.6	3.3	100		3.33	.811
Communicate assessment criteria and standards to all students and parents.	0	13.1	55.7	27.9	3.3	100		3.21	.710
Create a learning community that encourages social interaction, active engagement, and self-regulation for every student.	0	4.9	36.1	45.9	13.1	100		3.67	.769
Create establishes, communicate, model, and maintain standards of responsible student behavior.	1.6	11.5	31.1	41.0	11.5	96.7	3.3	3.51	.917
Demonstrate habits and skills of continuous inquiry and learning.	0	6.6	42.6	42.6	6.6	98.4	1.6	3.50	.725
Work collaboratively to improve professional practice and student learning.	0	4.9	42.6	44.3	6.6	98.4	1.6	3.53	.700
Adhere to board policies, district procedures, and conceptual obligations	1.6	14.8	37.7	32.8	11.5	98.4	1.6	3.38	.940
Demonstrate professional and ethical conduct as defined by the state of Iowa and individual district policy.	0	4.9	29.5	45.9	18.0	98.4	1.6	3.78	.804
Overall perceived effectiveness of the programs on 16 criteria	0.53	12.5	42.7	35.2	7.59	98.52		3.35	.57

[a] 1 = ineffective; 2 = less effective; 3 = moderately effective; 4 = effective; and 5 = very effective

[b] 0.00- 1.49 = ineffective; 1.50-2.49 = less effective; 2.50-3.49 = moderately effective; 3.50-4.49 = effective; and 4.50 - 5 = very effective

Table 8. Perceived effectiveness of teacher education certification program in preparing teachers on overall teaching standards

How do you think the undergraduate agricultural education teaching program prepared you to…	Level of effectiveness (%)[a]								
	1	2	3	4	5	Total	Missing	*M*[b]	*SD*
Demonstrate the ability to enhance academic performance and support for the implementation of the school district student achievement goals.	0	13.1	44.3	34.4	6.6	98.4	1.6	3.35	.799
Demonstrate competence in content knowledge appropriate to the teaching position.	1.6	1.6	34.4	47.5	11.5	96.7	3.3	3.68	.776
Use strategies to deliver instruction that meet the multiple learning needs of students.	0	16.4	39.3	36.1	6.6	98.4	1.6	3.33	.837
Use a variety of methods to monitor student learning.	0	9.8	44.3	39.3	4.9	98.4	1.6	3.40	.741
Demonstrate competence in classroom management.	6.6	18.0	32.8	36.1	3.3	96.7	3.3	3.12	.984
Engage in professional growth.	0	4.9	31.1	44.3	14.8	95.1	4.9	3.72	.790
Fulfill professional responsibilities established by the school district.	0	11.5	34.4	39.3	11.5	96.7	3.3	3.53	.858
Overall perceived effectiveness on overall standards	1.17	10.76	37.23	39.57	8.46		2.8	3.45	.826

[a] 1 = ineffective; 2 = less effective; 3 = moderately effective; 4 = effective; and 5 = very effective

[b] 0.00- 1.49 = ineffective; 1.50-2.49 = less effective; 2.50-3.49 = moderately effective; 3.50-4.49 = effective; and 4.50 - 5 = very effective

Table 9. Perceptions regarding program effectiveness in preparing teachers on agricultural education course content

How do you think the undergraduate agricultural education teaching criteria program prepared you to…	Level of effectiveness (%)[a]					Total	Missing	*M*[b]	*SD*
	1	2	3	4	5				
Teach agricultural business and economics.	9.8	13.1	32.8	32.8	8.2	96.7	3.3	3.17	1.101
Teach plant science.	4.9	9.8	18.0	49.2	16.4	98.4	1.6	3.63	1.041
Teach soil science.	4.9	13.1	32.8	37.7	9.8	98.4	1.6	3.35	1.005
Teach animal science.	3.3	9.8	14.8	45.9	24.6	98.4	1.6	3.80	1.038
Teach natural resources and ecology.	14.8	26.2	27.9	23.0	6.6	98.4	1.6	2.80	1.162
Teach food science.	16.4	37.7	26.2	16.4	1.6	98.4	1.6	2.48	1.017
Teach agricultural mechanics.	55.7	19.7	8.2	9.8	4.9	98.4	1.6	1.87	1.228
Overall perceived effectiveness of the programs on content areas	15.69	18.49	22.96	30.69	10.69			3.02	1.07

[a] 1 = ineffective; 2 = less effective; 3 = moderately effective; 4 = effective; and 5 = very effective

[b] 0.00- 1.49 = ineffective; 1.50-2.49 = less effective; 2.50-3.49 = moderately effective; 3.50-4.49 = effective; and 4.50 - 5 = very effective

Table 10. Perceptions regarding importance of college teaching criteria

How important in your teaching do you think…	Level of importance of criteria in teaching (%)[a] NI	SI	MI	VI	Total	Missing	M[b]	SD
Providing evidence of student learning to students, families and staff.	0	1.6	36.1	59.0	96.7	3.3	3.59	.529
Implementing strategies supporting student, building, and district goals.	0	9.8	37.7	49.2	96.7	3.3	3.41	.673
Using key concepts, underlying themes, relationships, and different perspectives related to the content area.	0	1.6	36.1	59.0	96.7	3.3	3.59	.529
Using knowledge of student development to make learning experiences in the content area meaningful and accessible for every student.	0	3.3	31.1	62.3	96.7	3.3	3.61	.558
Using student achievement data, local standards and the district curriculum in planning for instruction. √	0	13.1	49.2	34.4	96.7	3.3	3.22	.671
Communicating high expectations for social, behavioral, and academic success of all students. √	0	1.6	24.6	70.5	96.7	3.3	3.71	.493
Aligning classroom instruction with local standards and district curriculum	0	8.2	36.1	52.5	96.7	3.3	3.46	.652
Using research-based instructional strategies that address the full range of cognitive levels	0	8.2	45.9	42.6	96.7	3.3	3.36	.637
Aligning classroom assessment with instruction	0	3.3	26.2	67.2	96.7	3.3	3.66	.545
Communicating assessment criteria and standards to all students and parents.	0	8.2	44.3	44.3	96.7	3.3	3.37	.461
Creating a learning community that encourages social interaction, active engagement, and self-regulation for every student.	0	3.3	32.8	60.7	96.7	3.3	3.59	.561
Creating, establishing, communicating, model, and maintain standards of responsible student behavior.	0	1.6	23.0	72.1	96.7	3.3	3.73	.485
Demonstrating habits and skills of continuous inquiry and learning.	0	3.3	37.7	55.7	96.7	3.3	3.54	.567
Working collaboratively to improve professional practice and student learning.	0	3.3	39.3	54.1	96.7	3.3	3.53	.568
Adhering to board policies, district procedures, and conceptual obligations.	0	4.9	37.7	54.1	96.7	3.3	3.51	.598
Demonstrating professional and ethical conduct as defined by the state of Iowa and individual district policy.	0	3.3	32.8	60.7	96.7	3.3	3.59	.561
Overall perceived importance of criteria	0	4.91	35.67	56.15		3.3	3.53	.568

[a] 1 = not important (NI); 2 = slightly important; (SI); 3 = moderately important (MI); and 4 = very important (VI)

[b] 0.00- .1.00 = not important (NI); 1.99-2.00 = slightly important; (SI); 2.01-3.00 = moderately important (MI); and .3.01-4.00 = very important (VI)

Table 11. Perceptions regarding importance of eight overall teaching standards

How important in your teaching do you think…	Level of importance of criteria in teaching (%)[a] NI	SI	MI	VI	Total	Missing	*M*[b]	*SD*
Demonstrating the ability to enhance academic performance and support for the implementation of the school district student achievement goals.	0	1.6	47.5	47.5	96.7	3.3	3.47	.537
Demonstrate competence in content knowledge appropriate to the teaching position.	0	0	23.0	73.8	96.7	3.3	3.76	.429
Demonstrate competence in planning and preparing for instruction.	0	1.6	31.1	63.9	96.7	3.3	3.64	.517
Use strategies to deliver instruction that meet the multiple learning needs of students.	0	1.6	24.6	70.5	96.7	3.3	3.71	.493
Use a variety of methods to monitor student learning.	0	4.9	31.1	60.7	96.7	3.3	3.58	.593
Demonstrate competence in classroom management.	0	1.6	27.9	67.2	96.7	3.3	3.68	.507
Engage in professional growth.	0	8.2	31.1	57.4	96.7	3.3	3.51	.653
Fulfill professional responsibilities established by the school district.	0	6.6	32.8	57.4	96.7	3.3	3.53	.626
Overall perceived importance of overall standards	0	3.26	31.14	62.3			3.61	.544

[a] 1 = not important (NI); 2 = slightly important; (SI); 3 = moderately important (MI); and 4 = very important (VI)

[b] 0.00- .1.00 = not important (NI); 1.99-2.00 = slightly important; (SI); 2.01-3.00 = moderately important (MI); and .3.01-4.00 = very important (VI)

Table 12. Perceptions regarding level of influence of in-service activities on teacher development

Professional development activity	Participation		Level of perceived influence by in-service %) [a]				Total	Missing	*M* [b]	*SD*
	Yes	No	NI	SI	MI	SI				
Local school mentoring program	75.4	24.6	24.6	21.3	36.1	16.4	98.4	1.6	2.45	1.048
Information by other teacher (s) in your discipline	86.9	13.1	3.3	3.3	39.3	52.5	98.4	1.6	3.43	.722
On-the-job experience	88.5	11.5	4.9	3.3	14.8	75.4	98.4	1.6	3.63	.780
Formal local school performance evaluation program	88.5	11.5	13.1	32.8	42.6	8.2	96.7	3.3	2.47	.838
Self-directed study in self interest area(s) (e.g. reading, internship, etc)	63.9	36.1	21.3	19.7	39.3	18.0	98.4	1.6	2.55	1.032
Graduate courses	67.2	32.8	23.0	18.0	44.3	9.8	95.1	4.9	2.43	.975
District in-service	95.1	4.9	19.7	29.5	34.4	13.1	96.7	3.3	2.42	.969
Professional organization in-service (e.g. IAAE, conference)	91.8	8.2	4.9	29.5	34.4	29.5	98.4	1.6	2.90	.896
Assistance from Iowa Department of Education	77.0	23.0	18.0	24.6	34.4	18.0	95.1	4.9	2.55	1.012
Materials acquired from the Internet	95.1	3.3	6.6	9.8	36.1	45.9	98.4	1.6	3.23	.890
Overall perceived influence by professional development activities			13.94	19.18	35.57	28.68			2.81	.916

[a] 1 = no influence (NI); 2 = slight influence (SI); 3 = moderate influence (MI); 4 = strong influence (SI)

[b] 0.00 - 0.99 = no influence (NI); 1.00 -1.90 = slight influence (SI); 2.00- 2.90 = moderate influence (MI); 3.00- 4.00 = strong influence (SI)

Objective 3: Compare Iowa secondary school agriculture teachers who began teaching before 2000 and those who began teaching after 2001 on:

- ***a. Their perceptions of the effectiveness of teacher education programs in addressing, standards, criteria, and subject matter;***
- ***b. Their perceptions of the importance of teacher standards, criteria, and subject matter to the teaching of agriculture in schools***
- ***c. Their perceptions of the influence of professional development activities; and***
- ***d. Their participation in professional development workshops.***

T-test (2 groups on 3 dependent variables). Table 13 shows results of *t*-tests conducted to compare group means of teacher perceptions regarding effectiveness, the importance of standards, and the influence of professional development activities on teaching. There were no statistically significant differences in perceived overall effectiveness and importance of the programs and influence of professional activities between teachers of agriculture who started teaching in 2000 and before and those who started teaching in 2001 and afterward.

T-tests (2 groups of teachers on criteria, standards, and subject content). T-tests conducted to compare the two group means on individual constructs of effectiveness (16 criteria, 7 overall standards, and 7 subject contents), and importance (16 criteria, 7 overall standards, and 7 subject contents) found no statistically significant difference (Table 14)

Table 13 *T*-tests of group means of participants' perceptions regarding overall effectiveness, importance, and influence of professional development in their teacher education programs

Variables	2000 & before		2001 & after		*t*	*p*
	n	*M* (*SD*)	*n*	*M* (*SD*)		
Program effectiveness	18	3.28 (.58)	39	3.32 (.47)	-.184	.855
Program importance	18	3.52 (.373)	38	3.56 (.41)	-.359	.721
Influence of 10 professional activities	18	2.75 (.402)	39	2.85 (.453)	-.719	.478

Table 14. *T*-tests of two group means of participants' perceptions regarding 16 criteria, standards, and subject content in their teacher education programs

Variables	2000 & before		2001 & after			
	n	*M* (*SD*)	*n*	*M* (*SD*)	*t*	*p*
Effectiveness on 16 criteria	18	3.34 (.66)	39	3.37 (.49)	-.184	.85
Effectiveness on 7 standards	18	3.40 (.62)	39	3.45 (.49)	-.325	.748
Effectiveness on subject contents	18	3.03 (.79)	39	3.03 (.74)	.010	.992
Importance of 16 criteria	18	3.52 (.34)	38	3.51 (.44)	.023	.981
Importance of overall standards	18	3.52 (.43)	39	3.64 (.39)	-.1.00	.323
Influence of 10 professional development activities	18	2.75 (.49)	39	2.84 (.38)	-.719	.478

($p > .05$). The two groups (teachers who started in 2000 and before and teachers who started in 2001 and afterward) perceived the effectiveness of the teacher education programs and the importance of the programs' standards and criteria in the same way. Similarly, the group means on the influence of professional development activities were not significantly different.

Frequency of participation in professional activities. Table 15 shows the frequency of teacher "participation" or "no participation" in different teacher professional development activities since starting teaching in secondary schools in Iowa. All 10 activities were attended by more than two-thirds of the teachers. Approximately 95% of respondents indicated having participated in *"district in-service"* and *"materials required from the Internet,"* whereas 5% and 3.3% said "no participation" in the 2 activities, respectively. Nearly 92% of respondents indicated had participated in professional organization in-service, e.g., at the Iowa Association of Agricultural Educators (IAAE) conference; almost 89% in "on the job experience" and "the formal local school performance evaluation program;" 87% in

Table 15. Frequency of teacher "participation" or "no participation" in development activities ($n = 61$)

Development activity	Frequency of Participation (%)	
	Yes	No
Local school mentoring program	75.4	24.6
Information by other teacher(s) in your discipline	86.9	13.1
Job experience	88.5	11.5
Formal local school performance evaluation program	88.5	11.5
Self-directed study in self interest area(s) (e.g., reading, internship)	63.9	36.1
Graduate courses	67.2	32.8
District in-service	95.1	4.9
Professional organization in-service (e.g., IAAE, conference)	91.8	8.2
Assistance from Iowa Department of Education	77.0	23.0
Materials acquired from the Internet	95.1	3.3

"information by other teacher(s) in your discipline;" 77% in assistance from the Iowa Department of Education; three-quarters in local school mentoring programs; and 64% in self-directed study in self-interest area(s)such as reading or an internship. The proportions of teachers who participated in professional development activities ranged between 63.9 to 95.1%.

Objective 4: ***Determine if teachers' perceptions regarding effectiveness of teacher education programs, importance of what is learned in these programs, and the influence of the professional development activities on teaching, are associated with demographic characteristics.***

To address this objective, four statistical tests were computed: *t*-tests, Pearson correlations, Cramer's V, and ANOVA. The appropriate statistics were used in this objective to analyze the data that fit the computation required to address the objective as suggested by

Miller (1994). The analysis addressed statistical significances and relationships found between group means of independent variables on dependent variables. The selection of which statistics to use was done on the basis of the data analyzed.

First, the *t*-tests analyses were conducted to measure the statistical significance of the group differences with two levels. The analysis was carried out to determine if the two categories of independent variables made a significant difference in ratings of the dependent variables. The binary or dichotomous independent variables used in this analysis included: gender- male or female; college attended by participants-ISU or other; year of graduation with BS degree- before 2000 or after; and year of teacher certification- before or after 2000. Table 16 – 18 presents the results of the *t*- tests comparing the groups.

Table 16 presents *t*-test results comparing participants' group perception means by gender regarding the 3 dependent variables (effectiveness of teacher education, importance of standards and criteria, and influence of development activities). There was no significant difference found between males and females on their perceptions of effectiveness. There is a significant difference in the perceptions of teacher respondents regarding the importance of standards in teaching and the influence of professional development activities on teaching. As shown in Table 16, male and female respondents do not perceive the importance of standards and activities in the same way. Greater group means, like that of females, indicate perceived importance of standards and criteria in teacher education programs is more important to female teachers than to male teachers. Similarly, greater means for the perceived influence of professional development activities among females' means also indicates that they perceived professional development activities to have greater influence in their teaching profession than

Table 16. *T*-tests comparing group means for male and female respondents regarding program effectiveness, importance of the influence of standards, and professional development activity

	Male		Female			
	n	*M (SD)*	*n*	*M SD*	*t*	*p*
Effectiveness of teacher education	30	3.33 (.538)	29	3.23 (.484)	.770	.444
Perceived importance of standards and criteria	28	3.42 (.389)	29	3.68 (.351)	-2.69	.009
Perceived influence of professional development activities	29	2.67 (.392)	29	2.97 (.396)	1.033	.036

their male teachers. Thus, females see the programs more important than males and perceived a need for professional development workshop more than male teachers did.

