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National Agricultural Education Research Conference
Locations and Chairs

Year	NAERC Chair(s)	Institution NAERC	Location
2003	Jamie Cano	The Ohio State University	Orlando, FL
	Larry E. Miller	The Ohio State University	
2002	Michael K. Swan	Washington State University	Las Vegas, NV
	Marty Frick	Montana State University	
2001	Joe W. Kotrlik	Louisiana State University	New Orleans, LA
	Michael F. Burnett	Louisiana State University	
2000	Greg Miller	Iowa State University	San Diego, CA
1999	University of Florida	University of Florida	Orlando, FL
1998	Gary Moore	North Carolina State University	New Orleans, LA
	James Flowers	North Carolina State University	
1997	James J. Connors	University of Idaho	Las Vegas, NV
	Tim H. Murphy	University of Idaho	
1996	George W. Wardlow	University of Arkansas	Cincinnati, OH
	Donald M. Johnson	University of Arkansas	
1995	Leon G. Schumacher	University of Missouri	Denver, CO
	Robert J. Birkenholz	University of Missouri	
1994	David E. Lawver	Texas Tech University	Dallas, TX
	Robert Terry, Jr.	Texas A & M University	
1993	Dennis Scanlon	The Pennsylvania State University	Nashville, TN
	Thomas H. Bruening	The Pennsylvania State University	
1992	John P. Mundt	University of Idaho	St. Louis, MO
1991	Larry R. Arrington	University of Florida	Los Angeles, CA
1990	Robert A. Martin	Iowa State University	Cincinnati, OH
1989	Michael F. Burnett	Louisiana State University	Orlando, FL
1988	Edgar P. Yoder	The Pennsylvania State University	St. Louis, MO
1987	Alfred J. Mannebach	University of Connecticut	Las Vegas, NV
1986	Alan A. Kahler	Iowa State University	Dallas, TX
1985	Bob Stewart	University of Missouri	Atlanta, GA
1984	Jimmy Cheek	University of Florida	New Orleans, LA
1983	Paul R. Vaughn	New Mexico State University	Anaheim, CA
1982	Dale Oliver	Virginia Tech	St. Louis, MO
1981	Maynard Iverson	North Carolina State University	Atlanta, GA
1980	L. H. Newcomb	The Ohio State University	New Orleans, LA
1979	Ronald Brown	Mississippi State University	Anaheim, CA
1978	Bennie Byler	Mississippi State University	Dallas, TX
1977	William Richardson	Purdue University Atlantic	City, NJ
1976	Glen Shinn	Mississippi State University	Houston, TX
1975	Hollie Thomas	Florida State University	Anaheim, CA
1974	Hollie Thomas	Florida State University	New Orleans, LA

The Peer Review Process

The National Agricultural Education Research Conference (NAERC) is the premier professional event in which research in agricultural education is communicated orally and in written form to the profession. Agricultural education professionals from throughout the United States and around the world submit their most recent research for presentation at the annual research conference.

Each paper proposal was sent to three agricultural educators as part of the blind review process. Only papers receiving the most favorable reviews were accepted for presentation at NAERC and for publication in the proceedings. One hundred and thirty-eight paper proposals were submitted for review by the postmark date of June 2, 2003. A distinguished group of **90** agricultural educators served as paper reviewers.

Based on the reviewers' recommendations, the top 48 papers were accepted for presentation at the 2003 NAERC. The review process resulted in an acceptance rate of 34.7%.

2003 National Agricultural Education Research Conference Manuscript Reviewers

Name	Affiliation
David Agnew	Arkansas State University
Randy Andreasen	New Mexico State University
Andy Baker	Western Illinois University
Matt Baker	Texas Tech University
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Kirby Barrick	University of Illinois
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Bill Camp	Cornell University
Jamie Cano	The Ohio State University
Richard Carter	Iowa State University
James Christiansen	Texas A&M University
Marcus Comer	North Carolina A&T
Jim Connors	The Ohio State University

Name	Affiliation
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David Doerfoert	Texas Tech University
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Nick Place	University of Florida
Rama Radhakrishna	Pennsylvania State University
Matt Raven	Mississippi State University

Name	Affiliation
John Ricketts	University of Georgia
Grady Roberts	University of Florida
Rick Rudd	University of Florida
Dennis Scanlon	Pennsylvania State University
Brenda Seevers	New Mexico State University
Glenn Shinn	Texas A&M University
Bob Stewart	University of Missouri
Gary Straquadine	Utah State University
Benjamin Swan	The Ohio State University
Michael Swan	Washington State University
Kirk Swortzel	Mississippi State University
Allen Talbert	Purdue University
Rob Terry	University of Missouri
Greg Thompson	Oregon State University
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Anissa Wilhelm	North Dakota State University
Michael Woods	Michigan State University
Mark Zidon	University of Wisconsin - Platteville

Pedagogical Knowledge Espoused by Teacher Educators in Agricultural Education

Anna L. Ball & Neil A. Knobloch, University of Illinois

Abstract

The purpose of this study was to examine pedagogical knowledge espoused in teaching methods courses in agricultural education. The population was a census of 74 agricultural teacher educators who taught a teaching methods course during the 2002-03 academic year. The researchers utilized a content document analysis method (Hodder, 2000) of teaching methods course syllabi to identify the required course readings, assignments, and teaching methods taught by teacher educators. The most frequently required reading resource was Newcomb, McCracken, and Warmbrod's (1986, 1993), *Methods of Teaching Agriculture*. One-fourth of the teaching methods teacher educators required this text. Nearly one in seven educators required a teaching methods text outside of agricultural education. Teacher educators had a wide range of the types of assignments and amount of work required in their teaching methods courses. Teacher educators spent an average of 21% of the course time teaching methods. The problem-solving approach to teaching was the most widely espoused teaching method in agricultural education course syllabi. The predominant number of teaching methods taught appeared to be directly from Newcomb et al.'s book. Regardless of the teaching method listed in the syllabi, teacher educators spent a low percentage of course time on teaching methods.

