PREPARATION TO TEACH AGRICULTURAL MECHANICS: A QUALITATIVE CASE STUDY OF EXPERT AGRICULTURAL SCIENCE AND TECHNOLOGY TEACHERS IN TEXAS

A Record of Study

by

RICHARD KIRBY FORD

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

December 2005

Major Subject: Agricultural Education

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Approved by:

Co-Chairs of Committee,	Glen E. Shinn
	David E. Lawver
Committee Members,	Timothy H. Murphy
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ABSTRACT

Preparation to Teach Agricultural Mechanics: A Qualitative Case Study of Expert Agricultural Science and Technology Teachers in Texas.

(December 2005)

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Since federal legislation in 1917 and the widespread program growth in the 1930's, agricultural mechanics has been a major part of the high school agricultural science and technology curriculum. Local programs integrated individual problem -solving, practical applications of mathematics and technical science skills in to the curriculum. However, recent financial constraints and a perceived lack of interest have led to reductions in course offerings in agricultural mechanics in some universities that are responsible for the maintenance and future of the disciplinary area. These curricular issues gave rise to a research problem examining the perspectives of successful agricultural science and technology teachers of agricultural mechanics and the education and experiences that were associated with their success. This study used qualitative measures to identify factors that enabled certain agricultural science and technology teachers who were more noted in teaching of agricultural mechanics to be more successful than their peers. It examined factors that motivated teachers to excel and examined the influences that determined what portions of the curriculum were included or deleted. Finally, this study focused on the

recommendations of experts regarding improvements for future teaching of high school agricultural mechanics. Data were collected, analyzed, and reported using accepted a qualitative protocol to develop emergent themes.

Successful agricultural science and technology teachers agreed that their undergraduate course work did not adequately prepare them to teach the current curriculum. Unanimously, the respondents expressed a concern for the lack of depth, scope, and technical skills in agricultural mechanics currently being taught to future agricultural science teachers. This concern for the pre-service curriculum led teachers to agree that the three-week agricultural mechanics certification workshop is essential for successful instruction of agricultural mechanics. Furthermore, teachers espoused a formal mentoring program to aid the professional development of agricultural science and technology teachers. The respondents alluded to the need for more quality workshops on the part of the Texas Education Agency, the VATAT professional organization and the agricultural education community as a whole to improve the quality, scope, depth, and technical skills in the instruction of Agricultural Science and Technology in the high schools of Texas.

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Any successful individual endeavor beyond the status quo for a particular profession requires some intense motivation and spark to promote it. I would like to thank Dr. Bill Long and Dr. Billy Harrell for providing that spark in my career. Their extreme passion for teaching in the field of agricultural mechanics definitely motivated me to make this attempt.

Certainly, my fellow members of Cohort '04 are to be commended for their enthusiasm and friendship through it all. A special note of thanks goes to Michael Womack for his support and encouragement. To the faculty and staff of Texas A&M University and Texas Tech University agricultural education departments, thanks for the support, effort, and vision to make such a program as this possible.

Last but not least, I must thank my family. To my loving wife, Robin, thank you for the encouragement, support, and assistance throughout the program. Finally to the boys John, Alan, and Will for their acceptance and understanding as this endeavor has and will continue to change their lives.

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CHAPTER I

INTRODUCTION

"Agricultural teacher educators have experienced significant pressure over the past 15 years to reform the process by which the teachers are prepared in the profession" (McLean and Camp, 2000, p. 25). Twelve teacher education programs in Texas offer course work designed to prepare teachers to instruct within the area of agricultural mechanics. These universities provide encouragement, advice, and expertise after graduation; yet many teachers refuse to attempt instruction in the field of study, or delete or omit units from course content to match their own knowledge and skill levels. Though this phenomenon occurs across all levels of experience, it is extremely obvious in the younger generation of agricultural science and technology teachers, obviously compounded by a reduction of required instruction in agricultural mechanics during the degree program. "Research has shown that those teachers new to or preparing for the agricultural teaching profession often express anxiety for and a lack of preparedness to teach agricultural mechanics subject matter"(Hubert and Leising, 2000, p.18).

The passage of Texas HB 72 (1984) brought changes to the curriculum and course content, as well as demanding accountability. Previously integrated into a four grade-level classification oriented curricula, agricultural mechanics units became nine stand-alone semester courses. After several years of teaching or monitoring these courses, it

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This record of study follows the style and format of the *Journal of Agricultural Education.*

was evident to teachers and college faculty alike, that not all of the content of each course were included in normal instruction. Current Texas agricultural science and technology teachers are expected to provide basic skills and knowledge in a broad range of topics. Units of instruction and course content vary from very basic in the Introduction to Agricultural Mechanics, to intense content areas in such courses such as Metal Fabrication, Agricultural Structures, and Agricultural Electronics.

Statement of Problem

Many young or beginning agricultural science and technology teachers hesitate to attempt or successfully teach units of the prescribed agricultural mechanics curriculum. Persistent observation in the community of practice exposes several themes alluding to a lack of basic understanding of the curriculum, and a lack of confidence to teach some of the basic skills in agricultural mechanics seem to exist. This perception was best illustrated by, "numerous studies indicated that teacher knowledge of agricultural mechanics was in need of improvement both prior to and after accepting teaching positions" (Hubert and Leising, 2000, p.18). Several experienced agricultural science and technology teachers were observed during a computer record book workshop. The workshop was conducted on a South Texas high school campus and directed by a current agricultural education or agricultural mechanics professor from a nearby university. During the workshop, the observer realized through comments made by participants that most of the teachers in attendance did not previously know how to instruct students to enter skill activities in an FFA record book. These teachers had not required their students to perform many of the

skills recommended for completion of several agricultural mechanics related courses. These experienced agricultural science and technology teachers admitted they had not used their student's SAE achievements in agricultural mechanics courses effectively to help those students obtain degrees within the FFA. Many teachers expressed a concern and hesitation to attempt many skills recommended for completion of the agricultural mechanics pre-lab, and expressed a concern that they were not confident enough to allow their students to participate in the FFA Agricultural Mechanics Career Development Event (CDE).

Furthermore, this lack of confidence and hesitance to attempt many skills recommended in the agricultural mechanics curriculum were found while researching the previous Career Development Event results. Young or inexperienced agricultural science and technology teachers do not successfully prepare students for the rigor of the event. Upon review of the 2003 FFA Agricultural Mechanics CDE results on-line (CDE & On-line Registration & Results, Texas FFA, n. d.) this researcher noted that more competitive teams in the event (i.e., those in the top six placings) were coached by very experienced teachers. When cross-referenced with the Vocational Agriculture Teachers Association of Texas (VATAT Directory, 2003) membership handbook, teachers that were most competitive in the latest agricultural mechanics CDE had an average of 23.8 years of tenure. The coaches of the top six teams in the event had a minimum of sixteen years teaching experience and a maximum of thirty-two years of tenure. (VATAT Directory, 2003). Hence one can conclude not only are the young instructors hesitant to attempt the CDE, but that it obviously takes several years teaching experience for an instructor-coach

to learn enough of the discipline himself or herself to be able to convey it to students at a competitive level. Apparently, the current agricultural science and technology teachers are both ill prepared to teach effectively in the agricultural mechanics realm and reluctant to attempt many activities to enhance their student's education in the field.

Several research studies concluded that teachers are least competent in agricultural mechanics content when compared to other fields of study taught in high school agricultural sciences (Baker and Malle, 1995; Hubert and Leising, 2000; McLean and Camp, 2000). Historically, teachers were hesitant to attempt many activities in class to justify coverage of the essential knowledge and skills within the curriculum because they felt inadequate to teach or to demonstrate the skill. Furthermore, the agricultural science and technology teachers exhibited great anxiety when allowing their students to compete in the agricultural mechanics CDE because they felt those students were unprepared. More research is needed to verify this lack of competence and confidence in the field of teaching agricultural mechanics.

Using the opinions of successful teachers, is the present pre-service curriculum, scope and sequence of collegiate courses, and current in-service and professional development activities preparing agricultural science and technology teachers for success in teaching agricultural mechanics?

Theoretical Framework

Some teachers are very confident and competent in their instructional abilities in agricultural mechanics. Therefore, this researcher assumed a very pragmatic approach to the research questions. First, pragmatists view experience and reasoning as major sources of knowledge. Second, in an inquiry research design the outcomes are useful to illuminate different aspects of the stated or desired reality (Driscoll, 2000). The reality being that some teachers, with the same basic education and preparation, are more successful than are their peers in the instruction of agricultural mechanics in a high school curriculum. Consequently, a systematic qualitative inquiry research approach should recognize reasons for those successes. This research was designed to identify the reasons for teacher success among current agricultural mechanics instructors and to obtain consensus among successful teachers concerning thoughts on how to better prepare future teachers to instruct in a technical discipline.

Research Questions

Research Question 1. What education and experiences enable certain teachers to develop successful agricultural mechanics programs? This question identified what formal education and related experiences teachers would credit for their recognized success in teaching agricultural mechanics, be it formal education, previous course work experience, post-graduate workshops or study, or a combination of the mentioned experiences.

Research Question 2. What influences teachers to instruct in the portion of the agricultural mechanics curriculum they do teach? Recognizing that some units of

instruction are not attempted or taught within the curriculum, this question attempted to clarify why some teachers delete or omit units from their instructional program.

Research Question 3. What steps should the agricultural education community engage in to insure quality instruction in the agricultural mechanics discipline in the future? This question probed the ideas, perceptions, and recommendations of experts necessary for improved performance in teaching agricultural mechanics in the future.

Assumptions

This researcher established several assumptions during the planning and implementation of the research project. First, through a personal interview process that recognized, successful instructors would honestly and completely reveal experiences and events that helped mold their teaching performance. Second, a sample size of 19 would achieve the necessary saturation of data for sound qualitative research (Lincoln and Guba, 1985). Third, that the researcher's interpretation of data through transcribed interviews and member checks would accurately reflect the respondents' thoughts and experiences.