Table 17 shows the results of *t*-tests conducted to test if agriculture teachers who are alumni of ISU and those who attended other universities but all currently teaching in schools in Iowa were differently perceiving the programs of teacher education that prepared them for the job of teaching. The *t*-test results in table 17 show that the two groups were not different in their perceptions of the effectiveness of the teacher education program. They are also not different in the way they perceived the importance of the program in their job of teaching. Similarly the two groups are not different statistically in the way they perceived the influence of professional development activities in their teaching of agriculture in schools. There were no statistically significance differences between the groups.

Table 18 shows the results of *t*-tests conducted to test if agriculture teachers who obtained their teacher certification before and including the year 2000, that is, before the introduction of standards in education in the state of Iowa, and those teachers who were certified between 2001 and 2006, that is, after the standards were different in perceptions.

Table 17. *T*-tests comparing group means for ISU graduates and other universities' graduates' respondents regarding program effectiveness, importance of the influence of standards, and professional development activity

Variable	ISU Graduates		Other Universities		*t*	Sig. (2-tailed)
	n	M (SD)	*n*	M (SD)		
Effectiveness	47	3.25 (.52)	10	3.57 (.61)	-1.548	.154
Importance	46	3.57 (.39)	10	3.66 (.22)	-.698	.488
Influence of professional development	46	2.86 (.43)	10	2.79 (.25)	.659	.517

Table 18. *T*-tests comparing group means for teachers who obtained teacher certification between 1995 and 2000, and those certified between 2001 and 2006

Variable	*n*	Teacher certification (1995 – 2000)	*n*	Teacher certification (2001 – 2006)	*t*	Sig. (2-tailed)
Effectiveness	17	3.25 (.61)	41	. 3.28 (.47)	-.185	.855
Importance	16	3.54 (.33)	40	3.57 (.41)	-.243	.809
Influence of professional development	16	2.72 (.52)	41	2.84 (.37)	-.895	.381

The *t*-test measure of differences between the groups found no difference in the perceptions of the teachers who were certified in 2000 and before from those who were certified afterward. The two groups perceived the program effectiveness, importance, and influence of professional development in their teaching profession to be the same.

As shown in Table 19, the *t*-tests results indicated that teachers of agriculture in the state of Iowa who graduated with a bachelor's degree in 2000 and those teachers who graduated afterward between 2001 and 2006 were not statistically different in terms of how they perceived the teacher education's effectiveness, importance and influence of professional development. The groups perceived the programs in the same way.

Table 19. *T*-tests comparing group means for teachers who graduated between 1995 and 2000, and those who graduated between 2001 and 2006

Variables	*n*	Teacher graduated (1995 – 2000)	*n*	Teacher graduated (1995 – 2000)	*t*	Sig. (2-tailed)
Effectiveness	18	3.28 (.58)	39	3.31 (.47)	-.184	.855
Importance	18	3.52 (.36)	38	3.56 (.41)	-.359	.721
Influence of Professional Development	18	2.75 (.48)	39	2.84 (.38)	-.719	.478

In summary, Tables 16-19 show *t*-test results comparing group means by demographics of teachers of agriculture on three dependent variables. Table 16 revealed statistically significant differences between male and females on two dependent variables (importance of standards and criteria and the influence of professional development). The results showed no statistical significant association between teachers' demographic characteristics and the dependent variables (effectiveness, importance, and the influence of professional development). Since there was no statistical significance revealed in all *t*-test results in Tables 17-19, this information suggests that, regardless of the demographics of the teachers, participants in the study perceived the teacher education programs in the same way for their teaching profession. That is, whether they are graduates of ISU or not, graduated before 2000 or after, male or females, they see the program effectiveness in the same way. Similarly, all teachers perceived program importance and the influence of professional development activities in the same way. Teachers' perceptions about the importance of the programs were the same regardless of the year they were certified or graduated.

The second analysis to address the objective was to compute the Pearson correlations, which were estimated between continuous independent variables (teachers' experience in the

field of teaching and the final college grade point average), and the dependent variables (effectiveness, importance, and influence of professional development). Correlations were conducted to determine if there were relationships between the demographic information about the teachers and three dependent variables.

Table 20 reveals correlational relationships. To interpret the correlation results, Davis (1971, as cited in Miller, 1994) was used. The results as shown in Table 20 were as follows: there was a negative negligible correlation (r = -.006) between the number of years teachers have been teaching (teaching experience) and the perceived effectiveness of the education programs in preparing teachers. There was also a negative but low correlation between teaching experience and perceived importance of the teacher education programs (r = -.169); whereas the teaching experience and perceived influence of professional development had a negative low correlation (r = -.108). This suggests that as teachers become experienced in the field of teaching, their perceptions of effectiveness of teacher education and importance of the teaching programs in preparing teachers and the influence of professional development tend to decrease. Nevertheless, the r^2 values suggested that the independent variable "teaching experience" has a very low association with the other variables.

Table 20. Results of correlations between selected independent variables and three dependent variables (effectiveness, importance, and influence of professional development)

Independent Variables	Effectiveness	Importance	Influence of PD
Teaching experience	-.006	-.169	-.108
Teachers' grade point average (GPA)	-.174	.005	-.110

$p < .05$

Teachers' college grade point average (GPA) had negative low correlation (r = -.174) with the perceived program effectiveness and had a positive negligible correlation (.005) with the perceived importance. The same GPA had negative low correlation (r = -.110; p < .05) with the perceived influence of professional development activities. As was shown with teachers' experience, GPA does not account for much variance in any of the dependent variables (effectiveness, importance, and influence of professional development). The correlations are not statistically significant.

In another analysis, "to teach agricultural mechanics" was correlated with the demographics and an independent variable with two levels using Cramer's V to describe the perceived effectiveness of the program between the two groups. Table 21 presents the results comparing graduates of ISU with graduates of other universities on perceptions regarding effectiveness of teacher programs in preparing them to teach agricultural mechanics. Sixty-five percent of the ISU alumni indicated that the programs were ineffective compared to only 29% of teachers who graduated from other universities. The distribution of the respondents from ISU former students was greater on the negative side of the 5 point Likert-type item. Teachers who graduated from other universities were almost evenly distributed on the item, while ISU graduates were skewed to the lower level. The extent of association between the participants' place of graduation and the level of perceived effectiveness of programs was calculated using Cramer's V. There was a positive substantial association (V= .648) between the two variables. Teachers who graduated from other universities than ISU perceived their preparation to be more effective compared to those who graduated from ISU.

Table 21. Comparison of ISU graduates versus non-ISU graduates on teaching agricultural mechanics in schools in Iowa

	Level of effectiveness of programs in preparing teachers to each					
Participants	Ineffective	Least effective	Moderately effective	Effective	Very effective	Total
Alumni of ISU	30 (50%)	12(20%)	2 (3%)	1(2%)	1(2%)	46(77%)
Graduates of other universities	4(7%)	0(0%)	3(5%)	5(8%)	2(3%)	14(23%)
Total	34(57%)	12(20%)	5(8%)	6(10%)	3(5%)	60(100%)

Tables 22 and 23 provide the descriptive statistics and ANOVA analysis, respectively for the three dependent variables. The analysis found that there were no statistically significant differences among the FFA groups on perceived "effectiveness," as determined by ANOVA models that were computed to determine the statistical significance of the differences in group means. ANOVA was used because the independent variable had more than two categories. The question posed was: Are teachers' different levels of achievements in the national FFA organization during their high school education (IV) related to the dependent variables (DV)? A one-way ANOVA was conducted between the independent variable, FFA degree achievement at high school and the three dependent variables (perceived effectiveness of the program in addressing standards and criteria, perceived importance of the program in addressing standards and criteria, and perceived influence of the professional development). The analysis was conducted to determine if the mean scores of the 4 groups of FFA (No FFA degree, Chapter degree, State degree, and American degree) on the dependent variables were significantly different statistically.

Table 22. ANOVA comparison of means between and within groups

Variance		Sum of Squares	df	Mean Square	F	Sig.
Effectiveness	Between Groups	1.809	3	.603	2.494	.069
	Within Groups	13.300	55	.242		
	Total	15.109	58			
Importance	Between Groups	1.238	3	.413	3.001	.039
	Within Groups	7.288	53	.138		
	Total	8.526	56			
Influence of professional development	Between Groups	.352	3	.117	.661	.580
	Within Groups	9.602	54	.178		
	Total	9.954	57			

Tables 22 and 23 provide the descriptive statistics and ANOVA, respectively, for the three dependent variables. The analysis found that there were no statistically significant differences among the FFA groups on perceived "effectiveness" and the "influence of professional development" at the .05 level of significance. However, there was a statistically significant difference between the groups "on the perceived importance of the programs" (Table 22). At least one of the national FFA achievement group means was different from the other three groups in contributing to the dependent variables. Since there was a statistically significant difference between groups, post hoc statistics were done. Tukey and Scheffé multiple comparisons were conducted to determine which group had different means. The results of the comparisons using Tukey and Scheffé did not locate a pairwise difference; thus, it is assumed that the difference is between those who did not earn an FFA degree and those who received the American FFA degree.

Table 23 shows the means and standard deviations for each of the FFA categories on each dependent variable. The chapter category had the highest mean (M = 3.43; SD=.43) followed by the state degree (M = 3.39; SD = .45) for the DV effectiveness. The American

Table 23. Means and standard deviations of FFA degrees for the three dependent variables

	Effectiveness		Importance		Influence of PD	
FFA Achievement	Mean	SD	Mean	SD	Mean	SD
No degree	3.11	.71	3.30	.32	2.62	.82
Chapter degree	3.43	.42	3.43	.51	2.79	.43
State degree	3.39	.45	3.55	.35	2.82	.35
American degree	3.01	.53	3.77	.22	2.92	.32
Total	3.28	.51	3.55	.39	2.82	.42

degree had the highest mean (M = 3.77; SD= .22) with regard to importance of the program, and the influence of the PD (M = 2.92; SD= .32).

Part II: Qualitative

Objective 5. Endeavor to understand the views of agricultural education teachers regarding the role of standards in their preparedness to teach and professional development.

Question 1. Describe three areas you perceive to be the strengths of the agricultural education teacher certification program in addressing the standards during teacher preparation.

Five sets of qualitative responses were obtained in the form of descriptive statements, words, and phrases as per the survey questions. Data were summarized statistically to indicate the number of respondents (Table 2) and qualitative descriptive/ narratives. Content analysis was conducted and the results of the qualitative data were presented in descriptive, numerical, and table forms to describe the perceptions of teachers of agriculture surveyed. The results are presented according to 5 research questions addressing the fifth objective of the study.

Managing qualitative data and coding

According to Crabtree and Miller (1992), De Vaus (1986), and Merrian et al. (2001), coding refers to assigning cryptograms, giving names, or numbering data segments or statements and phrases gathered from respondents (Table 24). The aim of coding is to organize data into a new format/structure (McMillan & Schumacher, 2001) to ease the understanding of information. The data gathered from teachers of agriculture about standards were in groups according to survey questions. The letter codes were derived from questions used in the study (pre-existing) and questions that were generated from common themes in the data collected (De Vaus, 1986) to create codebooks (Crabtree & Miller, 1992). Information was received from the participants in the form of statements, phrases, words, or concepts (Ary, Jacobs, & Razavieh, 2001).

First, coding and grouping of information for question 1 was based on five knowledge levels: semantic, conceptual, schematic, procedural, and strategic knowledge obtained from Mayer (2003, p. 15). This was done to determine the kinds of knowledge teachers perceived to be offered by their programs. Therefore, the first coding of data for question 1 classified data into three kinds of knowledge (Mayer). The three knowledge levels (semantic, conceptual, and schematic) were collapsed to form one category of the knowledge. The procedural (showing steps or processes) and strategic (for decision making in a situation where there are conflicts) knowledge levels were then formed into second and third groups (Mayer). Furthermore, analysis of the data was conducted on the basis of emerging themes leading to 9 areas which they perceived to have learned from college (De Vaus, 1986).

In the second question participants were asked to suggest standards which need improvement. Data obtained were assessed and matched with standards and criteria being

studied to identify standards requiring improvement. In the third question participants were asked to indicate whether standards were useful or not useful. Five levels of usefulness of standards were derived from participants' views in terms of "very useful," "somewhat," "not useful," and "no response". In question four participants were asked to compare effectiveness of college preparation and professional development in preparing teachers. Responses were categorized into three pre-determined groups: (1) college preparation (CP), (2) professional development (PD), and (3) combined (CP & PD). In question five participants were asked to indicate whether agriculture subject content matter studied during teacher preparation was used in teaching.

Table 24 illustrates an example of a manually created codebook produced to manage data for question 1 (Crabtree & Miller, 1992). The codes were produced from data received from the teacher participants (Appendix D-1). A maximum of three responses were expected from each respondent, and each participants' responses were automatically assigned a number code by inserting an ordinal numbering system in the left hand column. This automatic process easily determined a total number of responses per question. On the right hand of the supplied data as shown in Table 23, a column provided space for writing code(s) created to categorize the data. Based on Mayer's classification of knowledge, the responses providing knowledge in the form of information, facts, and concepts were grouped and coded as IFKC[1]. The code IFKC represented information, facts, knowledge, or concepts. Responses describing learning about some procedures, demonstrations, experiential knowledge, etc., were coded DDEP[2]. The code DDEP represented demonstrations and experiential learning. Responses providing descriptions of a process or method to solve a problem or a thinking process were coded PT[3]. The code PT represented processes of thinking. The blank spaces in

Table 24. Manual coding of the qualitative data obtained from teacher participants of agricultural education with regard to three strong areas of college preparation for teaching in secondary schools

Open-Ended responses to question # 1	Categorization code
1)	NO RESPONSE[4]
2) Communication.[1] Leadership.[1] Public relations.[1]	IFKC[1]; IFKC[1]; IFKC[1]
3)	NO RESPONSE[4]
4)	NO RESPONSE[4]
5) Methods class with Professor Y was good.[1] Ability to take courses from other areas (horticulture, agronomy, agriculture systems technology)[2]	IFKC[1]; DDEP[2]
6) Information about developing units of instruction.[1] Early field-based experience.[2] Community built among Ag Ed majors[2]	IFKC[1]; DDEP[2]; DDEP[2]
7) Content knowledge.[1] Hands-On applications for students.[2] Professional ethics.[1]	IFKC[1]; DDEP[2]; IFKC[1]
8) Strong content knowledge.[1] Importance of professional development.[1] Variety of learning tools.[1]	IFKC[1]; IFKC[1]; IFKC[1]
9) Communication: parents, other teachers and administration.[1] Providing an effective classroom environment.[2] Content knowledge[1]	IFKC[1]; DDEP[2]; IFKC[1]
10) Philosophy of ag education. Ethics of an ag teacher. AgEds 402 with (prof's name) was the most down to earth and realistic AgEds class we had[3], many of the others were filled with too much fluff and focused on stuff that is a minute part of teaching.[1]	PT[3]; IFKC[1]

KEY:
IFKC[1] Information/Facts/ Knowledge/ /Concepts/ /Rule/
DDEP[2] Doing/Demonstration Experiential
PT[3] Process/Thinking/
NO RESPONSE[4] (blank space)

the data were categorized as NO RESPONSE[4] to ease analysis (Appendix D-1). This process of coding the data was followed by quantifying the kinds of knowledge to quantify the frequency of each code (Table 25). Further, analysis of the same data using themes produced nine areas provided in the discussion that follows.