Introduction and Theoretical Framework

The professional practice of educators is guided by commonly held knowledge, beliefs, and assumptions about pedagogy. Likewise, a body of knowledge of research and theories guides the practice of the university professionals who prepare such educators. One important task for any practitioner is to reflect upon the actions of practice (Schön, 1983). A critical piece of such reflection involves examining the knowledge base and theories in use that inform, and ultimately shape the practitioners to which such knowledge and theories are disseminated. "Are we satisfied with the way that we, as teacher educators, teach our students or prepare them for their teaching roles?" (Crunkilton, 1988, p. 3) One step in determining the answers to this important musing is for teacher educators to gain a deeper understanding of the pedagogical knowledge they posit as a part of agriculture teacher preparation courses.

Ducharme and Ducharme (1996) discussed the paucity of systematic research in the study of teacher educators. While numerous studies have documented the work of teacher educators in normal schools, reform efforts in teacher education programs, the demographics of teacher education faculty, the research productivity of teacher education faculty and the nature of teacher education faculty work (Cruikshank, 1990), there is a lack of research regarding *how* and *what* teacher education faculty teach.

Cruikshank's Model to Guide Inquiry in Preservice Teacher Education (1984) provides a conceptual framework for the systematic study of teaching among teachers in teacher education, and thus forms the conceptual framework for this study. This model illustrates five variables: (1) teacher educators, (2) preservice teacher education students, (3) contexts where teacher preparation takes place, (4) content of the teacher preparation curriculum, and (5) instruction in

the teacher preparation program. These five variables ultimately influence the sixth variable-student outcomes (Figure 1).

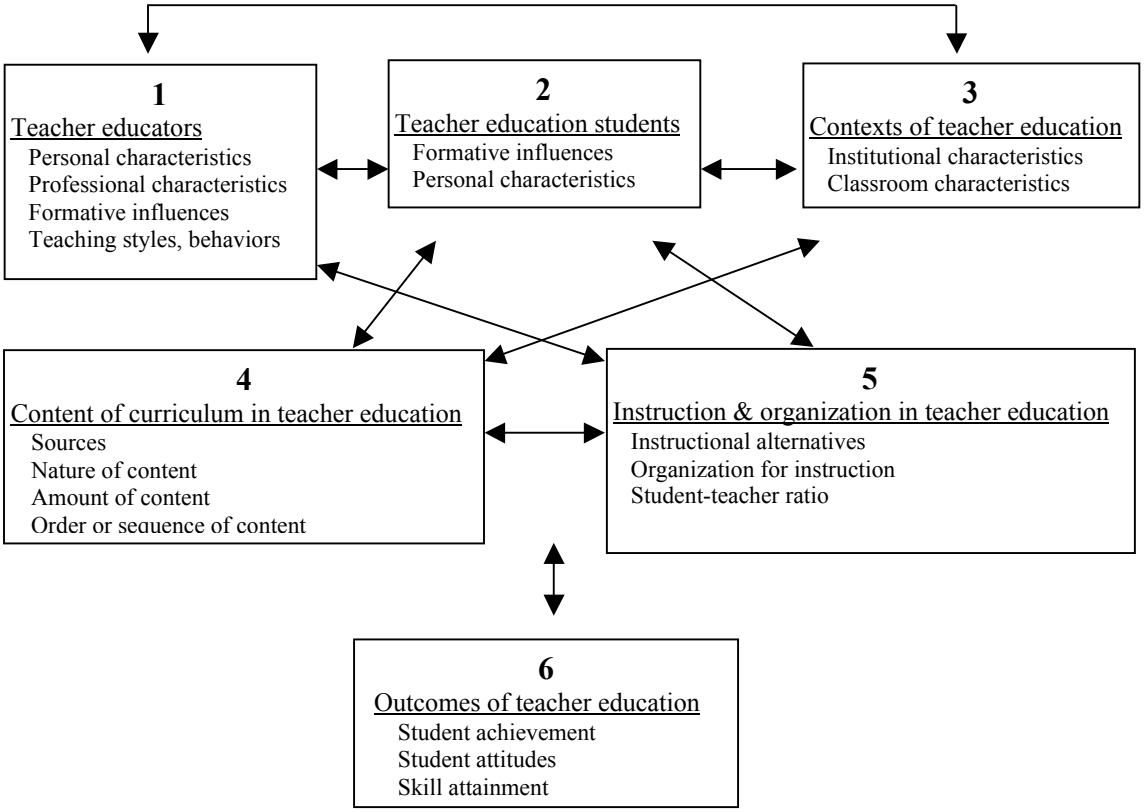

Figure 1. Model to Guide Inquiry in Preservice Teacher Education

According to this model, pedagogical knowledge espoused in an agriculture teacher education programs (Variable 4) is an important contributing factor in the knowledge, and ultimately the practices of teacher education students (Variable 6).

Teachers draw upon pedagogical knowledge to create learning environments and teach students. Teachers need to have knowledge of the teacher's role as the mediator in student learning, instructional strategies to promote active cognitive processing of the content, classroom environments that foster learning, and assessment methods that monitor students' thinking (Borko & Putnam, 1996). In addition to encompassing many domains of knowledge needed to teach, the learning-to-teach process is complex (Borko & Putnam). The concept of teacher knowledge plays a critical role in how: one views teaching and learning, knowledge is learned, teaching performances are enacted, and one is socialized into the profession (Munby, Russell, & Martin, 2001). "Universities are essential to high quality teacher education" (Darling-Hammond, 2000, p. 181), and teacher preparation programs should be created, implemented, and evaluated based on a body of knowledge consistent throughout the nation for what all teachers need to know to be effective (Darling-Hammond). Although some educators would disagree with Darling-Hammond's proposition, there is tension between teacher educators and teachers in the

field regarding how teachers develop, understanding and use of practical knowledge, and understanding and use of propositional knowledge (Munby et al.).