Delimitations

This study was delimited to include recognized, successful instructors of high school agricultural mechanics throughout the state of Texas, with no regard for geographic region, ethnicity, or gender. Personal interviews at various locations convenient to the respondents and member checks were conducted at respondent's convenience.

Limitations

Successful experiences and events leading to the recognition of high school teachers of agricultural mechanics are defined in the definition of terms. Successful instruction in the agricultural mechanics portion of agricultural science and technology curriculum included 1) the success in the FFA CDE preparation, 2) increased enrollment in courses, and/or 3) the implementation of new courses. Therefore, this study was limited to those individuals recognized as successful with five or more years of teaching experience. Teaching experience included instruction in the general agricultural mechanics pre-employment laboratory, instruction in several other agriculturally related courses, and/or consistent success in the FFA Agricultural Mechanics Career Development Event or Tractor Technician Career Development Event

Definition of Terms

Agricultural Mechanics. The teaching of any one of several related courses approved by the Texas Education Agency (TEA).

Career Development Events (CDE). The Texas FFA Career Development Event in Agricultural Mechanics is a curriculum-based event that is conducted annually in College Station, Texas; or the Texas FFA Career Development Event for Tractor Technicians is a curriculum-based event conducted annually in Houston, Texas.

National Evaluation System (NES). A private company hired to produce and validate the TExES exit examination for Texas agricultural science instructors. Teachers certify subject matter competence and earn licensure through this examination.

Successful Teacher. Any agricultural science and technology teacher in Texas that meets one or more of the following criteria: A) has coached agricultural mechanics CDE team to compete in the state contest at least three of the last five years, B) has coached a tractor technician CDE team to compete in the state contest at least three of the last five years, C) has taught a prolific agricultural mechanics pre-employment laboratory that shows increased enrollment the last five years, and/or D) has taught a successful agricultural mechanics program to include implementing a new TEA-approved agricultural mechanics related course in the last five years.

Texas Examinations of Educator Standards (TExES). The state approved exit test for agricultural science and technology teachers completing university studies and desiring to become certified to teach agricultural science and technology in Texas.

Vocational Agriculture Teachers Association of Texas (VATAT). The professional association of agricultural science and technology teachers in the state of Texas.

CHAPTER II

REVIEW OF LITERATURE

"Agricultural teacher educators have experienced significant pressure over the past 15 years to reform the process by which the teachers are prepared in the profession" (McLean and Camp, 2000, p.25). Texas colleges and universities continue to amend degree plans to cope with changing legislation, demographics, and financial woes. McLean and Camp (2000) reported an on-going trend of downsizing agricultural teacher education programs across the United States. It became apparent in reviewing previous research that the teacher education system in Texas does not adequately prepare young agricultural science teachers to proceed with confidence and competence when instructing within the agricultural mechanics discipline. According to Engel and van den Bor (1995) institutions of agricultural education need to restructure to a practical and professional problem-oriented inquiry (p.2). Reis and Kahler (1997) recommended a careful analysis of the agricultural mechanics portion of the program to find out why pre-service students were least satisfied with the subject matter content of agricultural mechanics. Further, Reis and Kahler recommended that steps be identified to reorganize and update this phase of the program.

Baker and Malle (1995) concluded that the national average of eight semester hours of collegiate agricultural mechanics courses for an agricultural education certification did not prepare young people to teach in this highly technical discipline. In addition, McLean and Camp (2000) noted that "of 15 identifiable courses taught in 10 highly recognized teacher trainer universities, only two schools offered a recognized

agricultural mechanics course" (p. 30). One of the major teacher education universities reported three agricultural mechanics subject matter courses required in the degree plan. Of the three, two courses were theory based lecture courses and one course was required with skill-based or laboratory experience. Consequently, those same agricultural education pre-service students will graduate to become agricultural science and technology instructors and teach an average of one-third of their teaching load in the field of agricultural mechanics (Hubert and Leising, 2000, p.18). This discrepancy was reported in a research project by Baker and Malle (1995). Baker and Malle found agricultural mechanics subject matter the weakest preparation among young agricultural science instructors. Baker and Malle warned, "little research has been conducted to examine pre-service teachers' knowledge of technical subject matter" (p. 51). Buriak and Harper (2001) agreed that more training is necessary to adequately prepare out preservice teachers. "Teaching is a craft. To learn a craft, apprentices observe, work, and practice with a master craftsman, usually over some extended period of time" (p.2). Furthermore, "critical thinking skills in colleges of agriculture have not been widely studied" (Rudd, Baker, and Hoover, 2000, p.4). Harper, Buriak and Hitchings (2001) found when administered the Agriculture Single Subjects Assessment Test (ASSAT), recently certified agricultural science instructors performed best on the "Agriculture and Society" portion with an 80% competency level. Predictably, recently certified agricultural science instructors scored lowest on the "Agricultural Mechanics" portion with a 46.97% competency level. Harper, Buriak, and Hitchings concluded that significant changes in the university curriculum coupled with the reduced scope of college-level instruction have

made it too expensive for teachers to instruct effectively in our present competency based agricultural mechanics curriculum model. However, Simeral and Hogan (2001) recommend active student participation as a major emphasis to process retention and application of new knowledge (p.1).

Understandably, young or inexperienced teachers are reluctant to delve into the rigor of teaching within the agricultural mechanics discipline. This is shown in mathematical applications when Miller and Gliem (1998) found "research has shown that secondary agriculture students lack competence in solving agriculture related mathematics problems. In order for agriculture students to become better mathematical problem solvers, teachers must become better mathematical problem solvers (p.29). In a study on the seven most recognized concerns of beginning teachers, Fritz and Miller (2003) determined that student teachers were more focused on dealing with self-adequacy concerns (subject matter material and discipline problems) than any other concern. High school agricultural mechanics courses remain popular among agricultural education students. Often one third of the courses taught in the agricultural science and technology program are agricultural mechanics courses. Dyer and Breja (2003) estimated that high school and university agriculture programs would have to more than double student enrollments to satisfy the growing demand for agricultural education graduates by both industry and education. Hubert and Leising (2000) found new or preparing teachers often express great anxiety for a lack of preparedness to teach the subject matter. A review of the Texas FFA CDE results of recent Agricultural Mechanics CDE events, Tractor

Technician events, and TEA approved courses for agricultural science confirmed that many teachers choose not to attempt it at all.

Croom, (2003) concluded, "the teaching profession is one of the most visible professions in the world" (p.1). This exposure is very evident in the field of teaching agricultural mechanics. Several studies imply that young instructors are not being adequately prepared in the field. McLean and Camp (2000) explained that two of the top 10 most recognized teacher education universities in the country fail to offer agricultural mechanics courses. They also found that only six universities offered courses in laboratory management, and five offered courses in equipment and facilities. Dyer and Andreason (1999) concluded that the lack of preparedness to teach within the discipline, coupled with a great anxiety for safety instruction to prevent possible litigation, has driven young teachers away from the agricultural mechanics curriculum. Dyer and Andreason noted several voids that existed in teacher preparation in laboratory safety.

Today, Texas agricultural science teachers are expected to instruct in a very broad science of agricultural mechanics. A review of the current curriculum found that in the Introduction to Agricultural Mechanics (Agricultural Science 221), teachers are expected to instruct in areas that include personal and machine safety, tool identification, carpentry, electricity, plumbing, masonry, fencing, painting, and hot and cold metal skills (Instructional Materials Service, n. d.). In the Agricultural Power Technology course, instruction is expected in small internal combustion engines, tractor power, hydraulics, and electrical power. Foster, Bell, and Erskine (1995) stated "the findings of this study agree with the earlier reported position of Klein. He stated that 'total teacher responsibility

demands too much based upon traditional teacher training and the inherent teaching culture'" (p.7).

Furthermore, starting in 2005, all potential agricultural science instructors will be given an exit exam mandated by the Texas Education Administration and produced by the National Evaluation Systems. Twelve percent of the examination questions must be relate to agricultural mechanics content and deal with theoretical concepts as well as technical skill knowledge (NES, 2004). This exam will test student knowledge of several topics including tool identification and safety; wood and metal construction; internal combustion engines; power tools and maintenance; field machinery; plumbing tools and skills; and land leveling and measurement. Most current curriculums for agricultural science teacher certification in Texas do not attempt to cover the theory of all these topics, let alone enhance technical skill development.

These areas were cause of major concern for young teachers not adequately prepared or confident to teach safely (Dyer and Andreason, 1999). A 2001 study by Ullrich, Hubert, and Murphy revealed "an element of weakness in curricula utilized by the teacher, and in the teacher preparation programs failing to prepare these individuals for the challenge of integrating safety and health concepts throughout the curriculum" (p.9). The more advanced courses of Agricultural Structures Technology, Agricultural Metal Fabrication Technology, Agricultural Power Technology, and Agricultural Electronics only compound the concerns of young teachers already horrified over their lack of technical knowledge and experience in the discipline. Mundt and Connors (1999) concurred that the early years in the teaching profession are very difficult with classroom

management and organizing and managing safe facilities among the major concerns for young teachers. Most of the university curriculums today require only fifteen to eighteen semester hours of agricultural mechanics. At least one major teacher education institution in Texas currently has only one laboratory requirement on the degree plan (Degree Plan-Agricultural Science, Department of Agricultural Education, n. d.). McLean and Camp (2000) concluded that academia has proposed an agricultural teacher preparation program based on textbook review and not on the needs of graduates. Franklin (2001) found that we are not adequately preparing our teachers to instruct effectively in psychomotor skill instruction. He recommends "utilizing student teacher candidates to present demonstration skills in agricultural mechanic courses in college and university undergraduate courses can be a successful training experience that benefits both the student teachers, and the college and university students" (p.9-10). This research is designed to identify those teacher needs in order to more adequately prepare teachers to work effectively in their most ignored, yet most often used discipline.