Results

Question 1: Identified areas of strengths of teacher education programs

Thirty-six (58.06%) teachers provided answers to this question, while 26 (41.94%) did not answer. Each respondent was expected to identify three areas he/she perceived to be

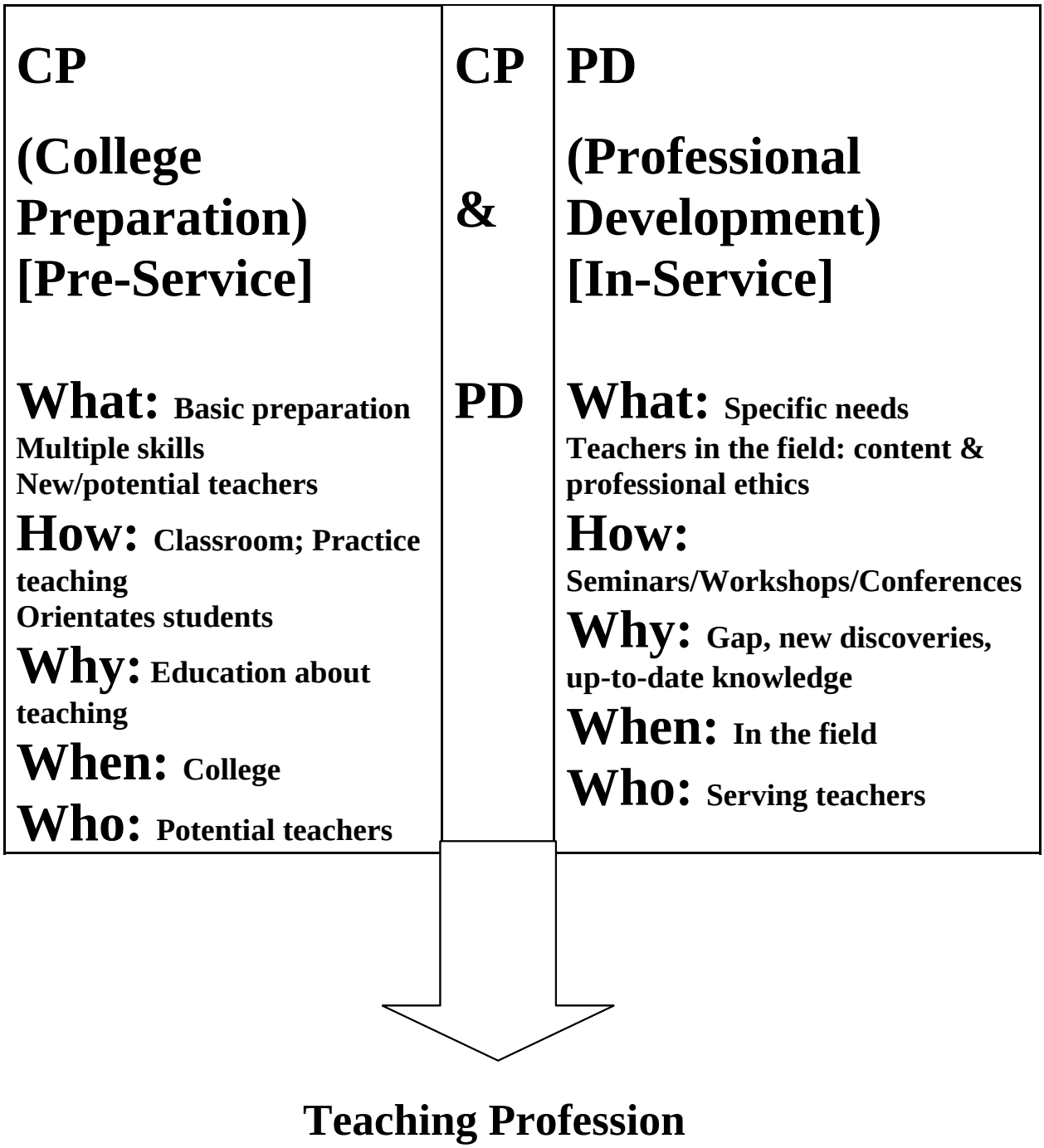
Table 25. Categories of information knowledge acquired during teacher education as percieved by agricultural education teachers

Identified knowledge	Frequency (*f*)	Percentage (%)
Declarative (information/facts/knowledge)	43	40.04
Procedural (processes of doing, activities)	34	31.47
Strategic (thinking, decision)	11	10.18
Missing	20	18.51
Total	108	100.00

strengths of the programs, and participants, indeed, mentioned different areas they perceived to be strengths of college/university teacher education programs. At least 104 responses were gathered for the first question.

Data for question 1 were analyzed in two ways: in terms of the kinds of knowledge and by thematic analysis. Table 25 reveals that approximately 40% of the knowledge offered-to potential teachers represented factual information. One-third of the teaching covers hands-on activities. This suggests that participants perceived their programs provided them with more knowledge information compared to other knowledge types.

Nine themes emerged from the data: (a) technical subject content knowledge/facts/information; (b) teaching as a profession; (c) ability to integrate new knowledge (d) educational psychology in order to handle “discipline” behaviors and multicultural challenges; (e) interaction skills; (f) classroom instructional methods; (g) communication skills; (h) the practice of “student teaching”; and (i) leadership and professionalism skills (Figure 2). These themes were identified as strong areas in teacher preparation (De Vaus, 1986).



(Prepared from teacher responses forming patterns)

Figure 2. Common areas within college preparation and professional development

The key aspect in these results is that teachers of agricultural education perceived the nine areas which teacher education programs strongly address. To produce these themes, the information for question 1 was scanned frequently during analysis in order to understand any pattern or relationship in the data provided (McMillan & Schumacher, 2001). The process of analyzing the data involved systematically arranging the information according to themes, contents in the data and further grouping the information under common into subheadings (McMillan & Schumacher, p. 466).

Analysis of information in this part of the results was based on an interpretive/ subjectivism theoretical perspective (Crotty, 2003). Teachers' perceptions regarding the concepts studied were described using both narratives and statistics. In the first question, which stated *"describe three areas you perceived to be strength of the agricultural education teacher certification programs in addressing standards during teacher preparation"* participants provided statements describing their perceptions. Next will be a discussion of the themes that emerged from the narrative responses to *questions 1* about the areas teachers perceived the programs to be effectively addressing.

Technical knowledge content

1. Technical content. In this study, technical *knowledge* development was perceived by the respondents to be one of the strengths of teacher education programs. Nine responses directly indicated the phrase *content knowledge.* The first category involved technical content, also referred to as *subject content*, in teacher preparation programs (Figure 3). Seven responses were interpreted to mean that student teachers are prepared to develop knowledge of agricultural subject content for their teaching. For example, responses indicated that they

had the "*ability to take courses from other areas,"* such as *"horticulture,*" *"agronomy," "animal science,"* "*…traditional agriculture with the exception of agriculture mechanics,"* and *"… in areas of professionalism.*" One response stated that during teacher preparation there were "*lots of classes in lots of areas from which to choose."* As such, there was a great *"diversity"* in the training areas of teachers. Thus, teacher education programs are perceived by teacher respondents as a source for (knowledge of subject) technical information/facts/ concepts/rules which they use in their teaching. In this regard teachers perceived the programs to provide information that will be applied in teaching. Therefore, teacher education programs prepare teachers to develop their knowledge further. This suggests that teachers effectively use in the classroom what they learn in college or during workshops. This suggests transfer of what have been learned at college into the school setting (Bransford, Brown, & Cocking, 2000).

2. Professional knowledge. Eight responses mentioned "*standards and benchmarks…requirements and licensure programs …theories behind the standards."* The participants also stated that teacher education programs make reference to statewide and national standards during their experience in the classroom. This suggests that teaching is similar to other professions such as the human medical and law fields where preparation of future doctors and lawyers is guided by a "specific code of ethics," and policies; hence, potential teachers are introduced to teaching standards at the college level for. One participant reminded us that currently "*Teaching standards is the biggest turn off for people in the education field, but* [becoming a professional teacher is one of the goals to be achieved through standards. As further indicated in this statement, people should also teach] … *with standards"* [in their mind to achieve quality].

According to Borich (1994), characteristics that also contribute to effectiveness in teaching or any other profession are the person's own excellence and devotion to the profession. As such, Borich indicated that professionals in teaching need to show empathy in their profession, by being practical, objective, confident, enthusiastic, flexible, and self reliant in their profession in order to be effective. Even though the profession of teaching was interpreted differently by stakeholders it is important that those who choose it should follow its professional ethics (Swortzel, Deeds, & Rogers, 2007).

3. Integrating new knowledge and technology. The third category (theme) emerging from the data involved integrating new knowledge. The fact that students are encouraged to select different courses across departments or colleges of agriculture during training means the teacher of agriculture needs more diverse knowledge. In the study, teachers responded that they integrated both new knowledge and additional knowledge (from courses taken in other areas). Teachers also indicated that they integrated technology into their classroom teaching. Research findings offer relevant information to educational practices as well as technology instruction (Bransford, Brown, & Cocking, 2000). As indicated by Borich (1994), and Bransford, Brown, and Cocking, (2000), the quality and method of instruction greatly influence classroom learning.

4. Educational psychology. In the fourth theme, the data seem to suggest that knowledge about human psychology referred to dealing with handling "discipline" and "multicultural" challenges. One response stated that *"I feel that the teacher program does a good job in preparing students for discipline issues,"* and others mentioned *"multicultural education."* Multicultural education may be related to "cultural diversity" as indicated by some other responses. Thus, the responses suggest that teachers are also exposed to

knowledge about cultural differences during preparation in order to teach most effectively at the secondary school level. The five-factor model of teacher effectiveness as discussed by Sadker & Sadker (2000) considered lack of discipline challenges in programs of education as an indication of effectiveness in learning.

5. Interaction. The fifth category involved interaction. Four responses were interpreted to mean that teacher education programs were effective in helping teachers build continued interaction with their former professors, other students (peer community), and the general population in which the university is located. For example, one respondent stated that *"the advisor is encouraging us to participate/communicate with others to learn about our profession to improve our skills."* This revealed that during training, potential teachers were encouraged to develop ways to build positive rapport with other professionals. This finding illustrates the importance of developing knowledge through socialization, a concept in Bandura's idea of learning. Furthermore, one participant mentioned that this was a *"community built among agricultural education majors"* thus emphasizing the need to interact with other professionals in agricultural education. This concept is supported by Talbert, Vaughn, and Croom, (2005), whose advice to teachers of agriculture science was to consider involving farmers, parents, and employers, etc. in their teaching.

6. Classroom instruction. Knowledge about classroom instructions is the sixth theme identified from the teachers' responses. Fifteen respondents outlined different *"core components"* of the classroom aspects of instructions which they perceived as adequately addressed by teacher education programs. In responding to the question about program strengths, the following responses were noted: *"methods"* of teaching, *"effective classroom environment," "lesson planning," "ways to implement different strategies,"* and how to help

students *"with different learning styles"* were classified as main elements for classroom learning. Furthermore, more than one respondent also stated that colleges/university programs prepared them in "*presentation strategies and developing units of instruction,"* and *"interpreting and planning for school...reports."* In line with this, it was also important to note a comment from one respondent who stated the following:

> *Since I did not attend ISU I won't answer this one but I think that the student teachers I have worked with have a good idea of how to teach but they don't know how to determine what should be taught in a unit. They are not sure of this and experience will help, but maybe giving them a curriculum and asking them to develop a unit for that curriculum and then bring in a teacher who does that and see what suggestions they would give the students and why.*

Sadker and Sadker (2000) indicated that effectiveness in a school is based on a combination of five factors (five-factor model), which include: (a) leadership contributions; (b) school goals to be achieved; (c) conducive environment for learning; (d) absence of disciplinary problems or being able to manage students' performance; and (e) "high expectations" (p. 195). These concur with effectiveness discussed by (Borich, 1994). This is also in lined with the requirements of the *Administrative Code of Iowa § 282 8/17/05-1/10/06.*

7. Communication skills. The seventh theme involved developing communication skills during teacher preparation. Four responses indicated that communication is emphasized in teacher education. As indicated in Eggen and Kauchak (2001), teachers' capability to communicate influences students' learning in the classroom. However, it is also important, as indicated by one respondent, that *"communicating with parents and a solid content knowledge of courses they will teach"* is important. The three responses indicated *"communication"* as an area where programs

are doing well, and this also suggests that there is a need for teachers to develop skills to communicate effectively. Communicating students' grades, for example, is important to students know the meaning helps to motivate students' learning (Orlich, Harder, Callahan, & Gibson, 2001).

8. Practice teaching. Knowledge about student teachers' practice teaching was the eighth theme that emerged from the responses. Thirteen responses mentioned "student teaching" as one area perceived to be the strength of agricultural education teacher certification programs during teacher preparation. One respondent suggested an increase of student teaching time to *the entire semester* in order to have adequate practice, coaching/assistance, and feedback. Other respondents wrote that student teaching provides the opportunity to observe, collaborate, *"talk about their programs," "teaching experience,"* and to receive guidance from experienced professionals in the field. As indicated by one response, some teacher programs provided an *"early field based experience" and a "40 hour period internship"* prior to student teachers. This suggests that clinical teaching, or practice teaching, contributes positively to professional teaching; thus, more time is also recommended as perceived by respondents.

9. Leadership and professional skills. The ninth and final theme in the responses mentioned by teachers in the field as necessary to be developed was leadership and professional skills. Although ten responses were categorized under this subheading, one participant indicated that student teachers take part in professional development organizations and activities for "professional development." Three responses stated "leadership," while another three indicated that programs help them develop professionally. Teaching means to help others grow and master what is required to be learned.

Summary

Data gathered from teachers for this question generated nine different areas which teachers perceived to be strong areas to develop their potential to become teachers in schools. Teachers' responses were summarized as: technical knowledge consisting of, technical subject content, professional, integrating new knowledge and technology, educational psychology/cultural diversity, classroom instruction, communication skills, and practice teaching and leadership. The results revealed that teachers expressed they were well prepared in the nine technical content areas, with "the exception of agricultural mechanics". They also indicated that, although they were prepared in areas of classroom management and instruction, they felt a need to be prepared in areas related to how to teach. Further analysis of the same data on the basis of the descriptions provided by teachers in terms of classes of knowledge, are described by Orlich, Harder, Gallahan, and Gibson (2001), who revealed that a majority of the teachers' descriptions were classified as declarative knowledge, followed by procedural knowledge, then strategic skills (Orlich, Harder, Gallahan, & Gibson).

These results, therefore, indicate that technical content knowledge was considered partially covered. The teachers revealed they were not adequately prepared to teach agricultural mechanics. Thus, there is need for a course in agricultural mechanics for teachers of agricultural education from ISU. Therefore, preparing teachers is multidimensional to gain competencies in different areas of teaching. The results have implications regarding teaching standard 2, which states "Demonstrates competence in content knowledge appropriate to the teaching position."

Question 2: Suggest standards you think should be improved in order to strengthen the agricultural education teacher certification program of preparing teachers.

Standards suggested for improvement

Teachers of agricultural education at the secondary school level in the state of Iowa were asked to indicate which standards they think should be improved in order to strengthen the agricultural education teacher certification programs for preparing teachers. Forty-four (70.97%) responses were obtained, and eighteen (29.03%) did not respond to the question. No specific amount of data was asked for, so respondents gave as much information as they wished. Data obtained for this question were all assessed frequently in order to make sense out of it (McMillan and Schumacher, 2001). The responses were grouped according to common areas or themes and further matched with standards and criteria studied in order to draw conclusions about the standards and criteria. Emerging themes regarding standards in teacher certification included;

Subject content related to agricultural mechanics. Twenty-one (47.73%) of the forty-four responses gathered from teachers of agricultural education mentioned subject contents, specifically *agricultural mechanics*, and how it should be taught. This suggests that teachers of agricultural education want to be prepared on the content in order to meet the State of Iowa standard 2, which states: "Demonstrate the competence in content knowledge appropriate to the teaching position." One response stated that *"Agricultural mechanics: we did not have any and now I am teaching a small gas engines class."* Another participant responded similarly:

> *Content area- agriculture mechanics. Construction … I don't understand how you can be licensed in these areas but do not have classes directed in how to teach. I think overall there should be classes on how to teach all the different areas we are supposed to be able to teach.*

Still another participant stated clearly that, *"we need agricultural mechanics at ISU."* Data gathered regarding this subject area suggest that an introductory course on agricultural mechanics for potential teachers of agricultural education programs. Further, it also suggests in-service courses for teachers already in the field as they appear to have a deficiency in the content. As suggested by one of the responses, it may also be appropriate to encourage collaborative learning.

"How to teach". The second theme generated from the data gathered for this question indicated the need to relate teaching strategies to agricultural science content. Four responses suggested courses on educational foundations that go with or relate to agriculture science course content taught in college/university programs. For example, one respondent suggested the following:

> *Students taking Animal Science 114 at ISU should also be taking a corresponding course called "teaching animal science" where teacher education students learn how to develop and deliver units of instruction to middle and high school students in that content area.*

Two respondents referred to the proposed course as *"courses on how to teach subject materials to high school students.*" This suggests a need for improvement in teacher education programs in order to meet the requirement of the State of Iowa standard 3, which reads *"Demonstrates competence in planning and preparing for instruction,"* as well as developing new criteria for some of the previously existing standards. Teachers' responses for this question proposed courses that prepare them on how to teach technical courses since they indicated that they need to have skills of teaching technical courses such as animal science, agricultural mechanics, etc.

Classroom management. Fifteen responses were grouped under classroom management needs and requirements. Some of the responses gathered and grouped under this subheading include the following: *"more time spent in the classroom;*" "*give the agricultural education students more lessons and toolbox materials to use in classrooms where other resources are not available;" "special education needs classroom management;"* and "*how to deal with problem students and parents."* These quotes suggest that potential teachers should be given longer opportunities for student teaching and encouragement to use variation in teaching strategies, both of which will result in an improved classroom environment as well as less disciplinary matters. For example, one participant stated:

> *More time spent in the classroom, experience is invaluable!! I really feel that all student teachers should start teaching when the school year or semester starts with the school they are working with and it should end at the end of the school's semester/year or within a few weeks of it. It would allow the students to see what happens in the first few weeks and give them more of an idea of what you need to do and what needs to happen.*

Although this is taken care of by the State of Iowa standard 6, which states, "*Demonstrates competency in classroom management,*" participants seemed to suggest their deficiency in meeting the standard. Also, teachers suggested more time for student teaching. Teachers' suggestions for more time for teaching practice concur with the findings of a study by Stallings (1980) who found that increase in time for students to be in assignment increases their success. This response is related to the response in question 1.