Several agricultural educators have published teaching methods books and resources that purport how agriculture teachers should teach. The researchers conceptualized seven themes that summarize the pedagogical knowledge espoused by these teacher educators and organizations in agricultural education: (1) Write lesson plans, develop program plans, create instructional objectives, and structure and organize content and its delivery (Hedges, 2000; McCormick, 1994; National Council on Agricultural Education, 2000; Newcomb et al., 1986, 1993; Phipps & Osborne, 1988); (2) create and maintain student interests (Hedges; Lancelot, 1944; McCormick; NCAE; Newcomb et al.; Stewart, 1950) and motivate students by emphasizing usefulness of knowledge and skills in meeting student needs (Hedges; McCormick; Newcomb et al.; Phipps & Osborne; Stewart) with diverse ideas, abilities, backgrounds, and cultures (NCAE); (3) teach using the problem solving approach (Hedges, 1996; Lancelot; McCormick; Newcomb et al., Phipps & Osborne; Stewart), give clear explanations (Hedges, 2000; Lancelot; Newcomb et al.), use effective questioning (Hedges; Lancelot; McCormick; National FFA Organization; Newcomb et al.), and develop thinking and understanding in the learners (Hedges, 1996; Lancelot; Newcomb et al.; Phipps & Osborne; Stewart); (4) use a variety of teaching methods, including lectures, discussions, demonstrations, supervised study, role plays, laboratory activities, field trips, experiments, student notebooks, and appropriate references and instructional media (Hedges; McCormick; Newcomb et al.; Phipps & Osborne) (5) engage learners of across all abilities (NCAE) by involving them in activities (McCormick; Phipps & Osborne), applying knowledge and practicing skills (Hedges, 2000; McCormick; Newcomb et al.; Phipps & Osborne; Stewart), and making "real-world" connections (NCAE); (6) care about students (NCAE), manage appropriate behaviors in the classroom, and guide students' interpersonal relationships (Hedges; McCormick; Newcomb et al.; Phipps & Osborne); and, (7) provide feedback on progress and quality of work (Phipps & Osborne) and evaluate learning (Hedges; McCormick; Newcomb et al.; Phipps & Osborne).

McCracken (1994) stated that the pedagogical knowledge base of teaching and learning in agricultural education is mostly based upon sensory experiences, agreement with others, expert opinion, and logic. Further, the current knowledge on the practice of teaching agriculture is in a state of perpetual "emic" knowledge transfer. Very little pedagogical knowledge is based upon the scientific method of inquiry. Is the current pedagogical knowledge base espoused by agriculture teacher educators applicable to the complex and often ill-structured contexts of current teaching in and about agriculture? Information in regard to the specific *content* of teacher education, can assist teacher educators in a more critical reflection upon the answers to the aforementioned question, and ultimately influence the *outcomes* of teacher education—the adequate preparation of its future agriculture teachers.

Purpose and Objectives

The purpose of this study was to examine pedagogical knowledge espoused in teaching methods courses in agricultural education by identifying the (a) required reading resources, (b) nature and type of assignments, and (c) teaching methods.

Methods and Procedures

The researchers sought to explore and describe the population of teaching methods courses in agricultural education. This census of tangibles survey (Ary, Jacobs, & Razavieh, 1996) used a content document analysis method (Hodder, 2000) to identify the required course readings, assignments, and teaching methods taught by teacher educators in agricultural education.

The population of the study was a census of agricultural teacher educators who taught a teaching methods course during the 2002-03 academic year. The American Association for Agricultural Educators (AAAE) directory served as the frame of the study. Websites were reviewed to determine if the departments listed in the AAAE directory had teacher education programs and to locate the contact information of the teaching methods educator. Department heads were contacted if the teaching methods educator was not found on the departmental website. Seventy-five departments were contacted, but 11 departments responded that did not meet the criterion of offering an undergraduate teaching methods course in agricultural education during the current academic year. Therefore, 47 of 64 (73%) teacher educators responded to the survey, which resulted in a usable data set of 43 course syllabi (67%). Four syllabi were not analyzed because they did not meet the *a priori* criteria of an undergraduate level teaching methods course exclusive to agricultural education.

The data were collected between November, 2002 and March, 2003. Five contacts were made using Dillman's (2000) tailored method. The initial contact was a prenotice message sent electronically to confirm the correct identification of the teaching methods educators and determine if they wished to participate by electronic or postal mail. For the second contact, a request for the teaching methods course syllabus was sent to each teaching methods educator. Third and fourth contacts were made using electronic mail, and a fifth contact was made via voice mail.

The researchers' epistemological stance was post-positivist based on the way of knowing as being dualist because the researchers sought objective, factual data from the participants using quantitative analyses of course syllabi (Lincoln & Guba, 2000). The researchers developed a category-coding procedure (Gall, Gall, & Borg, 2003) that listed discrete, mutually exclusive categories of the manifest content (Fraenkel & Wallen, 2003): (a) required course reading resources; (b) course assignments; and, (c) teaching methods. The researchers developed an explicit set of scoring rules and collaboratively coded the syllabi to ensure consistency. It was assumed that the syllabi would represent the content of teaching methods courses in agricultural education, and thereby, the data would be valid. Although the syllabi represented teacher educators' selected resources, expectations, and teaching methods, some teacher educators did not list all this information in their syllabi. A limitation of this study is that phone interviews with selected individual instructors should have been conducted to clarify some syllabus information. However, Hodder (2001) stated that concrete texts, such as course syllabi, can be understood as a form of artifact produced under certain material conditions embedded within social and ideological systems (Hodder, 2001). Latent content can be inferred from the underlying meaning of a document (Fraenkel & Wallen, 2003).

A spreadsheet was used to organize and summarize the data. Required readings, assignments, and espoused teaching methods, *as cited in course syllabi*, were coded as units of analysis. Descriptive statistics using frequency counts (rounded to the nearest 1/10th), population means (rounded to the nearest 1/100th), and population standard deviations (rounded to the nearest 1/100th) were reported. In an effort to increase trustworthiness and believability, the researchers reflexively situated themselves in the study by identifying three roles and how their backgrounds may have influenced the research study (Christians, 2000; Denzin, 2000; Ellis & Bochner, 2000): (a) current teacher educators in agricultural education with constructivist views; (b) former students who were taught teaching methods and knowledge traditionally espoused by agricultural educators; and (c) researchers' interests in epistemological beliefs. Although much care was taken to ensure accurate and reliable data, the findings of this study are limited due to the interpretation and subjectivity of the researchers (Denzin & Lincoln, 2000).

Results and Findings

The first objective was to identify the required reading resources in teaching methods courses in agricultural education as cited in course syllabi. There were a total of 74 reading resources required by 42 teacher educators (Table 1). Four teacher educators (9.30%) required four reading resources.