One of the largest agricultural education institutions in Texas requires only one hands-on laboratory based, skill developing agricultural mechanics or agricultural engineering course during its four-year agricultural education certification program (Degree Plan - Agricultural Science.n.d.). One lecture oriented environmental science class, one lecture oriented safety course with no hands-on education, and one laboratory based small engine course are all that exist on the current campus. There is no laboratory practice for students in order to become efficient in the demonstration of metalworking, electric wiring, carpentry, masonry, field machinery, plumbing, or power tool operation.

The correct and safe demonstration of these basic construction and maintenance skills are expected of all current agricultural science instructors in teaching one or more agricultural mechanics course. The agricultural education department at Texas A&M offers no theoretical bases for students to develop the basic concepts to teach the topics of planning and designing structures, water supply and sanitation, heating and cooling, nor basic land leveling and measurement.

Sam Houston State University continues to offer courses more adequate for the preparation of teachers to instruct in the field of high school agricultural mechanics. The agriculture department there still requires three courses in agricultural mechanics for teacher certification. This degree includes an introductory course in metalworking, woodworking, and tool safety. A mechanics in agriculture course is offered that involves engines, electric motors, metalworking, and soil and water management. An advanced course includes instruction in metal fabrication, wood structures, power tools, and construction design, including computer graphics (D. Ullrich, personal communication, August 29, 2004). The content related to heating and cooling, field machinery, and the portions on irrigation are questionable for the Sam Houston State University graduate attempting the TExES.

Similarly, Tarleton State University continues to offer instruction in most of the topics included on the TExES. One course offered at Tarleton State University includes instruction in small internal combustion engine theory and maintenance, tractor maintenance, power units, hydraulics, plumbing, and irrigation. Another course includes instruction in the basics of carpentry, tool maintenance, drawings and plans, concrete

work, and calculating a bill of materials. The third course develops skills in electrical wiring, electrical power theory, and structural heating and cooling (K. McGregor, personal communication, August 28, 2004). Only water supply and sanitation, soil conservation, land leveling and measurement, and the calibration and adjustment of field machinery are not included in course content to be tested by TExES.

The Texas Tech University course offerings follow suit by offering three courses in agricultural mechanics or engineering for students who plan to major in the Interdisciplinary Agriculture teaching degree. The first agricultural mechanics related course on the degree plan covers hot and cold metalwork and power tools. The next course includes small engine theory and maintenance and tractor maintenance. The third course includes study in building design, construction materials, and tool operation and maintenance (D. Lawver, personal communication, August 28, 2004). Clearly, the Texas universities that offer agricultural science teacher education and certification do not include a comprehensive course offering necessary for the knowledge and skills in agricultural mechanics for prospective teachers of agricultural science and technology.

Qualitative Research

In any recorded study, the basic issue to be consistently targeted and most heavily regarded is that of trustworthiness. Within conventional paradigms, the criteria most often considered for trustworthiness are internal validity, external validity, reliability, and objectivity. From the naturalist convention, Lincoln and Guba (1985) link the question of trustworthiness to credibility, transferability, dependability, and confirmability. Erlandson

(1993) explained, “trustworthiness is established in a naturalistic inquiry by the use of techniques that provide truth value through transferability, consistency through dependability, and neutrality through confirmability” (p. 132).

Lincoln and Guba (1985) recommend three actions to increase research credibility: prolonged engagement, persistent observation, and triangulation. Prolonged engagement demands a sufficient time investment by the observer or researcher to learn the nuance of the culture, recognize distortions that might affect the integrity of the data, and develop trust within the sample population. Erlandson (1993) noted that “prolonged engagement also serves to build trust and develop a rapport with the respondents” (p. 134). Persistent observations must serve to identify those characteristics most relevant to the research issue and focus on them (Lincoln and Guba, 1985). Erlandson (1993) added that “persistent observation helps the researcher sort out relevancies from irrelevancies and determine when the atypical case is important” (p. 137). In order to improve research credibility, triangulation is essential for the researcher to arrive at his conclusions from multiple sources. Erlandson concluded, “The greater the convergence attained through the triangulation of multiple data sources, methods, investigators, or theories, the greater confidence in the observed findings” (p. 139). Berg (1989) noted, “For many researchers, triangulation is restricted to the use of multiple data gathering techniques (usually three) to investigate the same phenomenon” (p. 5). However, the use of different investigators, peer debriefing, negative case analysis, and member checks are all recommended methods to establish triangulation (Lincoln and Guba, 1985).

Transferability is the naturalist's equivalent to external validity and must be provided for with the use of thick description to allow the reader the opportunity to contemplate transfer.

> The naturalist inquirer is also responsible for providing the widest range of information for inclusion in the thick description; for that reason (among others), he or she will wish to engage in purposeful sampling. It is, in summary, not the naturalist's task to provide an index of transferability; it is his or her responsibility to provide the database that makes transferability judgments possible on the part of potential appliers. (Lincoln and Guba, 1985, p.316)

Erlandson (1993) explained "Thick description provides for transferability by describing in multiple low level abstractions the data base from which transferability judgments may be made by potential appliers" (p. 145). Other qualitative studies recommended purposeful sampling including Berg (1989), who recommended that when ". . . developing a purposive sample, researchers use their special knowledge or expertise about some group to select subjects who represent this population" (p. 229).

Dependability is best insured when linked with triangulation. Both dependability and confirmability are established through an audit trail. Confirmability can be further improved with the use of audio tape interviews, field notes, and the member checking process (Lincoln and Guba, 1985).

CHAPTER III

METHODOLOGY

A review of literature revealed agricultural mechanics as the discipline within the agricultural education community in which students and teachers are the least prepared. Several articles alluded to the lack of preparedness on the part of the teacher and the teacher's hesitance to participate fully in the agricultural mechanics curriculum (Baker and Malle, 1995; Harper, Buriak and Hitchings, 2001). Many colleges and universities fail to instruct in all subject matter units of the adopted Texas high school curriculum and fail to motivate young instructors to compensate for this lack of preservice preparation. This qualitatively designed inquiry examined the perceptions of 19 successful agricultural science and technology teachers who were recognized for their successful instructional programs in agricultural mechanics. Personal interviews were conducted with agricultural science and technology teachers recognized as successful in teaching agricultural mechanics. This pragmatic approach was selected to obtain consensus from those previously successful regarding information relevant to their performance.

Qualitative research techniques included personal interviews, archival research, and persistent observation to provide for triangulation (Lincoln and Guba, 1985). This qualitative research reported on the findings of 19 personal interviews that were conducted during the spring and summer of 2004. Prolonged engagement, and persistent observation, and systematic member checks were employed to increase trustworthiness (Erlandson, 1993). Interviews were conducted privately and exclusively by the single

researcher with informed consent (Appendix A). The three basic research questions were addressed in the interview process:

1) What education or experiences enable certain teachers to develop successful agricultural mechanics programs?

2) What influences teachers to instruct in the portion of the agricultural mechanics curriculum they do teach?

3) What steps should the agricultural education community engage in to assure quality instruction in agricultural mechanics in the future?

Target Population and Sampling

The target population for this study was all agricultural science and technology teachers who were or hope to be successful in providing instruction in agricultural mechanics curriculum. Erlandson (1993) concluded, "Purposive sampling requires a procedure that is governed by emerging insights about what is relevant to the study. . ." (p. 148). For the purpose of this study teachers who instruct in the agricultural mechanics curriculum were defined as successful using four criteria. These were: A) have coached agricultural mechanics CDE team to compete in the state contest at least three of the last five years, B) have coached a tractor technician CDE team to compete in the state contest at least three of the last five years, C) have taught a prolific agricultural mechanics pre-employment laboratory that shows increased enrollment the last five years, or D) have taught a successful agricultural mechanics program to include implementing a new TEA-approved agricultural mechanics related course in the last five years.

Archival research through the Texas FFA CDE results and the VATAT directory identified some 26 potential candidates recognized for the quality of their instruction in agricultural mechanics. Personal questioning of teachers selected through this archival process was implemented to identify other instructors who would qualify through increased enrollments in the agricultural mechanics pre-employment laboratory, or through the implementation of new agriculturally mechanics related courses locally. Of the teachers identified by both processes, 20 were interviewed in this study. Twelve were recognized through archival research as qualifying to be successful, and conveniently located for private interviews. Eight were discovered through the interview process of other teachers, or by this researcher questioning them about their current teaching assignments, a result of months of persistent observation. These recognized agricultural science and technology teachers were sought out and interviewed privately for their perspectives on the three basic research questions.The 20 experts were interviewed and a resulting redundancy of acquired information reflected a saturation of data. As described by Lincoln and Guba (1985), additional interviews are unnecessary once saturation has occurred.

Instrumentation

The qualitative research instrument (Appendix B) was constructed by the researcher and approved by the Institutional Review Board – Human Subjects at Texas A&M University. The instrument focused on the education and previous work experiences of the respondents, their independent perceptions of the teacher preparation certification as it related to agricultural mechanics, and the respondents' ideas on how this preparation

could be improved. The respondents were asked to provide minimal demographic data sufficient to insure they did indeed qualify for the study.

Data Collection and Analysis

In all, 20 interviews were conducted beginning in June 2004 and concluding in August 2004. All interviews were scheduled at the convenience of the respondent. The researcher conducted each interview privately with time for a complete discussion. Six were conducted at local high school agricultural science and technology classrooms, four were performed during the Texas FFA state degree check in Stephenville, and 10 were completed during the Texas FFA Convention in Ft. Worth. One participant's data had to be removed from the reported findings because of failed efforts at member checking leaving 19 members data as suitable for analysis.

Persistent observation of these participants, as well as other agricultural science and technology teachers that instruct in agricultural mechanics, assisted this researcher in developing of themes during this work. Observations were conducted during several FFA "degree check" meetings where essential elements in agricultural mechanics were discussed. Also, participation in TEA approved agricultural mechanics workshops at the VATAT Inservice meetings provided valuable insight into teachers' perceptions of what units of instruction were being adequately or inadequately covered.