Professional organizations. At least six responses explicitly stated that [teachers] "*need to understand the importance of professional organizations better.*" This suggests that teachers of agriculture should acquire more information about organizations such as the Iowa Association of Agricultural Educators (IAAE) and also school organizations such as FFA

since they play a role during teaching. The responses on professional organizations are not currently tied to any of the eight standards.

Currently, there are approximately 10 national agricultural science education organizations (Talbert, Vaughn, & Croom, 2005). These organizations range from those specializing in helping teachers and other educators to those that deal with higher education. The National FFA that deals with students in schools is one of the organizations (http://www.ffa.org/index.cfm?method=c_ teamed.teamAged). However, standards 7 and 8 require teacher involvement in professional development, which may encompass organizations such as IAAE and national FFA.

However, the results of this study suggest that teachers want to be informed about the existence and functions of professional organizations during their college training in order to be involved with professional organizations. The need for teachers to be informed about professional development organizations also suggests the need to develop a policy or standard to direct attention or to inform education programs and how to address them.

Standards and benchmarks. Fewer than 10 teachers mentioned a need for teachers to be familiarized with standards and benchmarks. For example, one response to the question of what needs to be done to improve the program stated *"teaching more about standards and benchmarks*." Another response stated that "*I think teachers need a lot of work with the standards and benchmarks before going into the profession and we definitely do not receive any of that in the program.*" Yet another mentioned the need for education in *"building and district goals"* a quotation associated with standard 1a. All these responses suggest that teachers want standards to be discussed with them during teacher preparation.

Question 3: Are standards in certification programs useful or not useful in preparing teaching?

Are standards useful?

Table 26 illustrates teachers' perceptions regarding the usefulness of standards in teacher preparation programs. Respondents were asked to indicate if standards were useful or not useful in preparing teachers to teach agricultural education. Responses to this open-ended question were quantitatively and qualitatively analyzed to describe teachers' perceptions. Results (Table 26) are categorized into: very useful (37, 77.37%), not useful (3, 4.92%), somewhat useful (7, 11.48%), no response (16, 26.23%). This pattern of answers was derived from the textual data presented by respondent teachers. Benson (1998), state of Wisconsin superintendent, in an open letter regarding standards for agriculture, expressed the sincere goal of preparing the younger generation to develop life long "skills and abilities." Benson's comments suggest that standards, whether content, performance, or proficiency, are useful.

Among the teacher participants who indicated that standards were useful (approximately 60%), many also stated ways in which they perceived standards can be useful and the conditions under which they can be improved. For example, the "yes" responses were coupled with statements such as the following: standards are *"useful if they are linked with*

Table 26. Percentage of responses regarding usefulness of standards in teacher preparation programs

Standards are	Frequency	Percentage (%)
Very useful	35	57.37
Not useful	3	04.92
Somewhat useful	7	11.48
No response	16	26.23
Total	61	100.00

the agricultural education courses;" "*yes, because all teachers need to meet the same standard and be trained somewhat uniform*ly*;" "…provide a base for one to work and build from…because we are observed and evaluated based on the standards;*" *"…only if they are practical;"* and *"..they are to be followed."* These responses illustrate how varied teaching can be; therefore, standards should also have different uses. As indicated by Moskowitz (1976), the desire for "accountability and relevancy" in education have given birth to "competency-based" or "performance-based" education of teachers. This has, in turn, necessitated the introduction of standards and competencies. One respondent stated the following:

> *Yes, the university needs standards to prepare us well… just like we need standards to teach our students well. Most importantly, maybe students should have some say about the level of their understanding in each standard. If students don't think they have something mastered, maybe it should be covered again… in a new way even if they professor through it was already covered and student seemed successful.*

Some respondents noted that standards were *"useful"* and *"important"*… and added such phrases as: *"but…"* or *"only if they are practical, enforced, and provide opportunities for those students who do not meet standards to improve and eventually meet them."* According to the research advisory committee of the National Council of Teachers of Mathematics (1988), standards encourage problem-solving types of learning, which may be useful since they encourage increased skills and higher test scores or grades.

Table 26 also reveals that 11% of the respondents indicated that standards and criteria were not useful. For example, one participant stated that. *"No. Not at all. Being taught to be teachers that were successful in the real agricultural teaching world would be great. More time in the classroom prior to graduation"*

Noted also in this part of the analysis were that 26% indicated no responses. The fact that respondents' positive answers and those who decided to answer the items agreed in principle about the standards, justifies the usefulness of standards in teacher education. However, it is also important to that that majority of the responses, while positive, also indicated a need for improving standards. Teachers' responses agreed with Flowers (1990), who revealed that the rationale for competency-based education was to improve accountability and responsibility in vocational education. In conclusion, teachers perceive standards to be useful if appropriately utilized. Teaching standards can be useful in teacher education as well as in teaching.

Question 4: Which one do you perceive more effective in preparing teachers: college preparation or professional development activities you attend during teaching? Why?

Teacher perceptions of pre-service and in-service education

Data were categorized into college preparation (CP) activities, professional development (PD) activities, and combined CP and PD activities (MacMillan & Schumacher, 2001). Based on these, teachers' reflections regarding teacher education were assessed to classify the responses. The CP, PD, and combination were used as codes to classify data. In both CP and PD, responses formed patterns; that is, to answer the following questions: what it is, how it prepares teachers, and why. As shown in Table 27, college preparation contributes the greatest benefit (40.00 %) to a teacher in the field of teaching agricultural education at the secondary school level, followed by 20.00% contributed by professional activities teachers attend during their teaching. A combination of CP and PD contributes approximately 17%. Figure 2 illustrates the relationship and contributions of CP and PD

Table 27. Perceived contributing factors to teacher preparation (n = 60)

Factors contributing to teacher preparation	Frequency	Percentage (%)
1. College preparation	24	40.00
2. Professional development	12	20.00
3. Combined College preparation and Professional development	10	16.67
4. No response	14	23.33
Total	60	100.00

activities toward preparing teachers of agricultural education as perceived by participants. This suggests that at least close to a quarter of teachers indicated that preparation of teachers was due to a combination of both CP and PD, while approximately 23% did not respond to the item.

According to respondents, college: (a) prepares the teacher to have initial and important skills necessary for basic teaching. One respondent referred to college education as offering *"basics of multiple learning styles"* necessary in the profession of teaching. College education also (b) introduces and connects new agricultural education teachers to professional organizations such as Iowa Association of Agricultural Educators (IAAE) and (c) prepares potential teachers to be able to conduct *"student teaching,"* and obtain *"content knowledge."*

On the other hand, professional development activities were perceived by participants as components of teacher preparation which (a) address the immediate course content needs essential in the field and (b) are comprised of activities more useful and important on-the-job activities such as workshops, meetings, and seminars which promote interaction among teachers. For example one response stated that "*professional development…can make you*

talk to people who actually use different strategies in their classrooms and figure out what might work for you." In addition, professional development activities (c) bring new or current scientific research findings to the classroom situations, as mentioned by one respondent. Teacher participants also indicated that college preparation (pre-service) and professional development (in-service) activities are equally essential, relevant and important. For example, one response stated that *"Both play an integral role in the preparation of teachers. Both have tons of potential ideas in developing teachers, but only when implemented correctly."* This poses a question central to this study: do teacher education programs effectively address standards? Table 28 provides a summary comparing college and professional development activities in teacher education.

Finally, in the fifth open-ended question, *"Do you think the subject content offered during your teacher education program is important in your teaching?"* participants were asked to indicate by checking "yes" or "no." At least 55 (89.71%) responded "yes," and 7 (11.29%) said "no."

Summary of qualitative data

The purpose of the qualitative part of the study was to understand teachers' perceptions of the education programs from a different point of view other than the use of statistics alone Figure 3 provides a summary of qualitative results. It is based on five questions set to address the qualitative objective and summaries the responses. The figure serves as an outcomes model of qualitative responses [of this research] that explains the process of preparing teachers of agriculture to teach in schools in Iowa. It also highlights areas that need improvement.

Table 28. Summary and quotations from participants comparing college and professional development activities in teacher education

College Preparation (Pre-Service)	BOTH CP & PD	Professional Development (In-Service)
• Required for new teachers to "get started" • Provides knowledge about students' "multiple learning styles" • Orientates individuals about professional organizations existing for the profession of teaching • Orientates people about FFA/SAE in agricultural education • Develops content knowledge of what to teach • Focused on the needs of a new teacher	…as college forms the basis for teaching while professional development builds on the basis Since college provides background or foundation upon which professional development is built Since both play an integral role in the preparation of teachers they are both lacking different things" "… they both prepare about the same" College gives the "foundation in the teaching skills and professional development helps hone those skills…" Helps improve the area where the teacher is weak in…	• Constitute activities following graduation because while still in college students do not realize they do not know • Offers content that is immediately useful to the teacher in the classroom • Tries to solve problems arising from the actual teaching experience • Offers newer information and current information. • Addresses topics not covered by the college education • Creates interaction of teachers with colleagues, thus making a favorable environment • Experienced teachers are the "best resource" for new teachers • More teacher centered and content oriented • Provides a sharing experience environment for teachers through talking, discussing, peer education • Is a form of continuing education in our field • Conducted through mini courses, semester courses or event workshops that have helped teachers to improve

Source: compile from both direct teacher responses and modified response

Figure 3 denotes that effective teacher preparation is a contribution of both college and professional development coupled with standards set for the program. The specific content for preparing teachers is guided by standards in the program that define what knowledge is to be developed. Nine content areas were revealed programs are perceived effective with 2 areas requiring attention. However, the results revealed the need to review the standards on a regular basis to identify deficiencies and implement in-services for practicing teachers. In addition, there is a need for colleges to address agricultural mechanics and develop a course on "how to teach" skills in technical areas of agriculture. Three standards need review: (#2) "demonstrate competence in content knowledge appropriate to

the teaching position"; (#3) "demonstrate competence in planning and preparing for instruction;" and (#6) "demonstrate competence in classroom management". Finally, standards are important in preparation of teachers and they need to be reviewed at regular intervals.

Summary

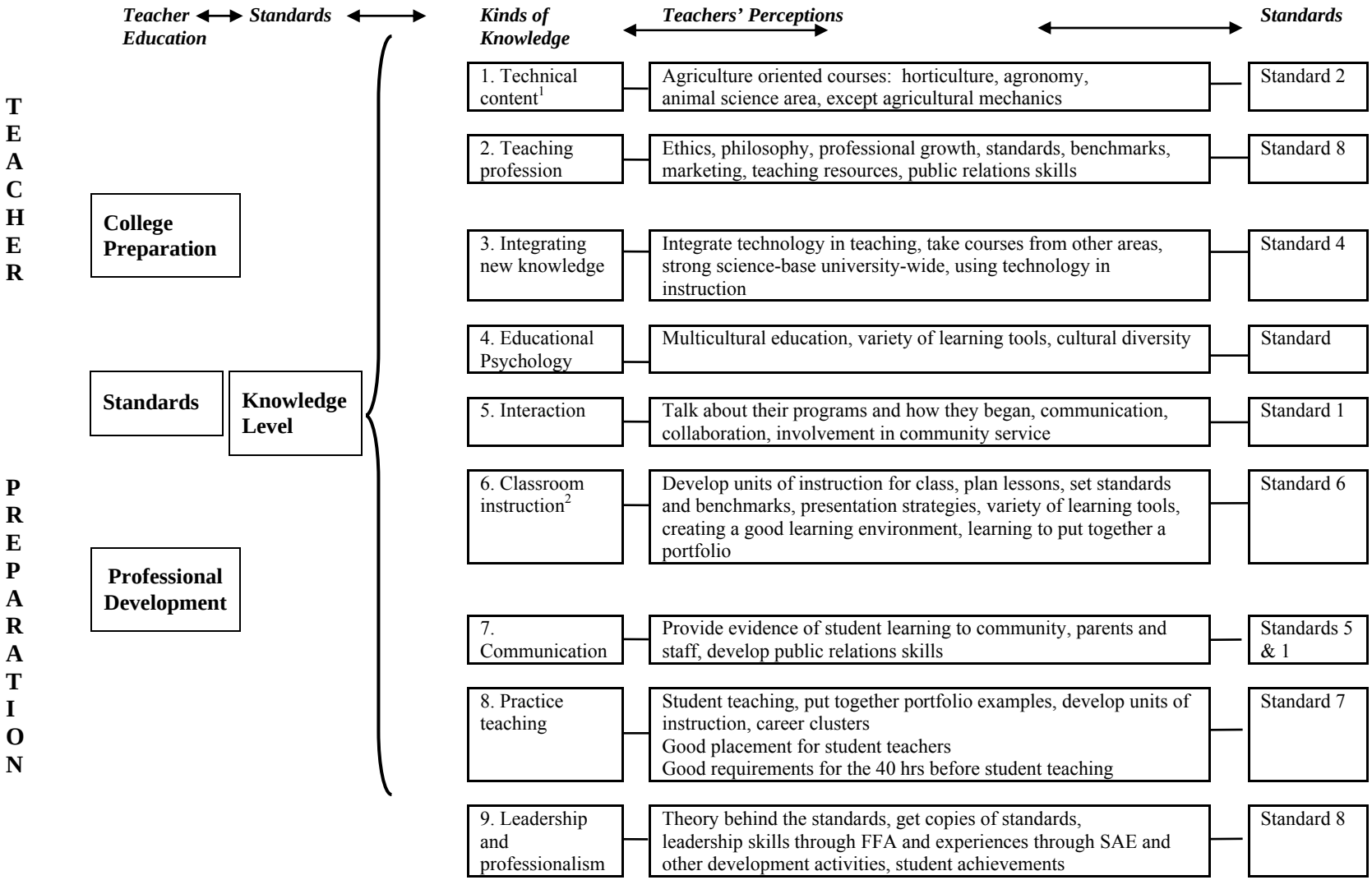
This chapter presented quantitative and qualitative results of the study about standards in agriculture teacher education programs. The quantitative results were based on descriptive statistics, *t*-tests, and Pearson correlation statistics. Figures were represented on demographics of the teachers who were surveyed and three dependent variables (effectiveness, importance, and influence of professional activities on teacher qualifications for teacher certification) to describe and compare group means regarding perceptions. On one hand, there were significant relationships, between other dependent variables and gender using a t-tests analysis. On the other hand, there was a non statistical significant relationship between gender and effectiveness of the program using t-test analysis. Both positive and negative negligible to low relationships between teaching experience and three dependent variables were found as well as between GPA and the dependent variables. Teachers who graduated from other universities than ISU perceived their preparation to be more effective compared to those who graduated from ISU (Cramer's V = .648).

A one-way ANOVA conducted between 3 DV "effectiveness" and the "influence of professional development" and the FFA levels of achievement found no significant differences between and within the levels at the .05 level of significance but significant difference were found with "importance". Post hoc statistics were conducted using Tukey

and Scheffé multiple comparisons to determine which group/level had different means. The results of the comparisons using Tukey and Scheffé did not locate a pairwise difference; thus, it is assumed that the difference is between the groups that achieved no degree and the group that achieved American degree

The qualitative results revealed the teachers' perceptions that they were inadequately prepared in agriculture mechanics, which are the technical knowledge content, required teaching specific courses in agriculture (e.g., horticulture, animal science, agronomy, etc.). This has implications on establishing standards for agriculture teacher education.

The next chapter provides a summary of the research, conclusions, implications, and recommendations for practice and further research. Finally, personal reflections of the researcher are presented based on this mixed methods research study.



Source: Developed from teachers' responses using a template suggested by http://www.epistemics.co.uk/Notes/90-0-0-htm

[1] Incomplete: Agricultural mechanics not well covered by teacher education; [2] Incomplete: missing course in how to teach related technical content (e.g., horticulture, etc.).

Figure 3. Nine knowledge areas perceived to be strengths for teacher preparation in agricultural education teacher programs

CHAPTER 5. FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to explore and describe perceptions of secondary school-level teachers of agriculture in Iowa regarding the effectiveness of agricultural education teacher programs in addressing teaching standards and criteria, agriculture subject content, and the influence of professional development activities in their teaching. To address this goal qualitative and quantitative data gathered from teachers of agriculture in schools were used and significances and relationships were analyzed. This was a descriptive mixed-methods research design to study teachers' perception regarding the effectiveness of standards –based education in agriculture programs.

The target population for this study comprised of the 96 agricultural education teachers who qualified to participate in the study. The 96 teachers in the study met the following criteria: (1) they had valid e-mail address, to access the online survey; (2) they had started teaching in a secondary school in the state of Iowa between 1995 and 2006; (3) they had graduated with a bachelor's degree from an accredited university; and (4) they were currently teaching agricultural education in schools in Iowa. That means, teachers who were surveyed comprised of those who started teaching in Iowa 6 years prior to and 6 years after the 2001 introduction of standards and criteria into Iowa's teacher education programs. Participants' names were obtained from the Iowa Department of Education. No random sampling was conducted.