Table 1.
Frequency Counts of Required Reading Resources

Resources (N = 74)	f	%
Teaching Methods in Agriculture (Newcomb et al., 1986, 1993)	19	25.7
Course Packets/Websites	14	18.9
Other Teaching Methods Texts	10	13.5
Effective Teaching in Agriculture and Life Sciences (Raven et al., 1998)	5	6.8
Handbook on Agricultural Education… (Phipps, 1980; Phipps & Osborne, 1988)	5	6.8
Agriculture Teacher's Manual (National FFA Organization, 1998)	5	6.8
State Curriculum Guides/Websites	5	6.8
Local Program Success (NCAE, 2000)	4	5.4
The Power of Positive Teaching (McCormick, 1994)	3	4.1
Teaching Vocational Agriculture and Agribusiness (Binkley & Tulloch, 1981)	1	1.4
College of Education Web Site	1	1.4
What Being a Teacher Is All About (Hedges, 2000)	1	1.4
Program Planning Guide for Agriscience and Technology Education (Lee, 2000)	1	1.4

Three teacher educators (7.0%) required three reading resources. Fourteen teacher educators (32.6%) required two reading resources. Twenty-one educators (48.8%) required four reading resources. One teacher educator (2.3%) did not require a reading resource. The most

frequently required reading resource was Newcomb et al's (1986, 1993), *Methods of Teaching Agriculture*. Second, nearly one in five teacher educators required a course packet or website. Third, nearly one in seven teacher educators required a teaching methods text outside of agricultural education.

The second objective sought to identify the nature and type of assignments in teaching methods courses in agricultural education. Thirty-six out of 40 teacher educators reported lesson plans and microteachings as required assignments (Table 2). Four teacher educators did not cite lesson plans or microteachings as required assignments in their syllabi. There were 4.19 (_ = 2.42) lesson plans per course and 3.89 (_ = 2.27) microteachings per course.

Table 2.
Nature and Type of Assignments (*N* = 40)

Assignments	f	%
Lesson Plans	36	90.0
Microteachings	36	90.0
Exam	27	67.5
Participation/Attendance	27	67.5
Quizzes	19	47.5
Unit Plans	16	40.0
Papers, Essays, Philosophy Statements	16	40.0
Critiques (Self, Peer, Feedback Conferences)	16	40.0
Homework	14	35.0
Field Experience	7	17.5
Portfolio	7	17.5
Technology (PowerPoint, Web Page, WebQuest, Integration Plan)	5	12.5
Bulletin Boards	5	12.5
Course Notebook, Internship Handbook	4	10.0
Management Plans (Student, Classroom, Program)	4	10.0
Objectives, Questions/Cognitive Levels	3	7.5
Modules	3	7.5
Interest Approach	3	7.5
FFA Activities/Guidebook	2	5.0
Game	1	2.5

The third objective identified the espoused teaching methods in agricultural education. Teaching methods were identified as listed in course syllabi. Of the 40 course syllabi that listed a course schedule, teacher educators spent 20.8% (Range: 2.2 to 55.7%) of their course time on teaching methods. More than one-third (*N* = 15) courses spent less than 15% on teaching

methods. The problem solving approach to teaching was taught by 23 teacher educators and 11.6% of course time was spent teaching this method (Table 3). One-third ($N = 13$) of the teacher educators listed teaching methods, in general, as a topic in their syllabi. Nine of the top ten most commonly espoused methods were identical to methods cited in Newcomb et al's (1986, 1993) book.

Table 3.
Espoused Teaching Methods in Agricultural Education ($N = 40$)

Teaching Methods ($N = 22$)	No. of Courses	% of Course Time
Problem Solving Approach to Teaching	23	11.6
Teaching Methods (general)	13	8.8
Individual Teaching Techniques	12	4.2
Questioning	11	5.5
Discussion	9	3.3
Demonstration	8	4.8
Field Trips	8	2.6
Group Teaching Techniques	7	5.2
Lecture	6	6.5
Cooperative Learning	4	3.2
Games	4	2.5
Student-Centered	4	9.0
Teacher-Centered	4	8.6
Adult Teaching Methods	3	5.3
Formal	3	5.8
Constructivism	2	1.9
Nonformal/Informal	2	10.4
Problem-Based Learning	2	4.5
Projects	2	2.8
Role Plays	2	2.2
Experiments	1	4.4
Case Study	1	1.9

Conclusions, Implications, and Recommendations

One-fourth of the teaching methods teacher educators required Newcomb et al.'s (1986, 1993) text. The implication of this finding is that one resource, originally written seventeen years ago, widely serves the current pedagogical knowledge base for future agriculture teachers.

It is recommended that teacher educators in agriculture consider creating a current teaching methods textbook.

One-third of the teacher educators required course packets/websites or teaching methods texts outside of agricultural education. Further, one-third of the teacher educators required teaching methods texts that were dated more than 10 years. A quote from one syllabus utilized for analysis in this study serves as an implication of both of these findings. "Because a good, comprehensive, up-to-date textbook is not currently available for this course, students will need to develop a notebook of materials obtained through the educator…" (Teacher Educator). It is suggested that teacher educators review teaching methods textbooks outside of agricultural education to discover agreed-upon resources that could be considered relevant and important to the profession.

Nearly half of the teacher educators required reading resources that were low-cost or free, specifically in the form of Internet-based resources, or resources developed by individual teacher educators. One implication of this finding is that resources may be moving away from traditional textbooks as important resources for developing teachers' pedagogical knowledge. Further, it has been posited that agricultural education is a profession that learns, "by doing," (McCracken, 1994) rather than by reading and reflecting upon scholarly writings and research-based practices. Perhaps teacher educators should form special interest study groups to discuss and share ideas regarding the Internet and/or teacher educator-developed materials utilized in teaching methods courses.

Teacher educators had a wide range of the types of assignments and amount of work required in their teaching methods courses. Half of the assignments were performance-based in nature and half were more traditional in nature. The finding implies that teacher educators provide their students with a wide variety of learning opportunities through their assessment procedures. Further research should be conducted regarding the nature and types of assessment in teaching methods courses and their impact on preservice teacher performance in the student teaching internship.

The problem-solving approach to teaching is the most widely advocated teaching method in agricultural education, which was aligned with Osborne's (1994) suggestion that this method was the preferred approach in agricultural education. The most frequently taught methods were the problem-solving approach, questioning, discussion, and demonstration. This conclusion was congruent with the methods published by Hedges (2000), McCormick (1994), Newcomb et al. (1986, 1993), and Phipps and Osborne (1988).