To complete triangulation for good qualitative research, archival research was implemented along with the literature review and personal interviews. Archival research was not only necessary to identify qualifying participants, but also very helpful for this

researcher to understand the changes in agricultural science teacher preparation. Many of the participants were sought out after reviewing several years of FFA Agricultural Mechanics and Tractor Technician CDE results. The results are readily available at the Texas FFA website. The current VATAT handbook provides contact information as well as tenure for all agricultural science teachers in Texas.

Also helpful in this work was a review of transcripts and course catalogs from fifteen to twenty-five years ago from various universities. Several respondents alluded to their transcripts and the courses they were required to take in agricultural mechanics during their undergraduate preperation. A review of the transcripts revealed that all agricultural science teacher-education programs in Texas formerly required at least twelve hours in agricultural mechanics. The required courses were similar among universities and included hands-on laboratory experience and practice in several topics. Most programs required arc welding and oxy-fuel processes, electricity, small engines, basic construction practices, tractor maintenance, and field machinery maintenance and operation. All courses previously had laboratory hours associated with them.

All conversations were audio taped to insure accuracy in the transcription of the findings as recommended for quality research (Berg, 1989). Transcriptions were provided to each participant as a member check for verification of accuracy. Lincoln and Guba (1985) recommended this as an essential procedure for effective qualitative research. To insure anonymity, participants were coded using a random notation (P1 for "Participant 1" through P19). These codes were assigned at the onset of the transcription process. Data were assimilated and recorded exclusively by the principle researcher. Any quotations,

inferences, or remarks used in the findings were recorded anonymously. Finally, the researcher analyzed the responses to report all recurring themes interpreted.

Reported themes were those ideas or perceptions most alluded to by the participants. Constant comparative techniques were used during transcription typing and in peer tutoring sessions to recognize these themes. Reported themes were those that a majority of the participants stated directly during interviews. All participants alluded to weaknesses in teacher preparation to instruct in agricultural mechanics. Fourteen out or nineteen called for the continuation of the three-week agricultural mechanics certification course, and increased workshops. Every participant suggested that the universities increase the requirements for agricultural mechanics/engineering for teacher certification. All but two agreed that most agricultural mechanics instructors fail to cover all components of the curriculum. And all but two of the nineteen accredited their successes to the influence of a mentor in the agricultural mechanics field.

CHAPTER IV

RESULTS

The data collected represents the perceptions of 19 successful high school agricultural science and technology teachers who instruct in the field of agricultural mechanics. The participants were screened to insure qualifications as deemed successful, and interviewed at their convenience with informed consent. Participants were interviewed to ascertain their thoughts concerning the three basic research questions: 1) what education or experiences enabled them to become successful, 2) what influences agricultural science teachers to instruct in the areas they do teach, and 3) what steps should the agricultural education community take to assure quality instruction in agricultural mechanics in the future?

The recognized successful participants were all agricultural science and technology teachers of high school agricultural mechanics in Texas. To be qualified the respondents must have taught agricultural mechanics at least five years, having been successful in preparing either agricultural mechanics CDE or tractor technician CDE teams for FFA events. Also, teachers were solicited that performed a great service to their local community and were rewarded with either an increase in enrollment in the Agricultural Science 422 course, pre-employment laboratory training in agricultural mechanics, or an increase in the number of TEA approved courses taught locally during the last 5 years.

Of the teachers that qualified, the number of years teaching experience in high school agricultural mechanics ranged from a minimum qualifying 5 to 32 years. Three participants met the criteria to be deemed successful because their schools saw fit to allow

them to open new TEA approved courses in agricultural mechanics during the last five years. Four met the demand for an increased enrollment in the agricultural mechanics pre-employment laboratory, Agricultural Science 422. Twelve were recognized early on through archival research as successful in preparing either agricultural mechanics CDE or tractor technician CDE teams, or both. Six of the interviewees were Texas A&M University graduates, four from Texas A&I University, four interviewees graduated from Tarleton State University, two from Texas Tech University. The remainder came from East Texas State University, New Mexico State University, and the former Southwest Texas State University, each with one graduate participating.

Several emerging themes were discovered upon reviewing the transcriptions of those interviews. First, the current agricultural education university community does not offer enough agricultural mechanics education to prepare teachers to instruct effectively in the discipline of agricultural mechanics and therefore the successful teachers have had to obtain constructive influences elsewhere. Secondly, the vast majority of agricultural science and technology teachers deleted or omitted topics of instruction in agricultural mechanics from the adopted curriculum due to a lack of familiarity or comfort instructing the subject. Finally, the community as a whole should take several important steps to improve teaching in agricultural mechanics and alleviate these shortcomings.

Results: Research Question 1

What education or experiences enable certain teachers to develop successful agricultural mechanics programs?

The interviewed participants had similar views concerning the education received by agricultural science and technology teachers to instruct in agricultural mechanics. Most of the participants questioned admitted that after several years of successful endeavors in teaching in the field of agricultural mechanics, they did not receive enough instruction during their undergraduate programs to provide adequately for their students. Their programmatic and individual successes were attributed to advanced education over and above requirements, or previous work experiences, or the influence of several key individuals within the community of practice. Admittedly, a few interviewees perceived their education in agricultural mechanics to be adequate for them to instruct in the current curriculum. However, those few participants that were comfortable with their previous education had considerably more undergraduate or graduate instruction in the discipline than the remaining individuals questioned.

Of the interviewees, the vast majority answered the question, "Did your undergraduate course work adequately prepare you to teach the current agricultural mechanics curriculum?" in a negative context (P1, 3, 4, 5, 6, 8, 10, 11, 12, 14, 15, 16, 17). To justify their successes in the instruction of agricultural mechanics, several participants pointed to the three-week agricultural mechanics pre-employment laboratory certification workshop as the greatest influence on their ability to instruct within the discipline (P1, 4, 5, 8, 12, 14, 15, 16).

The TEA approved three-week workshop to certify teachers to instruct the high school pre-employment laboratory in general agricultural mechanics has long been recognized as one of the major reasons some teachers are more successful in their instruction of agricultural mechanics. “The best career experience for me to improve my teaching was the three week certification workshop with Billy Harrell” (P1).

> Oh that’s easy, the three week agricultural mechanics certification workshop at Sam Houston State University. Because I think in three weeks' time we covered more information than the whole time I was taking agricultural mechanics courses in college and it was hands-on. It was a goal-based class. Every young teacher that is going to teach an agricultural mechanics course, they need that course, where we had a goal we had to finish [sic.]. There was great instruction, that course is amazing (P4).

“I believe that going to the workshop in Huntsville for three weeks, the agricultural mechanics certification was a big influence” (P8). “I think I was not really ready to teach agricultural mechanics until after the certification course, if then” (P14).

Four of the interviewees (P7, 9, 11, 16) cited some previous work experience or training before their undergraduate coursework as the major criteria for their recognized success. One particular individual that participated in the study began teaching agricultural science after a ten-year career in agricultural extension. After stating that, in his particular case the undergraduate course work did prepare him to teach the curriculum, admitted

those 15 hours of quality instruction and several other experiences contributed to his success:

> I think having a strong background in high school had a lot to do with it. I graduated from a pretty strong agricultural mechanics program. During college, I also worked at the university farm. During that time frame when I was there, the university put in swine facilities and got into a partnership with Dekalb. There were four of us that worked at the farm part time, we basically built the facilities, as far as the swine were concerned. We built the sow barn, farrowing facilities, the nursery facilities, the feeding floor, the whole deal from A to Z, as far as the swine were concerned. We spent a lot of time with structures, welding, concrete work, so that was a pretty strong background. I got to put a lot of skills that I had learned in high school and agricultural mechanics classes [sic.] we actually got to put them to use (P7).

Another participant that stated unequivocally that 15 hours of undergraduate course work prepared him to teach the curriculum also admitted:

> After returning back to college, I was a certified welder. I had worked offshore, in the oil industry for four and a half years. I choose to attend Texas A&I University in

> Kingsville. Number one because of its location and the opportunity to work in that industry. I was very fortunate to have very good instructors in the agricultural mechanics part of the deal at A&I, that actually took me to the next level. Being from the eastern portion of the state and A&M Kingsville, I was fortunate to have taken the trailer building class, and three other agricultural mechanics classes in the summer with Dr. Harrell at Sam Houston. (P9)

Another participant that recognized some previous education over his undergraduate work as the major contributor to his successes stated,

> I had worked in the industry for 15 years prior to teaching, so I think I got more of a real world experience, actually having to do agricultural mechanics on a farm or ranch. I worked for the school as farm manager and for a couple of ranches as manager. (P11)

Undoubtedly, the most successful instructor of high school tractor mechanics in the state of Texas explained, "Earlier experiences, particularly farm and ranch experiences did more to prepare me to teach than my formal education. I farmed for a good many years. Even after I started teaching, I farmed some on the side" (P16) contributed more than his 9 hours of collegiate agricultural mechanics to his successes.

Obviously, the required agricultural mechanics curriculum within the agricultural education degree plan did not prepare our more successful instructors to teach within that discipline. At least 60% of those questioned stated emphatically that it did not (P1, 3, 4, 5, 6, 8, 10, 11, 12, 14, 15, 16, 17). Of those that answered the question with a negative connotation, many went on to credit the three-week pre-employment laboratory workshop with being the greatest influence on their successes (P1, 4, 5, 8, 12, 14, 15, 16). Six proclaimed some form of previous work experience as the largest contribution to their endeavors, more so than any undergraduate coursework (P4, 7, 9, 11, 16, 17). "My B.S. degree exposed me to about 30% of what I teach today" (P17).