This research design was descriptive. The study used a questionnaire with qualitative and quantitative items to survey agriculture teachers who started teaching between 1995 and 2006 in secondary schools in the state of Iowa. There was a similar study conducted a few

years ago in New Mexico. The researcher gained permission to modify a survey instrument used by Dormody and Torres (2002) since they studied similar concepts to assess the perceptions of former students of agricultural education program at New Mexico State University. The modification involved replacing the competencies statements with Iowa state standards, creating the second and the qualitative parts of the instrument and modified the length of the Likert scale.

The modified instrument consisted of 5 parts: part 1- closed ended 5 point Likert type items, measuring program effectiveness items comprising of 7 standards, 16 criteria and 7 agriculture subject content statements. Part 2- closed-ended 4 point Likert type items, measuring program importance using the same items in part 1. Part 3a consisted of close-ended dichotomous items measuring teachers' participation or no participation (yes/ no) in professional development activities. Part 3b comprised of close-ended, 4 point Likert type items measuring the influence of professional development activities on teaching. Part 4 had 5 open-ended questions about standards; and, Part 5 requested participants to supply demographic characteristics of participants. The survey was self administered online using SurveyMonkey.com and the last contact for non respondents used paper survey.

Quantitative data gathered through the use of the survey instrument was analyzed using the statistical package for social science (SPSS) version 15. The quantitative data analysis was conducted as follows:

1. Cronbach's alpha was calculated to establish the internal consistency of statements used in the study.
2. *T*-tests were conducted to compare early respondents and late respondents and teachers who started teaching in 2000 and before, to those who started teaching in

2001 and after the introduction of standards and criteria in teacher education regarding the three dependent variables to determine if there were differences between two groups of teachers on the three dependent variables, means for male and female teacher participants on three dependent variables.

3. Pearson correlations were also used to determine if there are significant relationships between the three dependent variables (perceived effectiveness, importance, and influence of the teacher preparation programs) and independent variables (teaching experience and GPA). Cramer's V was conducted to determine if there was an association between teaching agricultural mechanics and the university where the participants graduated. ANOVA was conducted to test the difference between and within FFA degree levels and the three dependent variables.
4. Descriptive statistics, including frequencies, percentage, means, and standard deviations, were used to summarize respondents' demographic characteristics. Qualitative data gathered through the use of five open ended questions were analyzed.

The procedures for qualitative data analysis were as follows:

1. Upon receiving the data as part of the responses of the study, the narrative scripts were cut and pasted on a word document. The data for question 5 was included in the quantitative analysis. Data for questions 1 to 4 were grouped accordingly.
2 Information pasted on the word document was numbered to quantify the data and also to ascertain the number of respondents in the study.
3. Each response for each question was read several times, and coded according to analysis techniques described by Crabtree and Miller (2002) and De Vaus (1986) using classification of knowledge by Mayer (2005).

4. The narrative and descriptive statements were read to understand and quantify them.
5. Data were categorized into themes generated from the data gathered.
6. Responses were compared with findings from the quantitative data to conclude, summarize and suggest.

Findings

Demographic characteristics

There was an almost equal number of men and women who made up the new teachers of agricultural education surveyed in this study (49.25% and 47.5%). The results of this study showed a ratio of almost 1:1, which may or may not be the most realistic portrayal of teachers of agricultural education in the state of Iowa since random sampling was not used; however, the findings do suggest that there is a roughly equal number of male and female teachers of agricultural education in schools in Iowa. Previous research studies on gender have reported a lesser number of women than men in agricultural education and related sciences (Kantrovich, 2007; McLees, n.d.; Myers & Dyer, 2004; Ulrich et al., 2005) despite women's traditional prevalence in teaching (Kesley, 2006). However, an increase in the number of female students taking animal science, a core course for students of agricultural education, has been observed in a study conducted by Beck and Swanson (2003), which may suggest that the total number of female agricultural education teachers is on the rise.

The study also revealed that the percentage ratio of teachers who received their teacher certification in 2000, before the introduction of standards and criteria, to the number of teachers who received their teacher certification in 2001, after the introduction of standards and criteria, was approximately 28%:66%, or 1:2.The results indicated that there

are more new teachers than experienced teachers in the sample studied. A large number of new teachers is currently possible since choosing a career nowadays does not limit a person to that career for a lifetime, like it did in the past. A chosen career today is often one of multiple prospects, and people can change to a different field, like teaching, if needed or desired (Hammerness, 2006). Of those changing to teaching, different people join teaching careers for different reasons (Hammerness, 2006; Swortzel, 1998). According to Swortzel, women seem to join teaching to obtain an opportunity to advance professionally, while men join the field of teaching to share their achievements. Gende (2006) stated that the focus in teaching these days has shifted from teaching to student learning which may be encouraging people to join teaching in greater numbers.

As expected, a majority of teachers surveyed were found to be alumni of Iowa State University. The perceptions of teachers of agricultural education in this study echo the results of Boyd, Lankford, Loeb, and Wyckoff, (2005), who studied how teachers are distributed generally in the country and found that people tend to favor working in places where they grew up, were educated, and established relationships with friends and family members. One other factor currently influencing local jobs could be locations of teacher certificate offices within the universities (Albert, Vaughn, & Croom, 2005).

The number of teachers of agriculture who have taught for a period of 1 to 7 years is greater than the number of teachers who have taught for 8 years and above. The difference between the two groups was also illustrated by the number of teachers in the first to the third year of teaching, and from the fourth to seventh years, which were greater than the number of people in the upper category of 8 years and more. This trend might suggest that there is either teacher attrition following experience (Subair & Mojaphoko, 1992), that there has been an

increase in the number of new teachers entering the teaching professional career, or that there has been an increase in the number of positions in secondary schools in Iowa as demographics change (Myers & Dyer, 2004). The results are not different from those discussed above, whereby a greater number of people were certificated in 2000 and before than those who received their certification in 2001 or after. Flowers and Pepple (1987) observed that, generally, new teachers of agriculture have higher self-esteem as compared to older teachers in the field. This may be the reason the number of experienced teachers tends to fall.

The average GPA for the participants in this study was 3.33 on a 4-point scale, with almost equal representations on the lower and upper categories in the distribution of GPA scores of the group studied.

The findings of this study revealed that a majority of teachers of agriculture in the study were members of FFA and participated in SAE during high school. Thus, there is likelihood that many of the respondents' background in high school motivated them to become teachers of agricultural education. The results of this may not be used to generalize the teacher perceptions to all teachers in the state of Iowa due to lack of random sampling. That said, at least one-third of the respondents received an FFA chapter degree. This suggests that FFA is a popular component of schools' agricultural education to the group in the survey. Therefore, as teachers indicated in their descriptive responses, there may be a need to have standards that address the teaching of FFA to potential teachers in the programs at a college level. For example, when teachers were asked to suggest areas or "standards" which need to be improved in programs for preparing teachers their answers included *"… class teaching us about the FFA, i.e, how to fill out an Iowa degree," "more FFA instruction*

needs …," "getting ready for fairs and FFA activities," "more emphasis on FFA such as CDE's, etc.," and "proficiency award," and also indicated that we *"need to understand the importance of professional organization better."* This is a suggestion or an indication that the assumption in teacher preparation has been that teachers learn about FFA and about other organizations and components of agricultural education on the job. The agricultural education teachers' suggestions about teaching FFA in teacher-preparation programs is similar to the findings of a historical study by Connors (2004), which, among others, revealed that, in the past, FFA was part of the secondary-school agricultural education curriculum.

Both the quantitative and qualitative results of this study appear to suggest standards for FFA in teacher education. New teachers should be exposed to a variety of schools' curricula and to extramural activities that enhance the teaching and learning of agricultural education in schools, including FFA. One teacher stated that, *"college education was better at preparing me for the basics of multiple learning styles and for preparing me on the concepts of agriculture education/FFA/SAE and their connectedness."* This response challenges the responses in which participants suggested introduction of the FFA curriculum in teacher preparation at the college level. As shown in Figure 3, participants revealed a satisfactory preparation with regard to school organizations, such as FFA. The literature indicated that FFA has been one of the essential components of agricultural education in schools for many years (Hughes & Kirby, 1993). Therefore, this finding has implications in the curriculum and practices of institutions preparing teachers of agriculture. Studies on demographics by Myers and Dyer (2004), Hillison (1989), and Miller (2006) have revealed the change in demographics in agricultural education which will continue to change as,

indeed, society changes. As indicated by Rice (2003), demographic characteristics have an influence on the effectiveness of teacher education.

Program effectiveness

Teachers of agricultural education in secondary schools in Iowa surveyed for this study perceived education programs to be moderately effective in preparing teachers on criteria, standards, and course content. This means teachers perceived that they have moderately met the requirements for standards, criteria, and content required for their bachelor's degree in agricultural education in order to teach in secondary schools. However, as indicated in this study, the strength of the effectiveness of the programs in addressing each set of concepts differs, as shown by the range between the highest and the lowest means for each statement used to measure effectiveness. For example, there is a large range between the highest perceived criterion to "demonstrate professional and ethical conduct as defined by the state of Iowa and individual district policy" (M = 3.78), and the lowest perceived criterion about whether teachers were prepared to "use student achievement data, local standards and the district curriculum in planning for instruction" (M = 3.03). Thus, the range was .65. A larger group (approximately 43%) of teachers rated the programs to be moderately effective.

With regard to overall standards, teachers of agricultural education perceived the programs to be moderately effective in preparing them to be able to "engage in professional growth" (M = 3.68) and perceived programs to be least effective in preparing teachers to be able to "demonstrate competences in classroom management" (M = 3.12) (Table 8). Thus, the difference between the highest and lowest rated standard was .56. Approximately 40% of

the group categorized the programs as effective. Therefore, it was concluded that the program was effective in addressing overall standards.

Teachers of agriculture perceived teacher education programs to be more effective in preparing teachers to be able to "teach animal science" (*M* = 3.80), but the program was perceived to be least effective in preparing teachers to be able to "teach agricultural mechanics" (*M* = 1.87) (Table 9). The difference between the perceived most effectively addressed and the least effectively addressed is 2.03.

In addition to these results, teachers also stated descriptively that they were not well-prepared to handle agricultural mechanics. For example, comments included "*we need agricultural mechanics at ISU*" and "*agricultural mechanics: we did not have any and now I am teaching a small gas engines class*." In addition, quantified responses (Crabtree & Miller, 1992) which mentioned "agricultural mechanics" as one area that needs improvement in agricultural education were numerous, leading to the conclusion that teacher education programs were partially effective in addressing the Iowa teaching standard 2 for prospective teachers of agricultural education during their undergraduate programs.

Importance of standards in teaching

Results of this study also demonstrated that more than half of agricultural teachers in Iowa schools perceive criteria to be very important for their teaching profession. The teachers of agricultural education perceive the criterion, "creating, establishing, communicating, model, and maintaining standards of responsible student behavior "(*M* = 3.71; *SD* = .493), to be most important, and perceive the criterion "using student achievement data, local standards, and the district curriculum in planning for instruction" (M = 3.22; SD = .671), to

be least important in their teaching. The difference between the two was .49. Therefore, it was concluded that criteria were very important in preparation of teachers as well as the profession of teaching. Literature reviewed generally indicated that standards were important in education (Malan, 2000; Porter, 1989; Thomas, 2001).

With regard to overall standards, two-thirds of teachers of agricultural education surveyed perceived, overall, standards to be very important. The standard ranked as most important was *"demonstrate competence in content knowledge appropriate to the teaching position"* (*M* = 3.76; SD = .429), and the standard *"demonstrating the ability to enhance academic performance and support for the implementation of the school district student"* (*M* = 3.47; SD = .537) was ranked to be least important. The difference was .29. The study concluded that both the standards and the criteria were important agricultural education programs of preparing teachers. As indicated by Thomas (2001), standards are currently popular in education and thus important as they direct people to master what they are learning (Darling-Hammond & Wise, 1985; Glaser, 1978). The literature revealed that programs of teacher education use standards which help them help potential teachers articulate the knowledge, skills, and attitudes to learn effectively.

The study suggests that most professional development activities outlined in the study were attended by majority teachers who were surveyed. The professional activity *"on the job experience"* was perceived by teachers of agriculture to have the highest influence in the professional development of teachers, and teachers perceived the in-service activity "*district in-service*" to have the least influence in teachers' professional development. The same results regarding "on-the job experience" were found by Dormody and Torres, (2002). Based on the results, the study suggests that professional development activities were influential to

teacher development. In-service education needs for teachers of agriculture may range from addressing the technical content to fundamentals of instructions in the classroom (Duncan, Riketts, Peake, & Uesseler, 2006). According to Garton and Chung (1997), in-service education needs for teachers of agricultural education have always existed and will always exist. This implies that in-service education will continue to be as long as teachers are teaching.

There was no statistically significant difference ($p > .05$) between male and female teachers of agricultural education who were surveyed in this study on their perceptions about effectiveness of programs in addressing criteria, standards, and course contents. That suggests the males and females in the group studied perceive the effectiveness of the programs in addressing the three concepts in the same way. However, there was a significant difference between how males and females perceive the importance of the program and the perceived influence of professional development activities in their teaching profession ($p < .05$). This means male and female teachers in this study had different perceptions regarding the importance of the program and the need for in-service activities in their teacher education programs. There is a need for teacher education program participants to be exposed to criteria and standards in their training and for in-service training of teachers.

Influence of professional development

The study revealed that both college preparation (pre-service) and professional development activities (in-service) play a major role in teacher development. The findings also indicated that the respondents frequently participated in professional development activities conducted by different agencies to address their in-service needs. Teacher

participants in this study indicated that neither one is more important than the other since each has a role to play in teacher preparation and professional development. Majority of the teacher participants seem to share the feeling that "*Both* [college preparation and professional development] *play an integral role in the preparation of teachers. Both have a ton of potential in developing teachers…"*

Perceptions regarding standards in teacher education

The findings revealed that the preparation of teachers is a process and it involves several factors. Among other factors, are the nine areas revealed as strengths of teacher education programs, which center on developing the following areas: technical knowledge in agriculture concepts "*with the exception of agricultural mechanics"*, the teaching profession, integration of new more knowledge, educational psychology with culture diversity, integration of programs, classroom instruction, communication, practice teaching, and leadership and professionalism. One respondent stated that during teacher preparation they are exposed to "*lots of classes in lots of areas from which to choose."*This indicated the importance of "diversity" as referred to by the respondents.

The second finding was that teachers perceive the use of standards in teacher preparation programs to be useful. An insignificant proportion (4.5%) of the respondents indicated that standards were not useful. Approximately two third of the participants who said *"very useful"* and 12% who said *"somewhat useful"*) of the teachers surveyed indicated that standards were useful. One of the responses stated that "*they are very useful, because we are observed and evaluated based on the standards.*" However, the positive responses were

also coupled with suggestions to improve the use of standards, such as "*some of the standards were very helpful, but some really need to be re-looked at."*

The study revealed that both college preparation (pre-service) and professional development activities (in-service) play a major role in teacher development. Furthermore, as shown by the results of open-ended question 5, *Do you think the subject content offered during your teacher education program is important in your teaching?,* the majority (87%) of the teachers of agricultural education indicated that the subject content offered in colleges and university programs is important in secondary school teaching. This suggests adequate preparedness of teachers in courses that are offered in schools that prepare them to teach.

Whether teacher participants began teaching before or after standards and criteria were introduced, the comparison of the groups on three dependent variables found no statistical significance. That is, one group's perceived reported effectiveness, importance, and influence of professional activities on teacher education were the same as the other groups. Since there was no significant difference between the two groups on three dependent variables it was concluded that standards mad no difference on what teachers were doing.

The findings revealed that standards are useful in education. College preparation and professional development preparation (workshops, seminars, etc.) both equally play a major role in teacher development since they complement one another. Furthermore, agricultural education subject content offered in college and university programs for teacher education is important to secondary school teaching. The study also found that mechanics courses need to be introduced at the college level in order to educate teachers to be able to teach the course at the secondary school level.

The study also revealed that a vast majority of the participants indicated that the agricultural education course content offered at college during their preparation was important since they related it to their status as current teachers. This suggests that the content taught during teacher preparation was useful in their teaching of agricultural education in schools. As stated by one participant, *"The content areas are nice, but it would be better for the agricultural education students to state that material and to be taught to high school/middle school classes."* Another participant wrote, "*I think there must be a higher level of agricultural mechanics to help teachers prepare for what some school might offer."* This also suggests the importance of matching college programs with programs in high schools.

Limitations

The study was conducted with several limitations, therefore, the findings and conclusions should be interpreted in light of these factors:

1. There was a lack of random sampling; thus, the findings are not generalizable to other groups except the group studied. Additionally, due to the lack of random sampling, the statistics used in this study are limited to descriptive purposes rather than for making inferences about the group studied.
2. The sample was limited to teachers of agriculture in the state of Iowa who had a bachelor's of degree, are currently teaching in the state of Iowa, and who had emails (to access the online survey).
3. The population was further limited to teachers of agriculture and who have been teaching agriculture from 1995-2006. For purposes of comparison, teachers were then

divided into two groups: those who taught from 1995-2000, and those who started teaching in 2001 and were teaching in 2006.