While more than half of the courses taught the problem-solving approach to teaching, research in teaching by high school agriculture instructors indicates that teachers employ this method minimally in their programs (Osborne & Hamzah, 1989). This finding supports the implication of a theory-practice gap in agricultural education (Osborne, 1994). Further research is needed regarding methods utilized by effective agriculture teachers as well as the ways in which teaching methods courses can teach pedagogical knowledge that is more reflective of the real-world practice of teaching agriculture.

Nine of the top ten most frequently espoused teaching methods as cited in agricultural education course syllabi appeared to be directly derived from Newcomb et al's (1986, 1993) book. This finding implies that the pedagogical knowledge imparted to future teachers in agricultural education is predominantly derived from a single perspective. Research is needed regarding the degree to which agriculture teachers utilize such methods as well as the effectiveness of the methods on student learning and achievement in agriculture.

Regardless of the teaching method espoused, it can be concluded that little time is spent on teaching methods. This finding is consistent with McLean and Camp (2000) who found that topics offered in selected teaching methods courses included classroom management, curriculum design, lesson planning, evaluating students, and motivation and reinforcement among others. The pedagogical roles of the agriculture teacher are complex and varied, and teaching methods courses must also focus on preparing future teachers for such ill-structured roles. This implication is not an indictment of the knowledge espoused in teaching methods coursework; rather, it is an indictment on the structure of teacher education in universities. Perhaps one teaching methods course simply does not permit enough time to absorb, practice, and reflect upon the vast amount of pedagogical knowledge that an agriculture teacher must obtain. Further research is needed in regard to curricular structures that prepare future agriculture teachers for their complex roles.

This study was a beginning investigation into the espoused pedagogical practices in teaching methods courses in agricultural education. The findings of this study created more questions that teacher educators should pursue to gain a deeper understanding of the pedagogical knowledge underpinning the practices of developing future teachers of agriculture. A more in-depth investigation of the beliefs that underlie the pedagogical practices in agricultural education could ultimately create a dialogue among teacher educators about program improvement.

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Pedagogical Knowledge Espoused by Teacher Educators in Agricultural Education

A Critique

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Simply put, this is an excellent paper. The authors have put forward a theoretical framework that guides not only this piece of research but also should serve as the map for continued inquiry. Should not every research effort be connected to and reference such a model? I hope to read other works that address all or part of the six variables that are described in Figure 1 of the paper.

Beyond the research model, the paper is also well-written. The research is focused on outcomes of teacher education in agriculture. More and more, higher education in general is being looked at to verify and justify outcomes, as opposed to the historical emphasis on inputs. Such research should be helpful in guiding state agencies and accrediting bodies to look at the real importance of teacher education rather than simply identifying more "things you should do" in higher education.

There were three objectives for the study. Now that we see the data generated to address the first objective, we really need to ask how useful this is. Without any type of content analysis, we do not have a very clear picture of what the students are actually reading. For the three most-often-named resources, we do not know how much of each is actually "pedagogical knowledge," especially for documents that cannot be referenced, such as course packets.

The nature and type of assignments is more revealing. There is opportunity for substantial overlap in the list. For example, I would hope that "interest approach" is a part of the lesson plan assignment. Hopefully the 10 percent that do not require lesson plans in the teaching methods course have alternatives of some type, or perhaps misunderstood the question.

The responses on the third objective concerning espoused teaching methods is potentially problematic. If a teaching methods course is actually that – teaching methods – then we could assume that the vast majority of the content would address teaching methods. If so, then the typical course would include at least 15 of the teaching methods cited. Is that too much to expect? Should we think about concentrating on a few methods that work in many teaching situations, and help our students perfect a limited number of skills? Again, there is overlap in the listing in Table 3. But surely we could concentrate more on helping teachers be successful rather than making sure they have heard of every technique available.

THE EFFECTIVENESS OF TEACHER EDUCATION AS PERCEIVED BY BEGINNING TEACHERS

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Abstract

The presence of a highly qualified and certified teacher in every classroom is a noble goal, but one questions whether or not this goal is attainable given the present difficulty in finding enough certified agriculture teachers to teach in America's schools. Beginning agriculture teachers in a Southern state were asked to determine the quality of their teacher-preparation experience. The study also sought to determine if a relationship exists between a teacher's overall sense of preparedness and teacher efficacy, and determine if a difference exists between agriculture teachers prepared through a pre-service program at a teacher-education institution and agriculture teachers who had no formal preparation experience. Based upon the findings of this study, agriculture teachers with less than three years of professional experience believed that their teacher preparation programs, in most cases, adequately prepared them to teach. The study also determined that the teacher's degree of confidence in their ability to teach was positively related to their perceived effectiveness in the classroom. The study did not find any differences between methods of preparation by which a teacher enters the profession.

Introduction/Theoretical Framework

The Elementary and Secondary Education Act of 2000 will greatly influence how state education agencies and teacher education institutions prepare and certify teachers for the classroom. The presence of a highly qualified and certified teacher in every classroom is a noble goal, but one questions whether or not this goal is attainable given the present difficulty in finding enough certified teachers to teach in America's schools. The current teacher turnover rate in the southern state in which this study was completed was 12.3 percent in the 2001-2002 academic year (North Carolina Department of Public Instruction, 2002).

In the late 1990's the State Board of Education realized the need to develop a series of standards that defined the profession of teaching (North Carolina Professional Teaching Standards Commission, 2000). With cooperation from the state legislative body and the governor, the Board created a professional teaching standards commission to develop these standards. Over the course of eighteen months, the commission received input from teachers, parents, and others in "teacher town meetings". As draft standards were created, the public had the opportunity to review them and make suggestions for improvement. (North Carolina Professional Teaching Standards Commission, 2000). The standards agreed upon by the North Carolina Professional Teaching Standards Commission (2000) commission are 1.) teachers know the content they teach, 2.) teachers know how to teach students, 3.) teachers be successful in teaching a diverse population of students, 4.) teachers be instructional leaders, 5.) teachers reflect on their practice, and 6.) teachers respect and care about students. These six core standards represent the base performance level to which every teacher should be prepared upon exit from an accredited teacher education institution in the state.