Of the few who perceived their course work to be adequate to instruct within the current curriculum (P2, 7, 9, 13, 18), all had at least 15 hours of quality agricultural mechanics instruction during their undergraduate education. Three of the satisfied participants had degrees in Mechanized Agriculture or a Master of Science in Agricultural Education with an emphasis in agricultural mechanics to credit their successes in agricultural mechanics instruction to (P2, 6, 18). One of the more popular and successful instructors, in training both tractor technician and agricultural mechanics CDE teams, stated; "I took every class that Tarleton offered. I took every agricultural engineering class that Tarleton had and working on my master's was a teachers' aide for the farm power and machinery class, probably 30 hours"(P2), when asked what prepared him to teach the current agricultural mechanics courses. The participant with the most formal education, both a masters and doctorate with an emphasis in agricultural mechanics in both, stated when asked to allude to his preparation during the undergraduate degree:

> Adequately, (prepared) in the basics, when you talk about minimum passing standards with TAKS and everything, yes. But even back then, I wished I had taken more core courses in the area of agricultural mechanics. Coming out of a high school program, where it was not emphasized, I felt really at a disadvantage. So I worked even harder and I took as many agricultural mechanics courses as I could. But at the minimum level, minimum confidence level, minimum competence level, yes: but it should have been even more back in 1970 when I started. (P6)

Furthermore, the most successful coach in the state, in preparing agricultural mechanics CDE teams over the past ten years concluded, "I'm a graduate of Texas A&M University, plus a master's degree from it. I couldn't tell you the exact hours but I took every agricultural engineering class I could get my hands on, at least 18 hours" (P13), when asked to allude to his preparation to teach within the discipline. Another very capable instructor who has coached agricultural mechanics CDE teams to the state contest for 23 consecutive years added, "My degree is in Mechanized Agriculture, therefore I have over 30 hours"(P18), to describe his formal course work in preparation to teach.

Basically the 19 most recognized instructors of high school agricultural mechanics in the state attributed previous work experience, post-graduate education, or the three-week certification workshop as the major criteria for their successes. None of the participants professed to have become adequately acquainted with the discipline during an

undergraduate program similar to the current nine-hour program offered at most teacher education universities.

Also evident in the interview transcriptions was a pronounced recognition of mentorship during the development of these successful agricultural mechanics teachers. All of them agreed that some type of mentoring process is necessary to become successful in the profession. Several made comments alluding to the necessity of such a relationship, "You've got to have somebody help you be creative with the material you're presenting, and the way you're presenting it. I think you have got to have somebody help you because I don't think you get it at the universities" (P3).

> I think the mentor relationship is imperative; it has to be there. I have had several strong mentor relationships, I have picked up the phone in the middle of the night and called Billy Harrell and asked him how to solve a problem. You know I have called you from time to time. If I had any advice to give to a new teacher, about mentors, that would be to become involved in the agricultural mechanics committee on the state level, because all of those people are willing to help anybody new to the profession. I think that something they absolutely have to have is the confidence to pick up the phone and call an experienced teacher. An experienced teacher will not deny information to a new teacher to the profession, especially in the field of

> agricultural mechanics, because it's not like showing livestock where everybody feels there is a trick to it. There are no secrets in agricultural mechanics, it's all in print, if you take the time to read it, it's there. (P4)

A very successful yet soft spoken agricultural science and technology teacher felt very strongly about the value of the mentoring process, "an agricultural teacher needs a mentor, and it might be a college professor or teaching partner, or someone else"(P10). The single most successful instructor of agricultural mechanics in Texas over the last 10 years, as evidenced by his prolific CDE teams stated, "Any time a student can relate to somebody that is strong in that area, that definitely will be a help" (P13), when asked if a mentoring relationship played a role in quality instruction.

Again, all of the interviewees felt some sort of mentoring relationship had improved their development into quality instructors; whether that relationship was with former teachers, current collegiate faculty, teaching peers, or family members. Several individuals were mentioned as mentors or motivators for these recognized educators. Dr. Billy Harrell, professor of agricultural mechanics at Sam Houston State University (P1, 2, 4, 5, 6, 8, 9, 10, 12) of course was named a considerable number of times; not only by former SHSU graduates, but more so by participants in the general agricultural mechanics certification workshop (P1, 4, 5, 7, 8, 9, 10, 12), and by practicing teachers that learned to rely on him for guidance and direction as much as technical support (P1, 2, 4, 5, 7, 8, 9, 10, 12, 13, 14, 15, 16). Of course another distinguished professor, Dr. Lon Shell of Texas State University (formerly Southwest Texas State University) was also credited many

times for his teaching and motivation of agricultural science and technology teachers (P3, 4, 5, 6, 10, 13, 14, 17). Also mentioned numerous times were several professors of agriculture at Tarleton State University: including Dr. Moorvant, Dr. Chumley, Dr. Ted Ford, and Dr. Johnny Johnson. Former peer high school teacher and current professor of agricultural mechanics at Texas A&M Kingsville, Jerome Tymrak was noted on several occasions as motivator and provider (P1, 7, 11, 14, 15). Several instructors went on to include local business or industry personnel in their list of motivators and enablers (P3, 6, 9, 11, 12, 13, 14, 16, 17, 18). Obviously, the participants felt very strongly that some type of mentoring process was instrumental in the development of quality instruction.

Results: Research Question 2

What influences teachers to instruct in the portion of the agricultural mechanics curriculum they do teach?

Also perceived through the transcriptions of interviews was the pre-eminent theme that most instructors do not attempt to cover adequately all the recommended topics in the adopted curriculum for high school agricultural mechanics. When questioned specifically on the issue, the vast majority of teachers stated very confidently that most of their peers across the state did not adequately cover all the recommended topics within the adopted agricultural mechanics curriculum (P1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18). These instructors recognized a variety of reasons not for their peers to teach within each unit of the discipline including time allotted, the knowledge base and confidence of the instructor, and lack of interest or effort on the part of the teacher. Only two individuals

answered the question in a manner complimentary to their peers, when asked if they thought those peers adequately covered all topics in the curriculum (P5, 9).

Those participants that were kind to their peers across the state qualified their statements somewhat, trying to be honest with this researcher when asked if all other instructors competently taught all of the curriculum:

> That's a hard question, I don't know what other people do. I would say yes they do [cover all material]. I don't see how they can not cover all topics, and win some of the contests, they do. I do watch some of my teaching partners. When we talk about shop classes, they don't try to get into as much depth as I do. If they happen to be in charge of a metal fabrication class, they allow students to just play. When you allow students to weld pieces of metal together just for the sake of welding, just to be standing back there in a booth, it keeps them out of trouble. I have an objective each day and I want that objective covered. I watch some of my teaching partners and they don't do that. In some cases, students want to build shop projects; I think that's an excellent thing. But in so many cases they're building knives and swords, and things like this, I think we're missing something. (P5)

Another complimentary comment alluded to all teachers probably covering the broad curriculum, but admitting to personal expertise and interest limiting the depth of some units. “I think that everybody designs it to work. I think that everybody covers everything, but they cover what they are more comfortable with in more depth” (P9). Evidently, the respondents did not feel that the complete curriculum was being covered in any reasonable depth even though they responded with favorable terms when asked if their peers covered all units adequately.

For those that concluded their fellow teachers did not adequately cover all topics within the recommended plan, several reasons for the shortcomings were discussed. Far and away the most common influence recognized as preventing adequate coverage of all units within the recommended agricultural mechanics curriculum was a general lack of knowledge to allow the instructor to be comfortable teaching across that curriculum (P3, 4, 6, 7, 10, 13, 15, 17, 18). Other reasons include a distinct lack of time to allow for complete coverage of topics (P2, 8, 12, 14) or a general lack of interest or effort by the instructor (P1, 14, 16) as the major shortcoming.

Several participants alluded to teachers not being comfortable enough with the technical aspects of the diverse discipline, or not having received adequate education to do justice to the topic at hand. “They don’t have the training to teach it” (P1). When asked if his peers adequately covered all units in the program, one very successful teacher quipped, “Probably not. They’re probably just like me, they’ve got areas that they feel comfortable with and confident in, and they probably spend a little more time in those areas than others they feel less qualified in”(P3). “No, there’s a lot of the guys out there that teach the one

section they really enjoy the most and forget the rest. There's a lot out there that do just that, teach one particular part of it" (P4). "No, I think from my perspective, my situation, what I see around the area, it has to do more with the basic training. Again, you teach what you're comfortable with and know" (P6). Other teachers used more elaborate explanations for the perceived discrepancies:

> I feel that very few teachers in the state cover agricultural mechanics the way it should be covered. And I feel very strongly on this, I feel that agricultural teachers cover what they know and what's easy and what's comfortable and are very scared of newer technology or something that they did not know or that they think the kids may not want to learn. Because it takes some classroom time or book time or lecture time to learn it, before you go out in the shop. Outside of welding, or electricity, or maybe some engines, teachers will balk at anything else. (P10)

Another prominent South Texas instructor, with a history of preparing competitive CDE teams stated:

> I doubt it. I know one thing, if we do carpentry, and some of them that's all they do. And some of them don't touch it at all. You look at electrical wiring and some of them you don't think they cover it at all because, you go to a contest and the kids are so inadequate at it. You feel like they must

> not have had any hands on at all. Across the state, a lot of people don't cover everything they are supposed to. (P14)

Yet another South Texas instructor well known for supervising students in the construction of competitive projects for stock show exhibition commented on the lack of credibility some teachers faced if they were not proficient in several necessary skills:

> Students are pretty bright, I guess every school has them, and I get a lot of students in the program that already have some background, they either grew up on a farm or their dad's a welder or whatever the case might be, so they already have some skills. If you can't show them that you have those skills, or can expose them to some new techniques or technology, I think your credibility is affected. (P7)

One of the most successful instructors in agricultural mechanics over the past five years proclaimed, "No. I think they are probably exposed to about 85% of the material and come away with about 60% of it"(P17), when asked if all students in Texas received proper instruction in all the units of the broad subject. He went on to add, the reason some teachers deleted material from their programs was because, "No experience, and they don't feel capable" (P17). Respondent number eighteen was less diplomatic about his perceptions of why some teachers refused to attempt all topics on instruction, "No background, they are scared and don't want people in town to know how little they do know" (P18). Obviously, a general lack of basic knowledge deters many teachers from

attempting instruction in the broad field of agricultural mechanics, as well as time and interest level considerations.