4. Of a total of 96 teachers invited to participate in the study, 62 completed surveys in the time allotted. Some surveys that were finished had missing data and were discarded. Thus, the sample size was small and might not be representative of the entire group.
5. Some of the questions were adopted from a previous study and others were created based on teacher-education standards in the state of Iowa.

Conclusions

The following conclusions were drawn from the study based on teacher perceptions regarding program effectiveness in addressing standards, criteria, and course content; the importance of the standards and criteria; and the influence of professional development in teaching:

1. The group of secondary-level teachers who started teaching after the standards were implemented were still relatively new teachers, having started teaching less than six years before the study, most were Iowa State University graduates, their GPA average was 3.3, they had been FFA members in high school, and there were an almost equal proportions of males and female teachers.
2. There was no statistically significant difference between the group of teachers who started teaching before and after standards were introduced on perceived effectiveness and importance of the programs. Therefore, standards have not made much difference

in the way teachers rated them. The implementation of standards has not caused them to change what they do as a teacher.

3. Teachers in this study perceived the agricultural education programs to be effective in preparing them for standards and moderately effective in addressing the criteria for the standards. Teachers also perceived the standards and criteria as well as subject content met at preparation time to be very important in their teaching. Teachers perceived professional development activities to be moderately influential in their teaching.
4. The study revealed that whatever criteria and standards were perceived to be effectively addressed was not necessarily perceived to be important by the group studied. For example, based on the mean of criteria, to "*demonstrate professional and ethical conduct as defined by the state of Iowa and individual district policy"* one would have expected it to have been perceived important. This was not the case. However, the quantitative and qualitative findings agree that teacher education programs address well the issue of professionalism in teaching as perceived by the high mean and the teachers' comments regarding standards and their criteria. Both teaching criteria and standards were perceived by teachers to be important in teaching.
5. Both quantitative and qualitative results indicated that teacher education programs were effective in addressing subject content, but not enough in addressing the agricultural mechanics course to enable teachers perform their teaching of the content in schools. For example, the lowest mean score of M = 1.87 (SD 1.228) and such

comments like "*agricultural mechanics: we did not have any and now I am teaching a small engines class*" indicate that teachers perceived the program to be less effective in addressing some of the content material required for their teaching.

6. There was no significant difference at $p < .05$ level of significance between the group of teachers who started teaching before and after standards were introduced on perceived effectiveness and importance of the programs (Table 13). Similarly no statistical significance was found with individual concepts adding to dependent variables (Table 14). However, there was a statistically significant difference between the males and females on the perceived importance of the program and influence of professional development activities on teaching (Table 16). Females perceived professional development activities to be more beneficial for their teaching compared to males. The groups compared were found to perceive things in the same manner since there were no statistically significant differences between them.
7. There was no relationship found between the correlations of 3 principal concepts (dependent variables) and the number of years teachers have been teaching (experience) and their Grade Point Average (GPA) at $p< .05$ level of significance. The correlation produced both negative negligible to low relationships and were not statistical significant. One produced a positive negligible relationship (Davis, 1971, as cited in Miller, 1994). The correlations were at least close to zero.
8. Majority (65%) of the teacher participants from Iowa State University indicated that teacher education programs were ineffective as compared to only 29% percent who graduated from other universities. The extent of association between the participants' place of graduation and the level of perceived effectiveness of programs was

calculated using Cramer's V. There was a positive substantial association (V= .648) between the two variables. Teachers who graduated from universities other than ISU perceived their preparation to be more effective compared to those who graduated from ISU. It was also found that the results of quantitative and qualitative data seem to concur, as ISU alumni teachers stated that they were not able to teach agricultural mechanics. Responses such as *"we need agricultural mechanics at ISU"* are an indication of a need to introduce the course.

9. A one-way ANOVA conducted found no. significant differences among the FFA groups on perceived "effectiveness" and the "influence of professional development" at the .05 level of significance but significant difference was found with "importance" and post hoc statistics were done using Tukey and Scheffé multiple comparisons to determine which group had different means. The results of the comparisons using Tukey and Scheffé did not locate a pairwise difference; thus, it is assumed that the difference is between the group that received no FFA degree in high school and those who received the American degree.
10. Almost all teachers surveyed participated in professional development workshops/ seminars and were perceived to be moderately influential in teaching.

Recommendations

Based on the findings of the study, the following recommendations are made for practice and for future research:

1. There is a need for course work in agricultural mechanics (skills and methods) to prepare teachers to teach this subject in secondary schools. At ISU, one or more

departments must offer agricultural mechanics coursework to potential teachers of agriculture as a part of pre-service teacher preparation.

2. The Iowa State Departments of Education, in collaboration with the Department of Agricultural Education and Studies at ISU, should develop a series of in-service modules on agricultural mechanics and offer them to teachers currently in the field through professional development programs.
3. Further studies should be conducted on how standards have been implemented or addressed in schools, particularly in agricultural education programs, since standards seem to have not made much difference in what teachers actually do in the classroom.
4. The Department of Agricultural Education should identify any additional standards, in addition to the current standards, that would be beneficial in the preparation of teachers of agriculture science.
5. Since teachers desire specifically to be better prepared on subject matter methods, there is a need to offer professional development workshops, where agricultural science content area will be offered along with a module on "how to teach" the content.
6. There was a statistical significant difference between the means of male teachers of agriculture and female teachers regarding importance and influence of professional development. The Department of Agricultural Education and Studies should conduct research to find out why female teachers' perceptions regarding importance and the influence of professional development activities in their profession of teaching were significantly higher.

7. Teachers desire to learn not only what to teach but how to teach it. The Department of Agricultural Education and Studies needs to seek ways to link teaching/learning methods and strategies to the various agriculture and life science subject matter areas in the pre-service teacher preparation program.
8. There is a positive relationship between FFA and SAE/SOE and becoming a teacher of agricultural education. The majority of teachers surveyed was members of FFA and participated in SAE/SOE while in high school. Not all teachers had taken agricultural education or participated in FFA and SAE/SOE in high school. There is need to reinforce this connection by having all students learn about FFA and SAE/SOE during the pre-service teacher preparation program.
9. At the time of the study, student teaching in Agricultural Education at ISU took place over a 12-week time period. Agricultural education faculty should consider the teachers' recommendations for increased time for student teaching.

Final Thoughts

The design of this study has not been commonly used in Agriculture. I became interested in the design when I reviewed the literature in preparation for this research. The article by Teddle and Yu (2006) served as eye-opener because it addressed social research. Previous courses that I have taken at undergraduate and graduate levels have placed emphasis on a quantitative research paradigm. My knowledge of qualitative design was minimal. When I began this study the question that came into my mind was: What benefit will mixed methodology research bring to my understanding of teaching standards, course

content, and professional development activities about preparing teachers of agricultural education?

The findings of a mixed methods study enable one to gain a greater understanding through the use of both quantitative and qualitative data. The desire to gain an understanding of the perceptions of teachers in agricultural education regarding programs of teacher preparation was a strong motivating factor in this study because of the nature of my job. The information shared by teachers about how they interpret standards, strengths in college/university programs regarding teacher preparation, areas requiring some improvement as well as the statistical significance between groups (before and after standards) on certain variables helped me to understand the difficulties teachers sometimes face as they enter teaching and continue to encounter while teaching.

The issue of establishing pre-set standards for teacher performance is challenging at best. I was impressed by the responses I gathered from teachers about standards. Even though the literature indicated that the two paradigms address different research questions, I found a relationship between the ranking of standards on a 5-point Likert-type range and the textual information gathered from teachers with regard to standards, course contents, and professional development activities. For example, teachers ranked Agricultural Mechanics under subject content offered to them in Colleges/university low on a quantitative Likert-type range. On different questions (open-ended) teachers uttered statements that described the need to improve agricultural mechanics at the college level. It became clear that there is a serious need for in-service workshops. Although I recommend establishing in-service training, I feel that another study should be conducted to gather data to validate my findings.

I will urge teacher education programs to consider frequent feedback from alumni of their programs whether in state or out of state.

APPENDIX A. GUIDELINES FOR ASSESSING STUDENT TEACHERS IN AGRICULTURAL EDUCATION AND STUDIES AT IOWA STATE UNIVERSITY

Table A-1. Student level of performance on standards form (*ISU handbook*, 2008)

Performance Standard	Acceptable	
	Yes	No
1. Demonstrates ability of enhance academic performance and support for implementation of the school district student achievement goals. Provides evidence of student learning to students, families, and staff. /Implements strategies supporting student, building, and district goals. / Uses student performance data as a guide for decision-making. / Accepts and demonstrates responsibility for creating a classroom culture that supports the learning of every student. / Creates and environment of mutual respect, rapport, and fairness. / Participates in and contributes to a school culture that focuses on improved student learning. / Communicates with students, families, colleagues, and communities effectively and accurately.		
2. Demonstrates competence in content knowledge appropriate to the teaching position. Understands and uses key concepts, underlying themes, relationships, and different perspectives related to the content area. / Uses knowledge of student development to make learning experiences in the content area meaningful and accessible for every student. / Relates ideas and information within and across content areas. / Understands and uses instructional strategies that are appropriate to the content area.		
3. Demonstrates competence in planning and preparing for instruction. Uses student achievement data, local standards, and the district curriculum in planning for instruction. / Sets and communicates high expectations for social, behavioral, and academic success of all students. / Uses student developmental needs, background, and interests in planning for instruction. / Selects strategies to engage all students in learning. / Uses available resources, including technologies, in the development and sequencing of instruction.		
4. Uses strategies to deliver instruction that meet the multiple learning needs of students. Aligns classroom instruction with local standards and district curriculum. / Uses research-based instructional strategies that address the full range of cognitive levels. / Demonstrates flexibility and responsiveness in adjusting instruction to meet student needs. / Engages students in varied experiences that meet diverse needs and promote social, emotional, and academic growth. / Connects students' prior knowledge, life experiences, and interests in the instructional process. / Uses available resources, including technologies, in the delivery of instruction.		
5. Uses a variety of methods to monitor student learning. Aligns classroom assessment with instruction. / Communicates assessment criteria and standards to all students and parents. / Understands and uses the results of multiple assessments to guide planning and instruction. / Guides students in goal setting and assessing their own learning. / Provides substantive, timely, and constructive feedback to students and parents. / Works with other staff and building and district leadership in analysis of student progress.		
6. Demonstrates competence in classroom management. Creates a learning community that encourages positive social interaction, active engagement, and self-regulation for every student. / Establishes, communicates, models, and maintains standards of responsible student behavior. / Develops and implements classroom procedures and routines that support high expectations for student learning. / Uses instructional time effectively to maximize student achievement. / Creates a safe and purposeful learning environment.		
7. Engages in professional growth. Demonstrates habits and skills of continuous inquiry and learning. / Works collaboratively to improve professional practice and student learning. / Apples research, knowledge, and skills from professional development opportunities to improve practice. / Establishes and implements professional development plans based upon the teacher's needs aligned to the Iowa Teaching Standards and district/building student achievement goals.		
8. Fulfills professional responsibilities established by the school district. Adheres to board policies, district procedures, and contractual obligations. / Demonstrates professional and ethical conduct as defined by state law and individual district policy. / Contributes to efforts to achieve district and building goals. / Demonstrates an understanding of and respect for all learners and staff. / Collaborates with students, families, colleagues, and communities to enhance student learning.		

Table A-2. Form for assessing student teacher's portfolios (*ISU handbook,* 2008)

PORTFOLIO ASSESSMENT FORM – form 9 Student Teacher : _____		
Assignment	**Related ISU-TE Standards**	**☑ Completed**
Teaching philosophy		
Teaching Materials	1, 3, 2, 4, 6	
• Unit plans		
• Teaching plans		
• Handouts and worksheets		
• Activities		
• Tests		
Performance Evaluations	7	
• Evaluations by cooperating teacher		
• Evaluations by university supervisor		
• Evaluations by students		
• Videotape of teaching and self-evaluation		
Experience Plan Checklist and Related Reports		
• Cooperating teacher's curriculum		
• Plan book or appointment book		
• Sample IEP	3, 4, 5, 6	
• Report on a field-trip	8	
• Report on use of a resource person	8	
• Your classroom and laboratory rules	6	
• Five reports of Career Experience in Agriculture evaluations		
• Report of supervised FFA activity other than regular meeting		
• FFA meeting agenda for which you served as advisor		
• Report on interview with school administrator	8	
• Report on visit to another class	8	
Other Requirements as Designated by the University		

Table A-3. Checklist for monitoring student progress (*ISU handbook,* 2008)

Advising Checklist for Monitoring Student Progress Toward Attaining ISU Teacher Education Standards

Student _____

		C & I Courses				AGEDS Courses			
	Undergraduate	201	204	333	406	310	401	402	417
Performance Standard	Graduate	505		533	506		501	502	617
1. Communication/Student Learning:									
2. Subject Matter Specialization/Instructional Planning:									
3. Assessment/Computer Technology Related to Instruction/Student Learning/Diverse Learning/Instructional Planning:									
4. Instructional Strategies/Student Learning/Diverse Learners/Computer Technology Related to Instruction:									
5. Student Learning/Diverse Learners:									
6. Communication/Student Learning/Diverse Learners:									
7. Foundations, Reflection and professional Development									
8. Collaboration, Ethics, and Relationships:									
9. Collaboration, Ethics, and Relationships:									
10. Computer Technology Related to Instruction:									
11. Subject Matter Specialization:									

Introduction: Open cells in the course by performance standard matrix indicate that the course contains a designated performance indicator for the associated standard. Advisors should indicate the level of performance achieved on each designated performance indicator using the following rubric: A = Acceptable; MA = Marginally Acceptable; U = Unacceptable. Advisors will obtain information on advisee performance from instructors of each course. Advisors are expected to review this information with their advisees each semester.

Table A-4. Expected teacher competencies (*ISU handbook,* 2008)

No.	Competency
(a)	Student learning: the practitioner understands how students learn and develop, and provides learning opportunities that support intellectual, career, social and personal development.
(b)	Diverse learners: The practitioner understands how students differ in their approaches to learning and creates instructional opportunities that are equitable and are adaptable to diverse learners.
(c)	Instructional planning: The practitioner plans instruction based upon knowledge of subject matter, students, the community, curriculum goals, and state curriculum models.
(d)	Instructional strategies. The practitioner understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.
(e)	Learning environment/classroom management. The practitioner uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, and support interaction in the classroom.
(f)	Communication. The practitioner uses knowledge of effective verbal, nonverbal and media communication techniques, and the other forms of symbolic representation, to foster active inquiry, collaboration, and support interaction in the classroom.
(g)	Assessment. The practitioner understands and uses formal and informal assessment strategies to evaluate the continuous intellectual, social, and physical development of the learner.
(h)	Foundations, reflection and professional development. The practitioner continually evaluates the effects of the practitioner's choices and actions on students, parents, and other professionals in the learning community, and actively seeks out opportunities to grow professionally.
(i)	Collaboration, ethics and relationships. The practitioner fosters relationships with parents, school colleagues, and organizations in the larger community to support students' learning and development.
(j)	Computer technology related to instruction.
(k)	Completion of pre-student teaching field-based experiences.
(l)	Methods of teaching with an emphasis on the subject and grade level endorsement desired.
(m)	Student teaching in the subject area and grade level endorsement desired.

Source: IAC8/17/05, 5/10/06, Ch. 14, p. 7.

Table A-5. Iowa state teaching standards and criteria

No	Standard and criteria
1.	***Demonstrates ability to enhance academic performance and support for implementation of the school district student achievement goals.*** Provides evidence of student learning to students, families, and staff. / Implements strategies supporting student, building, and district goals. / Uses student performance data as a guide for decision-making. / Accepts and demonstrates responsibility for creating a classroom culture that supports the learning of every student. / Creates an environment of mutual respect, rapport, and fairness. / Participates in and contributes to a school culture that focuses on improved student learning. / Communicates with students, families, colleagues, and communities effectively and accurately.
2.	**Demonstrates competence in content knowledge appropriate to the teaching position.** Understands and uses key concepts, underlying themes, relationships, and different perspectives related to the content area. / Uses knowledge of student development to make learning experiences in the content area meaningful and accessible for every student. / Relates ideas and information within and across content areas. / Understands and uses instructional strategies that are appropriate to the content area.
3.	***Demonstrates competence in planning and preparing for instruction.*** Uses student achievement data, local standards, and the district curriculum in planning for instruction. / Sets and communicates high expectations for social, behavioral, and academic success of all students. / Uses student developmental needs, background, and interests in planning for instruction. / Selects strategies to engage all students in learning. / Uses available resources, including technologies, in the development and sequencing of instruction.
4.	***Uses strategies to deliver instruction that meet the multiple learning needs of students.*** Aligns classroom instruction with local standards and district curriculum. / Uses research-based instructional strategies that address the full range of cognitive levels. / Demonstrates flexibility and responsiveness in adjusting instruction to meet student needs. / Engages students in varied experiences that meet diverse needs and promote social, emotional, and academic growth. / Connects students' prior knowledge, life experiences, and interests in the instructional process. / Uses available resources, including technologies, in the delivery of instruction.
5.	***Uses a variety of methods to monitor student learning.*** Aligns classroom assessment with instruction. / Communicates assessment criteria and standards to all students and parents. / Understands and uses the results of multiple assessments to guide planning and instruction. / Guides students in goal setting and assessing their own learning. / Provides substantive, timely, and constructive feedback to students and parents. / Works with other staff and building and district leadership in analysis of student progress.
6.	***Demonstrates competence in classroom management.*** Creates a learning community that encourages positive social interaction, active engagement, and self-regulation for every student. / Establishes, communicates, models, and maintains standards of responsible student behavior. / Develops and implements classroom procedures and routines that support high expectations for student learning. / Uses instructional time effectively to maximize student achievement. / Creates a safe and purposeful learning environment.
7.	***Engages in professional growth.*** Demonstrates habits and skills of continuous inquiry and learning. / Works collaboratively to improve professional practice and student learning./ Applies research, knowledge, and skills from professional development opportunities to improve practice. / Establishes and implements professional development plans based upon the teacher's needs aligned to the Iowa Teaching Standards and district/building student achievement goals.
8.	Fulfills professional responsibilities established by the school district. Adheres to board policies, district procedures, and contractual obligations. / Demonstrates professional and ethical conduct as defined by state law and individual district policy. / Contributes to efforts to achieve district and building goals. / Demonstrates an understanding of and respect for all learners and staff. / Collaborates with students, families, colleagues, and communities to enhance student learning.