In an earlier analysis of the study by Darling-Hammond, Chung and Frelow (2002) that analyzed the variation in teacher prepraration, Silvernail (1998) performed an earlier factor analysis that arrived at five basic groups similar to the North Carolina Professional Teaching Standards Commission. The results of Silvernail's analysis found the five factors that best described a teacher's sense of preparedness were: 1.) Promoting student learning, 2.) teaching critical thinking and social development, 3.) using technology, 4.) understanding learners, and 5.) developing instructional leadership (Darling-Hammond, Chung, and Frelow, 2002).

Generally speaking, agriculture teachers are prepared for field service in two ways. The first method is through a pre-service agriculture teacher education program at a higher education institution. Students in a teacher education program generally complete a baccalaureate course of study that leads to teacher certification by a state education agency. Students complete courses in technical agriculture, educational psychology and pedagogy. This course of study helps teacher candidates develop into what Delnero and Montgomery (2001) define as the three basic roles of agriculture teachers: academic teachers, coaches and mentors. The second method involves the provisional certification of a person who is coming into the teaching profession from the private sector. Persons who wish to teach, but do not have teacher certification, usually complete a series of courses designed to provide them with an understanding of the teaching process. Whether or not these provisionally certified teachers are required to have a baccalaureate degree in technical agriculture depends upon the certification requirements of the particular state in which they are teaching or plan to teach. In recent years, these two methods have been amalgamated to form a third method of teacher preparation by which the teacher with a baccalaureate degree in technical agriculture completes one additional year of college work to earn teacher certification. In this method, the teacher-education courses are reserved for this last year of academic work.

At issue is whether or not these certification pathways are valid. Darling-Hammond, Chung and Frelow (2002) surveyed 3000 teachers in the New York City school system to determine their attitudes toward their teacher preparation method. Their study found that teachers who received professional training through a pre-service teacher education program reported that they were significantly better prepared to teach when compared with the attitudes of their colleagues who were certified through a lateral-entry teacher preparation program. Specifically, teachers who had completed a formal teacher-education program felt better prepared to manage student misbehavior, and teach higher order thinking skills. Castillo and Cano (1999) found that teachers were at least slightly satisfied with their jobs on the basis of personal achievement, advancement, recognition and responsibility. This finding is congruent with the findings performed in agricultural education by Moore (1975) and Bledsoe, Cox, and Burnham (1967). Of the teachers in their study, Darling-Hammond, Chung and Frelow (2002) found that black and Hispanic teachers experienced a greater sense of efficacy than Caucasians. Furthermore, their research found that those teachers with more teaching experience tended to report greater feelings of efficacy. However, the greatest predictor of teaching efficacy was in the participants' perception of how prepared they were to teach. Teachers who felt poorly prepared reported that they would most likely not remain in teaching for very long, and would not enter teaching again as a profession if given the choice. (Darling-Hammond, Chung, and Frelow, 2002)

For urban schools, the deficiencies of teacher preparation are all too apparent. Students who graduate from teacher education programs do not wish to teach in an inner-city school

system (Follo, Hoerr, & Vorheis-Sargent, 2002). The school system is forced to find alternative means for supplying teachers for the classrooms in these inner city schools. Teacher tenure regulations further complicate the matter by making it more difficult to remove poorly prepared teachers from the classroom. (Johnson, 2002) Johnson (2002) asked school administrators to identify the key factors that would significantly improve school leadership. The most strongly reported factor was the ability of administrators to remove poor teachers from the classroom (Johnson, 2002). As teacher education institutions move toward a more concentrated focus on student learning and away from routines that have proven to be ineffective, the chasm between teachers from teacher education institutions and provisionally certified teachers will most likely continue to grow (Darling-Hammond, 2000).

Objectives

The objectives of this research is to:

1. Determine how agriculture teachers view the quality of their teacher-preparation experience.
2. Determine if a relationship exists between a teacher's overall sense of preparedness and teacher efficacy.
3. Determine if a difference exists between agriculture teachers prepared through a pre-service program at a teacher-education institution and agriculture teachers who had no formal preparation experience.

Methodology

The population for this study was agriculture teachers with five years or less formal teaching experience in a high school or middle school agricultural education program in the southeastern United States. A proportional random sample was drawn from a list of beginning teachers supplied by the state staff with responsibility for agricultural education.

This study employed a survey instrument developed by Darling-Hammond, Chung, and Frelow (2002). The survey instrument was comprised of three sections. The first section gathered demographic information about the participants in the study. Participants will be asked to provide information about their years of teaching experience, ethnic background, number of years of teaching experience, and the grade level at which they taught. Darling-Hammond, Chung and Frelow (2002) did not find gender and age to be significant factors, and thus the researcher chose to omit these variables from the study. The second section of the instrument was comprised of 40 statements requiring the participant to choose a response form a Likert-based scale. The response scale ranged from 0 (not prepared at all) to 4(well prepared). The final section of the survey instrument asked subjects to rate their opinion of statements concerning the profession of teaching. The instrument was validated by professional educators and teacher educators working in the New York public school system. An analysis of the instrument's reliability yielded a Cronbach's Alpha of .95. Data was analyzed using the Statistical Package for Social Sciences 11.5.0. For research objective one, means and standard deviations were computed for each item on the survey instrument. For research objective two, correlational statistics were computed for each item related to teacher preparedness and efficacy. The Davis convention was used to describe the magnitude of correlations (Davis, 1971). For objective three,

an independent samples T-test was performed by using the method of preparation as the grouping variable.

Findings

Sixty-one of the 74 survey instruments mailed were returned. Of these instruments, 16 were not useable because the respondents indicated that they had completed more than five years of instruction in agricultural education. The population for the study was reduced to 58 instructors. This creates a final response rate of 77.5%. Those respondents who returned survey instruments prior to the second mailing were compared with respondents who returned instruments sent out in subsequent mailings. Comparisons were made on the basis of faculty size and estimated general method of teacher preparation. Although not a part of the data collection process, the geographic region in which the late respondents are employed was available to the researcher. Furthermore, the researcher used data available through the state director for agricultural education to determine whether or not the late responders were first-year teachers. Using the method prescribed by Miller and Smith (1983), the early and late responders were compared on the basis of known data, and no significant differences were discovered.