Other considerations mentioned included lack of time, effort, and interest, when teachers were asked to justify insufficient coverage of all essential elements, accounted for approximately one third of the total responses. Those respondents that mentioned time as a key factor generally accepted teacher knowledge and effort to be successful. When asked why some teachers chose to delete units from the recommended curriculum they contributed these comments, "Probably not enough time would be the number one reason. Most teachers I visit and talk with, try to cover all they can, the best they can. I think they just don't have enough time"(P2). "It's hard to say, probably most of them don't, but it's impossible, especially in a single teacher department to teach everything involved in agriculture" (P8). "I really don't know about my peers, sometimes I feel like I could do better in certain situations myself. I don't feel like I'm much different from my peers. Sometimes it's just time constraints" (P12).

Other mentioned concerns were again effort and interest of the instructor, used to explain the lack of competent instruction in high school agricultural mechanics courses. Some interviewed experts replied: "because they don't feel it's important" (P1), "interest, their own interest, and some laziness" (P16). At least one interviewee alluded to time constraints produced by show project construction or CDE team training as a possible reason for the lack of sufficient instruction,

> So many of them I believe fall into those traps. They're too intent on teaching a contest and building projects. There are

> some communities that compete at the San Antonio and Houston agricultural mechanics show, they leave a lot of other stuff behind. They are doing fabricating. Some of the kids that are good at one thing, they just let them do that for everybody. I don't know how they have time to teach it all. (P14)

Results: Research Question 3

What steps should the agricultural education community engage in to assure quality instruction in the agricultural mechanics discipline in the future?

During the interview process, the experts contributed several meaningful ideas for the agricultural education community to consider for future preparation of agricultural science instructors. Among these recommendations was the consistent belief that the teacher education universities must bolster the agricultural mechanics or engineering required for certification, that the pre-lab certification workshops must remain intact, and that a mentoring system would improve teaching in agricultural mechanics.

When asked to divulge their thoughts on what the universities could do to better serve agricultural science students, the group of very successful teachers insisted that the certification programs increase or maintain the number of hours of agricultural mechanics being taught. Most of the respondents felt that the current university degree plans did not offer enough instruction in the discipline. A relatively young South Texas instructor wondered if collegiate instruction in agricultural mechanics is geared in the right direction,

"I doubt if they offer an adequate amount or if the instruction in the courses is working toward helping those teachers cover the TEKS they are going to have to teach" (P1). An older, more experienced teacher commented on the education that several recent young partners of his had in college,

> Not discrediting my fellow teaching partners by any means, [they] didn't get any agricultural mechanics in college. Let those kids actually develop some competencies. They need some competency level to go out there and teach and a lot of our kids don't have it now. (P3)

Another qualified teacher of agricultural mechanics questioned the skill levels of recent student teachers in basic mechanics, "I have had several student teachers and I think some of them really come out lacking in some of the agricultural mechanics areas. There's a lot of them that seem to be lacking in basic things" (P5).

Several interviewees recommended more core courses in agricultural mechanics or engineering for teacher certification to bolster young teacher confidence and credibility. "I think more hands-on, more actual skill development. Like I said earlier, students are pretty sharp, and you can't pull the wool over their eyes. If you're not comfortable teaching a topic they'll see right through that and you lose credibility" (P7). Most participants felt that the universities do not offer enough agricultural mechanics courses and that these are necessary for the department to produce a well-rounded graduate. "Some schools offer an adequate amount; those schools are numbered and short. I would say the average university is perhaps lacking. Each university should have its own agricultural mechanics

program, in house, to have a well-rounded program "(P10). " Well, first of all, some of them need to reincorporate the agricultural mechanics back into the university. I think they need more preparation at the collegiate level" (P15). "They must get the basics in college. Unfortunately they have cut the traditional shop classes from our kids going to A&M" (P17). The participant with the most formal education in the field of agricultural mechanics or engineering felt that beginning instructors were ill prepared to the point of possible liability issues.

> It's very, very important. And again, the challenge is with the increased graduation requirements, not only in high school but teacher education institutions, there have been cases where universities had to make some hard choices. They need to be prepared. Because if you look at the numbers, you'll see how popular our agricultural mechanics courses are state wide, and if we've got young peers going in and being asked to teach these courses. They are at a disadvantage to begin with. Not only in what they teach our high school kids but what are the liability issues. How can you have a young man or woman go in and teach an agricultural mechanics course when they haven't had the basics. Every one of the TEKS curriculums call for a certain amount of safety and yet they haven't had it themselves.

> However they are to be held responsible for a safe lab environment. (P6)

Many of the instructors expressed legitimate concerns over universities reducing degree requirements in fields in which they originally felt least qualified.

> From cutting out programs that they had when I was there. I don't know for sure without sitting down and looking at it, but it's looking to me like a lot of the colleges don't have the agricultural power and machinery that I had. But I think they're trying to get it back, and I think A&M doesn't have near what they used to have. When you go to these colleges for contests and stuff and look in their shops, they're not the shops they had when I was in college, I'll put it that way. (P2)

Another concern registered consistently by the participants was the perception that few universities actually possessed the staff qualified to instruct students efficiently in the art of teaching agricultural mechanics. "They need to offer more courses (in agricultural mechanics). Part of it is going to come to finding people that are capable of offering that instruction" (P16). Some agreed that we currently do not offer enough courses in the discipline, and that qualified instructors are at a premium.

> Some of them need to reincorporate the agricultural mechanics back into the university. The other thing that they need to do is to make sure that, they have a decent

> professor in there that has a good sound knowledge of agricultural mechanics. And they need to put it into their course work, it needs to be part of what's required for them to get out of college. (P15)

Another teacher commented on the need for immediate planning to replace retiring teachers.

> First of all, a lot of the old stand by instructors that we have relied on all these years are reaching retirement age now. They need to be looking for young talent, who has an interest in the field, (and) who are willing to develop a good agricultural mechanics collegiate program. Then I think [the universities] need to offer as many courses, whether small power, electricity, tractor power, whatever the interest lies. But offer as much as you can to expose those to be teachers, because they are coming from a background where they probably have had zero experience. (P13)

Obviously, the successful agricultural science and technology teachers in Texas have recognized several problems in the teacher education system for agricultural mechanics instructors. Primarily they expressed a deep concern for the lack of technical instruction received during the bachelor's degree and certification process. None of the respondents felt that the four-year degree alone qualified them to perform the job as they do today. Many of them reported that previous industry experience, the three-week

certification workshop, or a combination of things, better equipped them to teach the recommended agricultural mechanics curriculum. Some referred to advanced education beyond the bachelor's degree as their most effective experience. Most instructors admitted they could not have been successful without the guidance, support, and advice of a strong mentor.

Also present in the interview transcripts was the inherent fear of the approaching absence of quality instructors to engage those charges in the study of the discipline. Most teachers recognized at least one quality mentor and usually the respondents mentioned several. The vast majority of these mentors are retired or senior collegiate faculty. The agricultural science and technology teachers in Texas that proliferate the agricultural mechanics programs in our high schools, foresee a shortcoming of qualified faculty instructors in agricultural mechanics in the immediate future.

Clearly, the 19 participants were concerned with their obvious lack of preparedness to instruct effectively in agricultural mechanics. In addition, the interviewees consistently expressed a major concern for the future teachers who receive even less technical hands-on instruction in the field. The members of this study went on to recommend unanimously a system of mentoring for young teachers to promote their professional development in the field. The respondents insisted on maintaining the three-week certification course for agricultural mechanics to prepare young or beginning teachers to instruct in the highly technical and skill-oriented curriculum. At the same time requesting improved professional development workshops for themselves and future

teachers, on the part of TEA and the agricultural education community to assist in quality instruction of the emerging technologies in agricultural mechanics.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study was conceived as an effort to not only examine the preparedness of agricultural science and technology teachers to instruct in agricultural mechanics, but to recognize the characteristics of successful teachers and their perceptions on the necessary improvements needed in the field. Several studies (Baker and Malle, 1995; Harper, Buriak, and Hitchings, 2001) proclaimed the lack of preparedness and confidence on the part of agricultural science teachers to dive head long into teaching agricultural mechanics. "Agricultural mechanization demonstrated significant growth and was the driving force of agricultural development during the middle part of the 20th Century. Harper, Buriak, and Hitchings (2001) concluded ". . . during the last twenty years, programs have diminished scope and many have undergone significant change" (p.1). They went on to warn that if we ". . . couple this with the reduction in engineering technology or mechanization credit requirements for certification to teach agriculture and it is obvious that competency-based guidelines are too expensive and cannot be met by prospective teachers of agriculture." (p.1). Consequently, this research validated the lack of scope, depth, and technical instruction obtained at our current teacher education universities.

> Let these kids actually develop those competencies, they need some competency level to go out there and teach, and a lot of our kids today don't have it now. They can present a power point on it, or present theory, but when comes time

> to get their hands on it in application, they're falling way short (P3).

A successful teacher recommended a review of the strategic plan and the priorities for program development based on societal need.

> I think that the agricultural education family as a whole needs to sit down and look at their curriculum and ask themselves what are we preparing our students for, what are we preparing them to do, what can we do to strengthen their competence level to go out and reach young people? They need to look at their budget, prioritize their academic areas of emphasis, and add more agricultural mechanics. (P6)

Evidently, these respondents felt strongly that agricultural mechanics courses should remain an integral part of the high school environment. Harper, Buriak, and Hitchings (2001) in their summation of Rosencrans and Martin work, recommended that "agricultural mechanization continue to be viewed as a viable component of secondary agricultural education to reflect emerging technologies, problem-solving, critical thinking, systems approaches, as well as science and mathematics applications" (pp. 1-2).