APPENDIX B. SURVEYNSTRUMENT, COVER LETTER, AND RESPONSES CODES

Perceptions of Secondary School Level Agriculture Teachers Regarding Effectiveness of Teacher Education Programs in Preparing Teachers

The following survey is an effort to investigate agricultural education secondary level teacher perceptions regarding effectiveness of teacher certification programs in addressing standards and criteria or competencies and some subject content areas during teacher preparation. The survey will also find out if there is relationship among teacher perceived level of program effectiveness, influence of professional development activities and some demographic characteristics.

Your answers in this survey are confidential.

Part 1: Effectiveness of Teacher Education

Teaching Standards and Criteria /Competencies

1 = Ineffective (I): 2= Least Effective (LE): 3 = Moderately Effective (ME): 4 = Effective (E): 5 = Very Effective (VE)

Directions: Reflect on your agricultural education undergraduate teacher education program. Read each statement and select the level of effectiveness of teacher program in addressing the statement.

How effective do you think the undergraduate agricultural education teacher certification program prepared you to:	1	2	3	4	5
1) Provide evidence of student learning to students, families and staff.	1	2	3	4	5
2) Implement strategies supporting student, building, and district goals.	1	2	3	4	5
3) Use key concepts, underlying themes, relationships, and different perspectives related to the content area					
4) Use knowledge of student development to make learning experiences in the content area meaningful and accessible for every student.	1	2	3	4	5
5) Use students achievement data, local standards and the district curriculum in planning for instruction					
6) Communicate high expectations for social, behavioral, and academic success of all students.	1	2	3	4	5
7) Align classroom instruction with local standards and district curriculum.	1	2	3	4	5
8) Use research-based instructional strategies that address the full range of cognitive levels.	1	2	3	4	5
9) Align classroom assessment with instruction.	1	2	3	4	5

10)	Communicate assessment criteria and standards to all students and parents.	1	2	3	4	5
11)	Create a learning community that encourages social interaction, active engagement, and self-regulation for every student.	1	2	3	4	5
12)	Create, establish, communicate, model, and maintain standards of responsible student behavior.	1	2	3	4	5
13)	Demonstrate habits and skills of continuous inquiry and learning.	1	2	3	4	5
14)	Work collaboratively to improve professional practice and student learning.	1	2	3	4	5
15)	Adhere to board policies, district procedures, and conceptual obligations.	1	2	3	4	5
16)	Demonstrate professional and ethical conduct as defined by the state of Iowa and individual district policy.	1	2	3	4	5
17)	Demonstrate the ability to enhance academic performance and support for the implementation of the school district student achievement goals.	1	2	3	4	5
18)	Demonstrate competence in content knowledge appropriate to the teaching position.	1	2	3	4	5
19)	U se strategies to deliver instruction that meet the multiple learning needs of students.	1	2	3	4	5
20)	Use a variety of methods to monitor student learning.	1	2	3	4	5
21)	Demonstrate competence in classroom management.	1	2	3	4	5
22)	Engage in professional growth.	1	2	3	4	5
23)	Fulfill professional responsibilities established by the school district.	1	2	3	4	5
24)	Teach Agricultural Business and Economics	1	2	3	4	
25)	Teach Plant Science	1	2	3	4	5
26)	Teach Soil Science	1	2	3	4	5
27)	Teach Animal Science	1	2	3	4	
28)	Teach Natural Resources and Ecology	1	2	3	4	5
29)	Teach Food Science	1	2	3	4	5
30)	Teach Agricultural Mechanics	1	2	3	4	5

Part 2: Importance in your current teaching

Directions: Reflect on your agricultural education undergraduate teacher education program. Read each statement and select the level of effectiveness of teacher program in addressing the statement.

1= Not Important; 2= Slightly Important; 3= Moderately Important; 4 = Very Important

How Important in your teaching do you think	1	2	3	4
31) Providing evidence of student learning to students, families and staff.	1	2	3	4
32) Implementing strategies supporting student, building, and district goals.	1	2	3	4
33) Using key concepts, underlying themes, relationships, and different perspectives related to the content area				
34) Using knowledge of student development to make learning experiences in the content area meaningful and accessible for every student.	1	2	3	4
35) Using students achievement data, local standards and the district curriculum in planning for instruction				
36) Communicating high expectations for social, behavioral, and academic success of all students.	1	2	3	4
37) Aligning classroom instruction with local standards and district curriculum.	1	2	3	4
38) Using research-based instructional strategies that address the full range of cognitive levels.	1	2	3	4
39) Aligning classroom assessment with instruction.	1	2	3	4
40) Communicating assessment criteria and standards to all students and parents.	1	2	3	4
41) Creating a learning community that encourages social interaction, active engagement, and self-regulation for every student.	1	2	3	4
42) Creating, establish, communicate, model, and maintain standards of responsible student behavior.	1	2	3	4
43) Demonstrating habits and skills of continuous inquiry and learning.	1	2	3	4
44) Working collaboratively to improve professional practice and student learning.	1	2	3	4
45) Adhering to board policies, district procedures, and conceptual obligations.	1	2	3	4
46) Demonstrating professional and ethical conduct as defined by the state of Iowa and individual district policy.	1	2	3	4
47) Demonstrating the ability to enhance academic performance and support for the implementation of the school district student achievement goals.	1	2	3	4
48) Demonstrating competence in content knowledge appropriate to the teaching position.	1	2	3	4
49) Demonstrating competence in planning and preparing the instruction	1	2	3	4
50) Using strategies to deliver instruction that meet the multiple learning needs of students.	1	2	3	4

51) Using a variety of methods to monitor student learning.	1	2	3	4
52) Demonstrating competence in classroom management.	1	2	3	4
53) Engaging in professional growth.	1	2	3	4
54) Fulfilling professional responsibilities established by the school district.	1	2	3	4

Part 3a: Activities for professional development of teachers

Check "Yes" for participation and "No" for no participation.

	Professional development activities- participation	Did you participate? Yes	No
55	Local school mentoring program	Yes	No
56	Information by other teacher (s) in your discipline	Yes	No
57	On-the-job experience	Yes	No
58	Formal local school performance evaluation program	Yes	No
59	Self-directed study in self interest area(s) (e.g. reading, internship, etc)	Yes	No
60	Graduate courses	Yes	No
61	District in-service	Yes	No
62	Professional organization in-service e.g. IAAE, conference)	Yes	No
63	Assistance from Iowa Department of Education	Yes	No
64	Materials acquired from the Internet	Yes	No

Part 3b: Professional development activities- influence

1= No Influence: 2= Slight Influence: 3= Moderate Influence: 4= Strong Influence

Select the level of influence each activity had on improving your professional development in teaching

65	Local school mentoring program	1	2	3	4
66	Information by other teacher (s) in your discipline	1	2	3	4
67	On-the-job experience	1	2	3	4
68	Formal local school performance evaluation program	1	2	3	4
69	Self-directed study in self interest area(s) (e.g. reading, internship, etc)	1	2	3	4
70	Graduate courses	1	2	3	4
71	District in-service	1	2	3	4
72	Professional organization in-service e.g. IAAE, conference)	1	2	3	4
73	Assistance from Iowa Department of Education	1	2	3	4
74	Materials acquired from the Internet	1	2	3	4

Part 4: Teachers perceptions (Qualitative data)

1. Describe three areas you perceive to be the strengths of the agricultural education teacher certification program in addressing the standards during teacher preparation.

2. Suggest standards you think should be improved to strengthen the agricultural education teacher certification program of preparing teachers.

3. Indicate whether standards in teacher certification program are useful or not useful in preparing teachers.

4. Which one do you perceive more effective in preparing teachers: college preparation or professional development activities you attend during teaching? Why?

5. Do you think the subject content offered during your teacher education program is important in your teaching?

Yes No

Part 5: Teacher Demographic characteristics

Check or fill in your response in the space provided.

Characteristics		
1. Gender?	□ Male	□ Male
2. What year did you receive teacher certification?	-------Years	
3. Where did you receive your Bachelor of Science degree?	□ Iowa Sate University □ Northwest Missouri State □ Other- please specify--------	
4. What year did you receive your Bachelor of Science degree?	-------Year	
5. Years of teaching experience including this year.	…….Years	
6. What was your final GPA at graduation?		
7. Were you a member of FFA in high school?	□Yes	□No
8. What is your highest degree you attained in FFA?	□ None □ Chapter degree □ State degree □ American Degree	

Thank you

Survey Cover Letter

Date 2/6/2007

Dear Teacher of Agricultural Education:

The implementation of standards or competencies is a part of teacher certification programs across the country. For example, in 2001 a set of "eight standards and forty-two criteria" became part of the teacher education program requirements in Iowa. Currently, there is limited research on effectiveness of teacher certification programs addressing standards or competencies. The purpose of this survey is to learn about effectiveness of teacher education programs addressing standards during teacher training. This letter, therefore, requests your cooperation to participate in this teacher education program effectiveness survey. The survey involves agricultural education teachers who started teaching in secondary schools in the state of Iowa a few years ago.

The survey is voluntary and you may decide not to participate. The completion of this survey should take you approximately 10-15 minutes. The second e-mail you will receive from us will provide you with the link to access the survey on-line. To ensure confidentiality of your identity, the survey automatically assigns you a unique code that will be used instead of your name and the code will be kept with the data.

We appreciate your time and the fact that you will contribute to our understanding of teacher education programs of agricultural education. In case you have any questions regarding this survey feel free to call us at 515-294-0895 or send an email to khulela@iastate.edu [Keba Hulela or wwmiller@iastate.edu [Wade Miller].

Thank you for participating in this survey

Sincerely,

Keba Hulela
Graduate Student

W. Wade Miller
Professor

Response Codes

Codebook # 1

CODES
IFKC: Information/Facts/ Knowledge/ /Concepts/ /Rule/
PT: Process/Thinking/
DDEP: Doing/Demonstration Experiential /Practical-Practice/action/

==========

Open-Ended Responses from teachers	Codes created
1)	NO RESPONSE
2) Communication Leadership Public relations	**IFKC; IFKC;IFKC**
3)	NO RESPONSE
4)	NO RESPONSE
5) Methods class with W. Miller was good, ability to take courses from other areas (hort, agron, ast)	**IFKC:**; **DDEP:**
6) Information about developing units of instruction. Early field based experience. Community built among Ag Ed majors	**IFKC DDEP;IFKC:**
7) Content knowledge Hand-On applications for students Professional ethics	**IFKC;DDEP: PT**
8) Strong content knowledge Importance of professional development Variety of learning tools	**IFKC; IFKC; IFKC**
9) Communication-parents, other teachers and administration. Providing an effective classroom environment Content knowledge	**COMM; DDEP: IFKC;**
10) Philosophy of ag education ethics of an ag teacher agEds 402 with dr. miller (wade)- was the most down to earth and realistic agEds class we had, many of the other were filled with too much fluff and focused on stuff that is a minute part of teaching.	**IFKC; IFKC;**
11)	NO RESPONSE
12)	NO RESPONSE
13) #NAME?	NO RESPONSE
14)	NO RESPONSE
15) I think that you prepare us well for teaching content areas. There is a lot of that you must also do on your own.	**IFKC; DDEP: PT:**
16) Background information on writing lesson plans. Student teaching with qualified teachers. Feedback from the college on requirements and licensure programs. Knowing what the options are.	**IFKC;DDEP: PT:**
17) The student teaching experience, multicultural education, and lesson planning.	**DDEP: IFKC;DDEP**
18)	NO RESPONSE
19) 1. Teaching Resource Suggestions have been helpful. No others.	**IFKC**
20)	NO RESPONSE

Open-Ended Responses from teachers	Codes created
21) using standards and benchmarks presentation strategies marketing of ag programs	**DDEP; DDEP;IFKC**
22)	NO RESPONSE
23)	NO RESPONSE
24) 1 The setting up of a program (Core components) 2 Presentation Strategies 3 Animal Science area	**DDEP:; DDEP; IFKC**
25) The course with Dr. XX that required us to look at competencies and standards to plan for a class was most valuable. The advisors at ISU were always encouraging us to participate/communicate with others to learn about our profession to improve our skills. We were well taught how to integrate technology into our teaching and our own development.	**DDEP: IFKC; PT:**
26) Interpreting and planning for school data.. including the yearly report. Prepare us for SAE's!!! ahhhhhh!	**DDEP; DDEP;IFKC**
27)	NO RESPONSE
28) Content Knowledge, FFA Involvement, Programs set up and standards	**IFKC;DDEP; IFKC**
29) I think they do a good job of helping very assessment techniques. I feel they do a good job of promoting professional development. I also feel they do a good job of talking about ways to implement different strategies	**IFKC; IFKC; IFKC**
30)	NO RESPONSE
31)	NO RESPONSE
32)	NO RESPONSE
33) Diversity	
34)	NO RESPONSE
35) Preparing a community to support an Agricultural Program. Looking for community support. Following the national ag ed standards.	**DDEP; PT: PT:**
36) 1) Strong Science base university wide 2) Lots of classes in lots of areas from which to choose 3) Large campus with a TON of leadership opportunities Weakness- XX	**DDEP;DDEP;DDEP**
37) Student Teaching Standards and Benchmarks Talking about sequential units	**DDEP; IFKC; IFKC**
38) Staff help and experience, learning to put together a portfolio, collaborating with classmates for ideas.	**DDEP: DDEP: DDEP:**
39) planning lessons base knowledge in areas professionalism	**DDEP;IFKC**
40) I don't know if I have any.	OTHER
41) 1. Brought in other ag teachers to talk about their programs and how they began. 2. Good placement of student teachers. 3. Good requirements for the 40 hours before student teaching.	**DDEP:: DDEP: IFKC;**
42)	NO RESPONSE
43)	NO RESPONSE

Open-Ended Responses from teachers	Codes created
44) Student achievement, life skills with students through FFA, etc., helps with different learning styles	OTHER? **DDEP; IFKC;**
45) Providing teacher with a copy of the ag ed standards examples. theory behind the standards portfolio examples	**DDEP; IFKC; PT:**
46)	NO RESPONSE
47)	NO RESPONSE
48)	NO RESPONSE
49) ISU prepared us with good information on applying for our license. Sending out our instructors to observe our teaching was beneficial while student teaching.	**IFKC; DDEP:**
50) Since I did not attend ISU I won't answer this one but I think that the student teachers I have worked with have a good idea of how to teach but they don't know how to determine what should be taught in a unit. They are not sure of this and experience will help but maybe giving them a curriculum and asking them to develop a unit for that curriculum and then bring in a teacher who does that and see what suggestions they would give the students and why.	**PT;**
51)	NO RESPONSE
52) All of placement time at one school	OTHER
53) I have a wide understanding of the 8 teaching standards that our school district follows closely. I feel that the teacher program does a good job preparing students for discipline issues, issues communicating with parents and a solid content knowledge of courses they will teach.	**IFKC; IFKC;IFKC**
54) 1) Development of content knowledge in traditional agriculture (with exception to Ag Mechanics). 2) Understanding and maintaining a level of professionalism in the program. 3) Participating in professional development organizations and activities.	DDEP;**DDEP;DDEP**
55) Content knowledge Student Teaching (being able to go where you want) Professional Growth	**IFKC;DDEP: PT;**
56) Creating Standards & Benchmarks and creating sequential units within specific career clusters. Using technology in instruction. Providing evidence of student learning to community, parents and staff.	**DDEP: PT; PT;**
57)	NO RESPONSE
58)	NO RESPONSE
59)	NO RESPONSE
60)	NO RESPONSE
61) Content areas	**IFKC;**
62) I can't answer this because I graduated before the standards was implemented.	OTHER