All of the instructors in this study have earned at least a bachelors degree in some field of agriculture or agricultural education. Twenty (44%) of these teachers completed their formal education through an undergraduate teacher education program. The remaining 25 teachers earned, or are in the process of earning, their teaching license through graduate school or alternate methods. One-third of the teachers in the study had also completed some type of post-baccalaureate work with eleven teachers earning a masters degree and their teaching license. The remaining for teachers in the study with graduate level experience received their teacher certification through provisional means. Of the remaining teachers in the study, one entered the teaching profession as a substitute teacher and worked into a permanent position in an agricultural education program. One teacher entered the teaching profession through participation in Teach for America. Of the teachers in the study, 13 entered the profession with no prior teaching experience, but with a college degree in an agriculturally related field. In summary, 62.2% of respondents (n=28) came into teaching via a teacher education program, and 84.4% of respondents (n= 38) had three years or less teaching experience. Most of the respondents work in a single-teacher program (n=28) with the remaining ones predominantly in two-teacher programs. The average age of respondents was 32, with 56% of respondents (n=25) at or below the age of 29.

One question on the survey instrument asked the participants to determine how well prepared they were to teach when they first started teaching. Teachers in this study reported that they were adequately prepared to teach (M=1.86, SD=0.58). With regard to teacher efficacy, participants were confident that they were making a difference in the lives of students(M = 2.60, SD = 0.57) and that they can handle most discipline problems in the classroom (M = 2.33, SD = 0.63). Participants also agreed that they have the ability to reach and teach students (M = 2.26, SD = 0.44) while maintaining a high standard of performance (M = 2.00, SD = 0.67). Conversely, participants in this study believe that they had an influence on the success of students, more so than students' peers and home environment. However, teachers expressed that they did not know how to teach some of their students, and that academic failure is due to the

students' failure to apply their skills and abilities in the academic setting. Respondents disagreed with the idea that they had little influence over students. Table 1 describes the mean responses to items regarding teacher efficacy.

Table1

Mean Scores of Respondents on Items Related to Teacher Efficacy

Item (n= 45)	Mean	SD
I am confident I am making a difference in the lives of students	2.60	0.57
I am confident in my ability to handle most discipline problems that may arise in my classroom	2.33	0.63
If I try hard I can get through to most of my students.	2.26	0.44
Students fail because they do not apply themselves.	2.26	0.65
I am confident in my ability to integrate information technology into my students' learning.	2.22	0.64
I am confident in my ability to teach all students to high levels.	2.00	0.67
I am uncertain how to teach some of my students.	1.75	0.65
My students' peers have more influence on their motivation and performance than I do.	1.60	0.57
Most of a students' experience depends on the home environment, so teachers can have little influence.	.99	0.58

Note. 0 = Not Prepared; 1 = Poorly Prepared; 2 = Adequately Prepared; 3 = Very Well Prepared

From among those items that addressed the promotion of student learning, participants in this study felt most prepared to use instructional strategies that helped students learn (M = 2.22, SD = 0.70). Respondents felt adequately prepared to set challenging and appropriate expectations for students (M = 2.17, SD = 0.68), and teach subject matter in a manner that enables students to learn (M = 2.15, SD = 0.56). Overall, respondents used their knowledge about teaching and the curriculum to plan instruction (M = 2.15, SD = 0.63). To a lesser extent, respondents reported that they were adequately prepared to create relevant curriculum materials (M = 2.04, SD = 0.63), create discipline-based curriculum materials (M = 1.88, SD = 0.80), evaluate curriculum materials (M = 2.08, SD = 0.59) and secure relevant teaching materials from community resources (M = 2.06, SD = 0.86). Not every respondent felt prepared to choose appropriate teaching strategies to meet individual student needs (M = 2.04, SD = 0.67) and help students meet rigorous academic standards (M = 2.00, SD = 0.70), but the majority of respondents did feel at least adequately prepared to do these. The majority of respondents felt at least adequately prepared to assess student learning in a variety of ways (M = 1.95, SD = 0.70). Respondents indicated that they were prepared to help students assess their own learning (M = 1.73, SD = 0.65) and understood how different students learn (M = 1.82, SD = 0.71). Table 2 reports the mean responses to items related to student learning.

Table 2

Mean Scores of Respondents on Items Related to Promoting Student Learning

Item	Mean	SD
Use instructional strategies that promote active student learning.	2.22	0.70
Set challenging and appropriate expectations of learning and performances of students.	2.17	0.68
Teach subject matter in a way that enables students to learn.	2.15	0.56
Plan instruction by using knowledge of learning subject matter, curriculum, and student development.	2.15	0.63
Evaluate curriculum materials for their usefulness and appropriateness for your students.	2.08	0.59
Identify and obtain materials and use community resources to create a multicultural curriculum.	2.06	0.86
Choose teaching strategies to meet different student needs.	2.04	0.67
Develop curriculum that builds on students' experiences, interests, and abilities.	2.04	0.63
Help students achieve high academic levels.	2.00	0.70
Use a variety of assessments (e.g. observation, portfolios, tests, performance tasks, anecdotal records,) to determine students' strengths and needs.	1.95	0.70
Create discipline-based and interdisciplinary curriculum.	1.88	0.80
Understand how different students in your classroom are learning.	1.82	0.71
Help students learn how to assess their own learning.	1.73	0.65

Note. 0 = Not Prepared; 1 = Poorly Prepared; 2 = Adequately Prepared; 3 = Very Well Prepared

With regard to teaching critical thinking and social development, respondents indicated that they were adequately prepared to use questioning skills to stimulate student learning, and through their preparation were adept at developing students own questioning skills. Teachers also felt adequately prepared to use effective communication strategies to guide student learning and were able to engage students in cooperative group work as well as independent work. Teachers felt adequately prepared to help students learn to think critically, interpret ideas from different perspectives, and develop the classroom environment that promoted social development while helping students become self-motivated. Table 3 reports the mean responses to items related to critical thinking.

Respondents in this study indicated that they were at least adequately prepared to support research and analysis. The primary method for doing this was through use of the World Wide Web. Teachers were also prepared to teach teamwork and collaboration skills, assess student progress and use technology to increased student interest in the subject matter. Teachers also indicated that they were prepared to use technology to communicate with others in the school and community. Table 4 reports the mean responses to items related to technology. Teacher preparation programs adequately prepared respondents in this study to understand how students family and background may influence learning. Respondents felt at least adequately prepared to understand how students social emotional physical and cognitive development influence to their

learning, and how factors in the students environment influenced their learning. To a lesser extent, respondents felt adequately prepared to engage parents and learning process, and formulate instruction to meet special learning needs. Table 5 reports the mean responses to items related to understanding learners. As instructional leaders, teachers felt adequately prepared to assume leadership responsibilities in their respective schools. Teachers indicated that ability to maintain an orderly learning environment and plan and solve problems collaboratively with their colleagues. To a lesser extent teachers felt prepared to resolve conflicts between students. Table 6 reports the mean responses to items related to instructional leadership.