This qualitative study was designed using archival research and qualitative measures to collect, analyze, and interpret data as described by Lincoln and Guba (1985). Archival research was implemented to recognize several agricultural science teachers that were successful in their instruction of agricultural mechanics. Interview sampling was

conducted until a redundancy of information suggested saturation of data (Lincoln and Guba, 1985). The results of this study were reported as the findings in each of the three basic research questions: 1) What education or experiences enable certain teachers to develop successful agricultural mechanics programs?, 2) What influences teachers to instruct in the portion of the agricultural mechanics curriculum they do teach?, and 3) What steps should the agricultural community engage in to assure quality instruction in agricultural mechanics in the future?

The 19 participants were interviewed privately and with informed consent to determine their perspectives on the preparation of agricultural science teachers to instruct in the field of agricultural mechanics. They were asked what influences affected the curriculum that was included in agricultural mechanics courses and their ideas on preparing better teachers for the future. The group alluded to a lack of preparation for themselves and a deep concern for the future agricultural science teachers to be able to teach effectively in agricultural mechanics. They all supported a need for some mentoring process, all admitted that mentoring had a major positive impact on their careers and each respondent whole-heartedly recommended such for future teachers. Many suggested that the agricultural education community improve both the number and quality of in-service workshops for high school teachers of agricultural mechanics.

Conclusions: Research Question 1

What education or experiences enable certain teachers to develop successful agricultural mechanics programs?

Of the 19 interviewees, fourteen professed not to be prepared to instruct in the agricultural mechanics curriculum at the onset of their teaching careers (P1, 3, 4, 5, 6, 8, 10, 11, 12, 14, 15, 16, 19). Of the remaining few who felt comfortable teaching within the agricultural mechanics realm upon graduation, all had far and away more class hours of agricultural mechanics than is currently required by universities for agricultural science certification. Currently the Texas teacher education universities require from nine to 12 hours of agricultural mechanics or engineering for certification. These recognized teachers that were comfortable beginning the teaching career had from 15 to 31 hours of collegiate instruction in agricultural mechanics or engineering before teaching. "I took every class that Tarleton offered—probably 30 hours" (P2). The most successful teacher of agricultural mechanics in Texas according to CDE results, has a bachelors and a masters degree from Texas A&M University in agricultural education, and agrees that he was more prepared than most of his peers because of several hours of electives in agricultural mechanics and engineering. "At least 18 hours because all of my electives were agricultural engineering classes" (P13). The next most prolific instructor in Texas in preparing students for the CDE also has two degrees and several additional courses in agricultural engineering. "I had 21 hours during my bachelors and 10 more in the masters program" (P17). Another very successful teacher has a bachelor's degree in Mechanized Agriculture, and a master's in agricultural education. The remaining two individuals that

did not answer the question of adequate preparation to teach agricultural mechanics with a negative response, had 15 hours of instruction in college apiece and both insisted that previous work experience and quality collegiate instructors greatly contributed to their preparation.

> In my case, I think it did. When I first started at A&I, Dr. Bill Long was the agricultural mechanics instructor at the time, and the first course was an introductory course like what our introductory course is in that it touched on all different areas, he was very thorough, and had a lot of expectations, so it was very good. As it got later into undergraduate program, John Harrison came in as instructor. His approach was a little bit different, Dr. Long was more hands-on type skills, Dr. Harrison was a whole lot more theoretical, more technical type instruction. I was fortunate to get both ends of it, I got the hands-on skills and yet the theory and technical aspects of it. (P7)

Additionally, the interviewees recognized the TEA approved workshops offered for certification in agricultural mechanics as the single biggest positive influence on their careers (P1, 4, 5, 8, 12, 14, 15, 16, 19). Three teachers cited previous work experience as the greatest contributor to their teaching careers in agricultural mechanics (P7, 9, 11). Six others noted a combination of things including several additional hours of collegiate

instruction and previous experiences (P2, 3, 6, 13, 17, 18) as the major reasons for their successes.

Conclusions: Research Question 2

What influences teachers to instruct in the portion of the agricultural mechanics curriculum they do teach?

Seventeen successful teachers recognized that not all portions of the approved agricultural mechanics curriculum for high school agricultural sciences are adequately taught in depth, scope, and quality. When polled to determine if they perceived adequate coverage in all topics within the curriculum by their peers, all but two of the 19 answered with a negative response (P1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19). Most of the participants felt that a lack of preparedness of the teacher was the major reason units of instruction were deleted or omitted from the approved curriculum (P1, 3, 4, 6, 7, 10, 13, 15, 17, 18, 19). “They’re probably just like me, they have areas they feel very comfortable and confident in, and they probably spend more time in those areas than others they feel least qualified in” (P3). “Because I think a lot of the guys won’t teach a part of the curriculum they’re not comfortable with” (P4). “No, and I think from my perspective, what I see around the district and area, it has more to do with basic knowledge and training” (P6).

> I feel that very few teachers in the state cover agricultural mechanics the way it should be covered. And I feel very strongly on this. I feel that agricultural teachers cover what

> they know, what's easy, and what's comfortable. And are very scared of newer technology or something that they did not know or that they think the kids may not want to learn. Because it takes some classroom time or book time or lecture time to learn it, before you go out in the shop. Outside of welding, or electricity, or maybe some engines, teachers will balk at anything else. (P10)

Most of the interviewees cited one of the current leaders in collegiate agricultural mechanics instruction as a major influence on their recognized success. Dr. Billy Harrell of Sam Houston State University was acclaimed as a major influence by some (P1, 2, 4, 5, 6, 8, 9, 10, 12) and Dr. Lon Shell of Southwest Texas State University by others (P3, 4, 5, 6, 10, 13, 14, 17, 19). Also noted when asked to explain some lack of instruction in all areas of the curriculum, where a shortage of time and interest on the part of the teacher. Three of the participants alluded to the issue of time. "Probably not enough time would be the number one reason" (P2). Three members mentioned the lack of interest or effort on the part of the instructor as a reason for failing to include all areas of the curriculum. "Interest, their own interest, and probably some laziness" (P16).

Conclusions: Research Question 3

What steps should the agricultural education community engage in to assure quality instruction in the agricultural mechanics discipline in the future?

Finally, when asked to provide this researcher with their perspectives on what the agricultural education community could do to improve instruction in high school agricultural mechanics, the interviewees provided several ideas. All but one of the participants insisted that more instruction in agricultural mechanics or agricultural engineering was necessary for the bachelor's degree and agricultural science teacher certification. When asked if the teacher education universities offered enough courses in agricultural mechanics currently for future agricultural science teachers to successfully teach agricultural mechanics, 18 of the 19 participants stated or implied that they did not (P1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19).

Additionally, all respondents felt that a mentoring process was instrumental in their personal development and to promote such would improve instruction in high school agricultural mechanics. "The mentoring process has got to be there" (P1). Also the individuals questioned predict a shortage of qualified instructors on the collegiate level to teach and mentor agricultural science teachers in the future (P1, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 19).

> Well, first of all, a lot of the old stand-by instructors that we have relied on all these years, they are reaching retirement age now. They need to be looking for young talent, who has an interest in the field, who are willing to develop a good agricultural mechanics collegiate program. Then I think, they need to offer as many courses, whether small power, electricity, tractor power, whatever the interest lies. But

> offer as much as you can, to expose those to-be teachers, because they are coming from a background where they probably have had zero experience, or at least very limited. (P13)

Fourteen of the 19 participants stated that more workshops in the field of teaching high school agricultural mechanics were imperative (P1, 3, 5, 6, 7, 8, 9, 10, 12, 13, 15, 16, 17, 19).

Conclusions

After a careful review and analysis of the interview transcripts used in this work, several pre-eminent themes emerged. The teacher education universities in Texas must maintain or increase the required number of agricultural mechanics courses in the agricultural science certification degree plan. Preservation of the three-week agricultural mechanics certification workshop is imperative. The agricultural community as a whole should require a mentoring system whereby recognized experienced teachers tutor beginning agricultural science instructors. The universities with agricultural teacher education programs, TEA, and VATAT must unite to provide a systematic, hands-on, technical skill enhancing workshops that are conducted in regional and statewide conferences. The community as a whole must continue to encourage young and promising educators to advance their education and enter the teacher education profession.

The respondents in this study consistently agreed that their four-year teacher certification degree did not adequately prepare them to instruct in the current agricultural

mechanics curriculum. That recognized discrepancy, compounded by a recent university mindset to reduce the number of collegiate hours required for the certification, obviously produced a generation of high school agricultural science instructors who were terrified to attempt to teach the agricultural mechanics curriculum. Only three interviewees with thirty or more college hours in agricultural mechanics or with postsecondary degrees with an emphasis in agricultural mechanics or engineering were satisfied that their collegiate experience adequately trained them to do the job. Add the impending TExES exit exam to the equation and we, as a community, may not have many young teachers certified, whether or not they are arguably prepared. The agricultural teacher education universities in Texas must reach consensus among themselves and offer at least twelve hours of laboratory based instruction in agricultural mechanics consistent across all campuses as to content and delivery.

Until the task of consistent statewide delivery of quality, laboratory-based instruction in agricultural mechanics is realized, the three-week certification workshop will remain an essential alternative in teacher preparation. One-half of the respondents questioned recognized the certification workshop as the single biggest influence on their careers in teaching high school agricultural mechanics. The hands-on training in the very technical field is imperative to quality instruction. Most of the respondents admitted to learning techniques during the workshop they were not exposed to in college. The mentoring process of how to teach safely and effectively begins in the three-week short course.