Question # 2 - Codebook # 2 Open-Ended Response

1) Ag Mechanics
2)
3)
4) More 'how to' type of education. Mechanics, Labs, student management. Horticulture
5) Courses on how to teach subject material to high school students. More experiences where students teach in front of peers.
6) Special ed needs classroom management assessments
7) CLASSROOM MANAGEMENT AG MECHANICS Curriculum mapping
8) Do not know for sure.
9) teaching 'standards' is the biggest turn off for people in the education field. do not teach the standards, teach with standards!!!!! That's what teaching is anyway in high school. you should not teach to meet a standard, but rather, teach and meet the standard. this is my personal opinion. standards are not 'pushed' all that big by administrators as we all have too much on our plates and we do it because we have to. a principal told me once- i don't need a portfolio to see your meeting standards- i'll know if your not teaching what is important.
10)
11)
12) -more content knowledge opportunities -improve 'teaching' methodology - focus on strategies to include all learning styles and special needs students - introduce new collaboration required by state for special ed. programs -including brain-based learning
13)
14) Teaching more about standards and benchmarks, teaching strategies for all types of learners, and reading strategies for students. Also, they need to understand the importance of professional organizations better.
15) The content areas are nice, but it would be better for the ag ed students to take specialized content classes where they learn the material and then have to adapt that material to be taught to high school/middle school classes. Give the ag ed students more prepared lessons and 'toolbox' material to use in classrooms where other resources are not available.
16) There needs to be classes offered in small engines and metals offered. I would also with there would have been a class on greenhouse maintenance, and a class teaching us about the FFA (how to fill out an Iowa Degree, Proficiency Award, etc)
17)
18) More collaboration with other Ag teacher and core curriculum teachers to integrate more.
19)
20) more FFA instruction needs to take place discipline management ag mechanics presentation strategies of specific topics
21)
22)
23) Ag Mechanics School policies and procedures School Law
24) We learn knowledge about topics (plants, animals, business) and we learn methods of teaching...but we are left on our own to connect the two. This can be difficult. Why not demonstrate for us how to teach effectively as we learn these topics ourselves vs always learning through lecture? (Whole college problem...not just Ag Ed.) Make a consistent effort to prepare us to teach in all career cluster areas - not just the sciences. I learn best from experience...we needed more before we landed careers. Provide/Require more classroom time in the certification program.
25) Building and district goals
26) I think teachers need a lot of work with the standards and benchmarks before going into the profession and we definitely DO NOT receive any of that in the program. Teachers also need more in the classroom time before beginning student teaching. If someone decides they do not want to teach it is a little late in their college career to change professions. Students also need more time in lesson planning before going out to student teach.
27) Different learners, Classroom management, Ag Mech,
28) AGRICULTURAL MECHANICS we didn't have any and now I am teaching a small gas engines class!!!! More information on food science would also be helpful. Also, learning to implement standards and benchmarks is huge at schools
29) Developing student inquiry materials for the classroom. Stay current on technical changes in agriculture.

30)
31) Need to have classes on how to actually teach plant science, animal science, MECHANICS, etc.
32) Ag Mechanics. Most schools are losing or have lost any of that. It needs to taught more. Contract negotiations. Most grads have no skill or idea that they can do it and how to do it.
33)
34) Preparing a community to support an Agricultural Program. Looking for community support. Following the national ag ed standards.
35) SHOP! MECHANIC STUFF! WELDING, TORCHES, PLASMA CUTTERS. More curriculum material/lesson plans etc. Stuff we will actually use. More FFA contest participation. More practice in Administrator Husbandry
36) Shop experience Getting ready for fairs and FFA activities
37) Teaching Ag Mech, Ag Business and how to get information to students in an interesting manor.
38) modifications for IEP students
39) Go over in more detail. Discuss specifically how the standards are to be reflected in our programs. Give examples for each of the 42 criterion.
40) 1. What is a Career Experience in Agriculture? No one knows what that is in the actual ag teaching world. 2. Not enough time in a classroom before student teaching. 3. More 'real-life' teachers to talk about their start-outs.
41) Student teachers should be at the school for an entire semester.
42)
43) Need ag mechanics at ISU
44) More time spent on how to create your own local standards Three sequential units discussion
45)
46)
47)
48) More instruction in particular curriculum areas such as instruction in Agriculture Mechanics (Shop set-up, running tools, safety, projects) Require us to prepare MORE specific lesson plans and especially in all areas an Agriculture Educator may teach (Horticulture, Ag Mech, Leadership, Agronomy, Business) Require us to have more observation time in classrooms to pick up different styles of teaching and discipline.
49) More time spent in the classroom, experience is invaluable!! I really feel that all student teachers should start teaching when the school year or semester starts with the school they are working with and it should end at the end of the school's semester/year or within a few weeks of it. It would allow the students to see what happens in the first few weeks and give them more of an idea of what you need to do and what needs to happen.
50)
51) More time in the field
52) I think that there should be a higher level of agricultural mechanics to help teachers prepare for what some school might offer. I also believe that there should be some science courses offered to complete the certification for teachers who are currently teaching.
53) 1) Content knowledge in Ag. Mechanics 2) Teaching strategies related to the content knowledge. For example--students take Animal Science 114 at ISU, there should be a corresponding course call 'Teaching Animal Science' where teacher ed students learn how to develop and deliver units of instruction to middle and high school students in that content area.
54) Ag Mechanics
55) Articulation Agreements Classroom Management
56) Ag Mechanics More emphasis on FFA such as CDE's etc.
57) Content areas - Ag mechanics, construction.... I don't understand how you can be licensed in these areas but do not have classes directed in how to teach. I think overall these should be classes on how to teach all the different areas we are supposed to be able to teach
58)
59)
60) How to deal with problem students and parents
61) teaching ag mech. better prep for all the extra district stuff that goes with it.
62)

Question # 3 – Codebook #3 Open-ended response

1) Ag Mechanics
2)
3) Not useful whatsoever. was not applicable to day-to-day teaching in Agriculture. Learned more in actual student teaching.
4) Useful if they are linked to the Ag Ed courses.
5) yes
6) Yes, because all teachers need to meet the same standard and be trained somewhat uniformly.
7) Useful, there needs to be some type of guide or set of rules to work through. These standards provide a base to work and build from.
8) little use, more effort into instructional methods (i am a big fan of CRISS strategies) and more input to differentiation in a mixed ability classroom. also maybe teach how to communicate with parents better. Also if there is 6 (or seven, depending on how you look at it) service areas of ag- ISU needs to better teach students how to prepare and teach for all 6 areas of the instruction. one thing that I am still upset about at ISU is ag mechanics, i know it has been 'addressed' but i think it is still in a poor manor just to keep me quiet. my favorite story from ISU was when i took small engines class in the AST department, we never met for class, it was all on CD and it was about power and physics, it turns out the professor used the same curriculum for his ag power class too and was getting out of work. i approached the TA and asked why we never touched a small engine or learned the principles for engine operation, and he said, well we figure you already had that in high school. he is right i did have that all in high school, but now i have a different purpose for learning. I then also tried to explain to him that i had English, math, and science in high school too, but i have to take that in college as well.
9)
10)
11) it's good to have something B&W to work towards but reaching standards and benchmarks should not be the entire focus. teachers need to be prepared for real-life situations rather than spend time on paperwork
12)
13) They are useful, but teaching is not easy. There is a lot that you need to just experience and figure out. Each district is different.
14) Some are and some aren't. I feel students completing even more but smaller versions of student teaching would be the most beneficial. The lesson plans are only a small part of teaching anymore and most students even when student teaching don't realize all of the other demands of their professional obligations. Many never even see a contract or master contract to realize what all of their demands are.
15) I wish I could have had more time to student teach at more schools. To get a broader experience.
16)
17) I think they could, I just don't feel I was prepared very well.
18)
19) somewhat useful
20)
21)
22) 22)Ag Mechanics School policies and procedures School Law
23) I don't remember what the standards were...I'm sure there were standards I was taught under...but I don't know/remember them specifically. Yes, the university needs standards to prepare us well...just like we need standards to teach our students well. Most importantly, maybe students should have some say about the level of their understanding in each standard. If students don't think they have something mastered, maybe it should be covered again...in a new way...even if the professor thought it was already covered and students seemed successful.
24) Building and district goals
25) I think teachers need a lot of work with the standards and benchmarks before going into the profession and we definitely DO NOT receive any of that in the program. Teachers also need more in the classroom time before beginning student teaching. If someone decides they do not want to teach it is a little late in their college career to change professions. Students also need more time in lesson planning before going out to student teach.
26) For the most part
27) Some of the standards were very helpful, but some really need to be relooked at
28) The standards are not useful.

29) Definitely useful...that is how your administration will evaluate you
30) Yes...
31) Most are. We still need to center around basics, math-English-science. Ag is not doing enough.
32)
33) Yes I think that it is very useful to teacher. More experience in each of the areas is the down fall. However it is hard to get experiences unless you are just there doing it.
34) no. Not at all. Being taught be teachers that were successful in the real ag teaching world would be great. More time in the classroom prior to graduation.
35) Shop experience Getting ready for fairs and FFA activities
36) yes
37) yes
38) They are very useful, because we are observed and evaluated based on the standards. I didn't feel as prepared as I should have been with things dealing with them..
39) OK
40) Student teachers should be at the school for an entire semester.
41)
42) Need ag mechanics at ISU
43) Yes, they are helpful, considering this is how most teachers are evaluated against
44)
45)
46)
47) More instruction in particular curriculum areas such as instruction in Agriculture Mechanics (Shop set-up, running tools, safety, projects) Require us to prepare MORE specific lesson plans and especially in all areas an Agriculture Educator may teach (Horticulture, Ag Mech, Leadership, Agronomy, Business) Require us to have more observation time in classrooms to pick up different styles of teaching and discipline.
48) More time spent in the classroom, experience is invaluable!! I really feel that all student teachers should start teaching when the school year or semester starts with the school they are working with and it should end at the end of the school's semester/year or within a few weeks of it. It would allow the students to see what happens in the first few weeks and give them more of an idea of what you need to do and what needs to happen.
49)
50) useful
51) I believe that the teaching standard program is a great program and ISU does do a good job with preparing teachers. There is always room for improvement, and as a teacher until you can reevaluate yourself and your program you will never become better. There are any strengths in preparing teachers but we all can do a better job.
52) Useful only if they are practical, enforced, and provide opportunities for those students who do not meet standards to improve and eventually meet them.
53) Yes, since that is what I am evaluated on by my local school district
54) We need something to go off of, so I would say they are useful, but they are very redundant.
55) They are somewhat useful because they give you a outline to go by
56) Standards are important
57)
58)
59) I think we spent so much time on benchmarks and standards that it leaves to little time to prepare and teach.
60) yes because they have to be followed in each district.
61) Somewhat useful.

Question # 4: Codebook 4

1) Professional Development has more content that is immediately useful. College Preparation should focus more on being able to survive teaching Agriculture the first three or four years.
2) Professional development activities; real time experiences where methods have been used and where individuals can practice those methods in front of their peers.
3) professional development because you have experienced the items first hand and now know what you need help with
4) Professional development activities I attend while teaching are much more important to me than my college preparation is. I learned very little about being a teacher while in college and have learned more about what it is to be a teacher from on the job learning.
5) A combination of both. Content and classroom management along with strategies in college. PD as teaching to keep up with the flood of new things coming into play all the time.
6) i find that my workshops, and working with nearby businesses teach me more than prof development inservices do- because i have purpose for learning instead of forcing me to meet a state mandated topic.
7) …
8) …
9) PD activities following graduation because while still in college you don't realize what you don't know.
10) Practical experience gives you an idea which areas you need additional help or info.
11) Professional Development- Newer information, Current research.
12) Both really have helped, probably professional development a little more however.
13) Some of both. However, the professional development activities are more current than my undergrad work, but by having the background, I am better able to understand the theories and realize the name change.
14) college preparation.
15) …
16) College Prep classes!
17) …
18) college forms the basis, professional development builds on the basis after some on the job experience so they are equally important
19) …
20) …
21) In college prep you don't really know what you are going to be teaching, depends on the school's standards and benchmarks. Once you have started teaching you can select workshops that help you build your experiences to make you a better teacher.
22) College Education was better at preparing me for the basics of multiple learning styles and for preparing me on the concepts of ag education/FFA/SAE and their connectedness. Professional development is a waste when it repeats what I already know. But, when professional development shows me how to make my class more interactive or requires me to actually do something to improve my classroom it is more effective.
23) College preparation is very important, but professional development is very helpful now that it is relevant to my experiences.
24) professional development- simply because we have the chance to interact with other teachers in the profession and I believe that they are the best resource that is out there for young, new teachers.
25) Student teaching- most effective- learned 1st hand what works
26) I think the college preparation is more helpful I have not been to a good inservice yet this year
27) college: Beginning teachers need classroom management skills and content knowledge to survive. Few things teach the first item but college gets them the second item.
28) Both are of importance...you need the background from college, but professional development to continue to grow as a teacher is very important
29) professional development - more teacher centered and content oriented
30) Professional development opened doors and you where able to get a different look at things
31) …
32) I think professional development is the best because this is your opportunity to talk to teacher about what they are dealing with and you can get suggestions for things your are struggling with.
33) Both play an integral roll in the preparation of teachers. Both have a TON of potential in developing teachers, but only when implemented correctly.
34) Professional development activities because you can talk to people who actually use different strategies in their classrooms and figure out what might work for you.
35) college preparation for content knowledge

36) prep ahead of time is good, but some professional development opportunities have been very helpful.
37) Both--they are both lacking different things. Between the two of them, they both prepare about the same. However, there are a lot of things that nothing prepared me for and I became aware of things on my own--sometimes in not so fun ways.
38) College preparation, but there needs to be some major changes to the program.
39) College prep is more effective
40) …
41) Both. You need to have a foundation in the teaching skills (college) and the professional development helps hone those skills as well as showing new information, etc.
42) College prep- student teaching Professional development in that you can pick the areas that you feel weak in and start to strengthen them.
43) …
44) …
45) …
46) College Preparation will help you survive the first year. Professional Development throughout your years will help you make changes and keep you learning new stuff.
47) Both of equal importance. You learn a lot of the why's in college and he how's in professional development activities.
48) …
49) professional development...teaching and agriculture are always changing which makes it more important to have continuing education in our field
50) I have found that Teacher Preparation has given me a solid underlining so I can teach many areas effectively. I have found that Professional development offered in mini courses, semester courses or event workshops that have helped me become a better teacher. I feel that the best way to become better is to have teachers site down and learn from each other. One thing I really enjoy about NICC is they offer courses that are directed towards ag teachers to make them better and it is discussion formatted with sharing of ideas among fellow teachers. If everyone shares their best teaching tools and ideas, everyone will benefit. We should not worry about who is the best but what can I learn from other people.
51) Difficult to choose one over the other. College preparation far exceeds professional development activities in terms of content knowledge. However the reverse is true when it comes to teaching strategy and delivery of that content.
52) Professional development activities that I have attended as a teacher. College preparation did a lot to get me where I am, but it is nothing compared to being with other people in our profession to get new ideas & learn what should be done in a program. Both are important, but professional development is more important to me now.
53) College preparation, specifically student teaching. This is because professional development is usually thrown together by staff last minute, and teachers have lots of other things on their mind. I would recommend more classroom time early on in college for students to actually experience teaching before it is too late to change majors.
54) Neither. Student teaching was my best preparation. Our school inservices are a waste of time. They waste time on stuff that we never use and then don't give us time to work on things they expect us to do like portfolios etc.
55) I believe both are important in developing the overall person through out life.
56) …
57) …
58) college preparation
59) college prep because 'professional development' in the schools changes so often and you only take what fits.
60) College preparation. So much of local professional development is just repeating what was covered by college courses.

APPENDIX C. HUMAN SUBJECTS APPROVAL

IOWA STATE UNIVERSITY

Institutional Review Board Office of Research Assurances Vice Provost for Research 1138 Pearson Hall Ames, Iowa 50011-2207

515 294-4566 FAX
515 294-4267

DATE: 12 December 2006

TO: Keba Hulela

FROM: Office of Research Assurances

RE: **IRB ID** 06-625 **STUDY REVIEW DATE:** 6 December 2006

The Institutional Review Board has reviewed the project, "Perceptions of Secondary School Level Agriculture Teachers Regarding Teaching Standards and Criteria in the State of Iowa" (IRB ID 06-625 and has declared the study exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101 (b)(1). The applicable exemption category is provided below for your information. Please note that you must submit all research involving human participants for review by the IRB. Only the IRB may make the determination of exemption, even if you conduct a study in the future that is exactly like this study.

The IRB determination of exemption means that this project does not need to meet the requirements from the Department of Health and Human Service (DHHS) regulations for the protection of human subjects, unless required by the IRB. We do, however, urge you to protect the rights of your participants in the same ways that you would if your project was required to follow the regulations. This includes providing relevant information about the research to the participants.

Because your project is exempt, you do not need to submit an application for continuing review. However, you must carry out the research as proposed in the IRB application, including obtaining and documenting (signed) informed consent if you have stated in your application that you will do so or required by the IRB.

Any modification of this research must be submitted to the IRB on a Continuation and/or Modification form, prior to making any changes, to determine if the project still meets the Federal criteria for exemption. If it is determined that exemption is no longer warranted, then an IRB proposal will need to be submitted and approved before proceeding with data collection.

Exempt Category

(1) Research conducted in established or commonly accepted education settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

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