Respondents unanimously agreed upon the necessity of mentoring for agricultural science instructors. All 19 mentioned a current or former collegiate agricultural mechanics instructor as not only responsible for motivating them and providing technical assistance, but inspiring them to achieve in their personal lives as well. There must be a statewide plan to organize a structured mentoring program whereby experienced and successful instructors are motivated to nurture beginning teachers. This plan should include instructional strategies, professional development, and FFA organizational activities. The collegiate community must continually seek young and inspired instructors to maintain a vibrant and enthusiastic university faculty who are experienced in educational and motivational techniques and dedicated to improvement of the profession.

Recommendations

Further study on the subject of teacher preparation and discrepancies within the delivery of curriculum are important for program improvement. This work centered on the education and experience of a 19 recognized experts in the field and their perceptions of influences that enabled them to achieve. Follow-up work on the perceptions and experiences of those who have been less successful will provide insights for academia as attempts are made to improve the finished product; a qualified and motivated high school agricultural science and technology instructor.

More research into the educational experiences of young and limited experience instructors of high school agricultural mechanics may provide the necessary motivation for the collegiate community to expand the required agricultural mechanics in its teacher

education program. All respondents recognized a recent reduction in agricultural mechanics course work for teachers as a major concern. Several mentioned the inability of recent young or student teachers to perform in the hands-on instruction of mechanical concepts. Further study might recognize key variables that promote these deficiencies. The preparation of the younger teachers must be a concern for the community as a whole and a qualitative study of their perceptions to compare with the thoughts of older instructors is highly recommended.

Furthermore, some quantitative work should begin immediately with the onset of TExES. A study of the results of the impending TExES and the ramifications on the agricultural community is imperative. Hopefully, the younger generation will perform exceedingly well on the new exit exam, but should it not, the collegiate programs will be forced to explore options to improve on the finished product, the agricultural science instructor. Current research shows a flagrant downsizing of agricultural mechanics programs, further studies should motivate the universities to again revive and enhance programs. Quantitative works comparing the curriculum coverage of recent graduates with those older ones who had more core coursework in mechanics or engineering and works expressing the results of TExES are encouraged.

The agricultural education community as a whole should consider some guided research into the possibility of an “area of emphasis” during the agricultural science and technology teacher certification program. As many as three to five areas of emphasis have been proposed; including an emphasis in animal science, plant and soil science or horticulture, and agricultural mechanics. Further research is needed to examine the

feasibility and implications of such a program, whereby degree plans could be altered or modified to allow prospective agricultural science and technology teachers to specialize in one of the “emphasis areas” with 18 or more credit hours of instruction in the field.

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APPENDIX A

INFORMED CONSENT FORM

Preparation to Teach Agricultural Mechanics: A Qualitative Case Study of Expert Agricultural Science and Technology Teachers in Texas

Consent Form

I understand that I am being asked to participate in a research study on Perspectives of Teachers of High School Agricultural Mechanics on Their Preparation to Teach Within the Discipline. This study is being conducted by Richard K. Ford and will be the subject of his record of study/ dissertation as a part of the Joint EdD in Agricultural Education with Texas A&M University and Texas Tech University. I understand that interviews will be tape recorded, transcribed verbatim, and analyzed. I understand that this study will last for the summer of 2004, and the results will be available in 2005.

I understand that only recognized successful teachers of agricultural mechanics will be eligible as participants. I understand that I may have been selected as a candidate by my performance in teaching as determined though archival research, or I may be questioned to determine eligibility. I understand that participation is completely voluntary and that I may refuse to enter or complete the study.

I understand that the purpose of this study is to recognize education/ or experiences that have enabled some teachers of high school agricultural mechanics to be more successful than others. And to recognize which portions of the agricultural mechanics curriculum I feel most confident in instructing, and those I feel least confident in. And to obtain my insight as to what the agricultural education community can do to improve instruction in agricultural mechanics.

I understand that all records will be held confidentially and that my identity will remain anonymous. No one but Richard K. Ford will have access to notes or tape recordings, and that only Richard and the five members of his graduate committee will have access to transcriptions made from them. In Richard's working documents, the dissertation/record of study, and in any subsequent publications of the study, my real name will not be used. I understand that confidentiality is a priority. I understand that Richard will securely store and keep the tapes and notes indefinitely.

I understand that if I have any questions about this study I may contact Richard or the chairman of his committee, Dr. Glen Shinn, whose contact information is listed below.

I understand that this research study has been reviewed and approved by the Institutional Review Board- Human Subjects in Research, Texas A&M University. For research related problems or questions regarding human subjects' rights, I may contact the Institutional Review Board through Dr. Michael Buckley, Director of Research Compliance, Office of Vice President for Research at 979/845-8585 (mwbuckley@tamu.edu).

I have read and understand the explanation provided to me. I have had all my questions answered to my satisfaction, and I voluntarily agree to participate in the study. I understand that there are no risks involved in this study. I understand that there are no personal benefits from this study.

I have been given a copy of this consent form.

Signature of Participant	Date
Signature of Principle investigator	Date
Principle Investigator: Richard K. Ford	Chairperson of Graduate Committee Dr. Glen Shinn

APPENDIX B

INTERVIEW QUESTIONS

Qualitative Study by Richard K. Ford
Interview Transcriptions
Doctoral Research- April-June 2004

Preparation to Teach Agricultural Mechanics: A Qualitative Case Study of Expert Agricultural Science and Technology Teachers in Texas

Opening Statement

Please understand that I am audio-taping this interview, in order to accurately transcribe your answers to the following questions. At the beginning of the transcription process, you will be assigned a code number to maintain your anonymity. Any remarks, inferences, or quotes used in my record of study/dissertation will be recorded anonymously.

Interview Questions:

Please state your name and current professional position.

Where are you currently employed?

How long have you worked there?

In order to guarantee your qualifications as a participant in this study, please answer the following:

How long have you taught high school agricultural mechanics?

Do you normally train an agricultural mechanics CDE team?

How have they performed in the last 5 years?

Do you normally train a tractor technician CDE team?

How have they performed the last 5 years?

In the last 5 years has your school implemented any TEA approved agricultural mechanics related courses into your program?

Has the number of students enrolled in your agricultural mechanics pre-employment laboratory (Agricultural Science 422) changed in the last 5 years?
From what institution (university) did you obtain a degree and teacher certification?

When was your degree and certification awarded?

How many collegiate semester hours of agricultural mechanics instruction did you receive during your bachelor's degree?

How many semester hours of post-graduate instruction in agricultural mechanics have you earned?

What agricultural mechanics related high school courses do you currently teach?

How many students do you have enrolled in agricultural mechanics?

Have these enrollment numbers changes in the last 5 years?

Due to the answers you have provided and due in part to some of my earlier research, you have obviously been more successful than many of your peers in teaching agricultural mechanics. What was different about your education in agricultural mechanics when compared to your peer agricultural science teachers?

What academic or career experiences have helped you to become successful in teaching agricultural mechanics?

What motivates you to continually learn new methods/techniques to improve your teaching?

What instructors and/or industry people would you credit with motivating you to improve your teaching?

What units (cite example) do you most enjoy teaching among each of the agricultural mechanics related courses that you currently teach?

Which units (cite example if needed) do you least enjoy teaching?

Among the units that you currently teach, which do you feel most qualified or comfortable teaching?

Among the units that you currently teach, which do you feel least qualified or comfortable teaching?

Do you think that your peers adequately cover all the units in each agricultural mechanics course they teach?

Why do some teachers omit or delete units in each curriculum course?

Do age and/or tenure play a factor in delivering quality agricultural mechanics instruction?

Does a student/mentor relationship play a role in quality agricultural mechanics instruction? If so, who would you give credit to as your mentor?

What was most valuable about their contributions?

What education/experiences since your undergraduate course work most improved your teaching of agricultural mechanics?

How important are agricultural mechanics courses offered by universities and colleges for future agricultural science teachers in Texas?

Do Texas universities currently offer an adequate amount of agricultural mechanics courses for today's agricultural science teachers?

What should the Texas universities and colleges do to improve the preparation of our agricultural science teachers to instruct within the agricultural mechanics curriculum?

What should the agricultural education community as a whole do to improve teaching in agricultural mechanics?

Is the current TEA-approved curriculum adequate to prepare high school students to meet industry standards?

Do you have any other information or insights that would help me understand perspectives of teachers of high school agricultural mechanics and issues related to your preparation to teach within the discipline?

Thank you for your contributions to this research. I believe your perspectives and experiences are important as we seek to improve our discipline.

You know that I audio-taped this interview in order to accurately transcribe your answers. A code number will be assigned to maintain your anonymity in these findings. Any remarks, inferences, or quotes used in my record of study/dissertation will be anonymously cited. I will maintain this confidential audio tape for 18 months and then it will be destroyed.

Best wishes for your personal and professional success. Thank you.

VITA

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Experience

1993-2004 Calallen ISD Corpus Christi, Texas
Agricultural Science and Technology Teacher

- member of VATAT State Leadership Development Event (LDE) Committee 1993-2004
- member of VATAT State Agricultural Mechanics Career Development Event (CDE) Committee 1996-2004
- coached state-champion FFA Agricultural Mechanics CDE team 1996, 1998, 2000
- advised 14 American FFA Degree recipients
- advised 120 Lone Star FFA Degree recipients
- President Area X VATAT 1993-1994

1992-1993 Texas A&M- Kingsville Kingsville, Texas
Professor of Agricultural Mechanics/ farm manager

- taught 4 Agricultural Mechanics courses for agricultural science and technology teacher-education
- managed 600 acre school farm
- improved passing rate on agricultural mechanics portion of Exit exam from 15% to 88%

1982-1992 Calallen ISD Corpus Christi, Texas
Agricultural Science and Technology Teacher

- member of VATAT State LDE Committee 1985-1992
- advised 3 American Degree recipients
- advised 138 Lone Star Degree recipients

Education

1981-B.S. in Agricultural Education from Texas A&M University-College Station
1991- M.S. in Agricultural Education from Texas A&I University
2004-completed course work for EdD in Agricultural Education through Texas A&M and Texas Tech University