Table 3

Mean Scores of Respondents on Items Related to Teaching Critical Thinking and Social Development

Item	Mean	SD
Use questions to stimulate different kinds of student learning.	2.31	0.73
Develop students' questioning and discussion skills.	2.31	0.66
Use effective verbal and nonverbal communication strategies to guide student learning and behavior.	2.26	0.68
Engage students in cooperative group work as well as independent learning.	2.22	0.76
Help student learn to think critically and solve problems.	2.17	0.71
Develop a classroom environment that promotes social development and group responsibility.	2.17	0.64
Encourage students to interpret ideas from diverse perspectives.	2.04	0.63
Help student become self-motivated and self-directed.	2.00	0.67

Note. 0 = Not Prepared; 1 = Poorly Prepared; 2 = Adequately Prepared; 3 = Very Well Prepared

To determine whether a difference existed between teachers prepared at a preservice program at a teacher education institution and agriculture teachers who had no formal preparation experience, an independent samples t-test was performed. The test variables were the mean scores for each of the following subscales efficacy content practice diversity leadership reflection and Rapport. Respondents in the survey were placed into two groups. One group included all those instructors who were prepared in a traditional preparation program in teacher education. The remaining instructors who into the teaching profession through alternative preparation means methods were placed in the other group. As a result by the independent samples t-test, only one significant difference was found to exist between the means of these two groups on item number two on the survey instrument. This item asked students to rate their ability to determine how different students in the classroom were learning. The teachers prepared via the traditional method of teacher education indicated a higher mean score (M=2.03, SD=0.63) than their counterparts prepared via alternate certification methods (M=1.47, SD=0.71). To determine if a relationship existed between teachers' perceptions of their teacher preparation method and their effectiveness in the classroom, a correlational test was performed on the data. The moderately strong positive correlation was found to exist between the respondent's sense of preparedness and their ability to handle discipline problems in the classroom, their ability to teach students at a challenging level. A moderately strong positive correlation also exists between the respondents' preparedness and their confidence level in

making a difference in students' lives. There also exists a moderately strong correlation between preparedness to teach and the delivery of a rigorous academic program that integrates information technology. A moderately negative correlation was also found to exist between teacher preparedness and the likelihood that the teacher's opinion would indicate that student success is more dependent on the home environment than the classroom instructional environment. Table 7 reports the results of the correlational analysis.

Table 4

Mean Scores of Respondents on Items Related to Using Technology

Item	Mean	SD
Support research and analysis.	2.37	0.68
Enhance group collaboration and teamwork.	2.26	0.71
Communicate with others (school community, state, country and world).	2.24	0.74
Increase student interest and learning.	2.11	0.57
Assess and track student achievement.	2.00	0.73

Note. 0 = Not Prepared; 1 = Poorly Prepared; 2 = Adequately Prepared; 3 = Very Well Prepared

Table 5

Mean Scores of Respondents on Items Related to Understanding Learners

Item	Mean	SD
Understand how students' family and cultural background may influence learning.	2.08	0.63
Understand how students' social, emotional, physical and cognitive development influences learning.	2.04	0.70
Understand how factors in the students' environment outside the school may influence their life and learning.	2.02	0.69
Work with parents and families to better understand students and to support their learning.	1.82	0.74
Identify and address special learning needs and/or difficulties.	1.75	0.71

Note. 0 = Not Prepared; 1 = Poorly Prepared; 2 = Adequately Prepared; 3 = Very Well Prepared

Table 6

Mean Scores of Respondents on Items Related to Developing Instructional Leadership

Item	Mean	SD
Assume leadership responsibilities in your school.	2.26	0.71
Maintain an orderly and purposeful learning environment.	2.11	0.71
Plan and solve problems with colleagues	2.06	0.78
Resolve interpersonal conflict in the classroom.	1.80	0.69

Note. 0 = Not Preparedl; 1 = Poorly Prepared; 2 = Adequately Prepared; 3 = Very Well Prepared

Table 7

The Relationship Between the Mean Scores of Respondents on Teacher Preparation and Teacher Efficacy

Items	Overall, how well prepared did you feel when you first started teaching?
If I try hard I can get through to most of my students.	.095
I am confident in my ability to handle most discipline problems that may arise in my classroom.	.480(*)
Students fail because they do not apply themselves	-.060
My students' peers have more influence on their motivation and performance than I do.	.098
I am confident in my ability to teach all students to high levels.	.387(*)
I am confident I am making a difference in the lives of students.	.411(*)
I am uncertain how to teach some of my students.	.248
I am confident in my ability to integrate information technology into my students' learning.	.320(*)
Most of a student's experience depends on the home environment, so teachers can have little influence.	-.301(*)

Note: * p <.05.; 0 = Strongly Disagree; 1 = Disagree; 2 = Agree; 3 = Strongly Agree

Conclusions and Discussion

Based upon the findings of this study, the following conclusions or reached:

1. Agriculture teachers with less than five years of professional experience believed that their teacher preparation programs, in most cases, adequately prepared them to teach. Teachers in this study indicated that they possessed a degree of competence in their ability influence students in a positive way. They expressed competence in their ability to handle the sublime problems they manage the classroom for effective student learning.

2. A significant relationship exists between a teacher's overall sense of preparedness and certain aspects of teacher efficacy. Teachers who reported a sense of preparedness for the classroom also indicate a significant degree of confidence in an ability to handle visible problems, confidence in the ability to teach all students at a challenging levels, and confidence in the ability to integrate technology into their learning

3. The method of preparation by which a teacher enters the profession does not seem to influence their perceptions of preparedness for field service. No differences were found between the two groups with regard to teacher efficacy, content area knowledge, practice, leadership within the school, professional reflection, and rapport with students. While the study did not find any differences between traditionally prepared teachers and alternatively-certified teachers, the small sample size and population for this study make it imprudent to generalize the results of this study beyond it's population.

The first thing that comes to mind about this study is the discovery that the state consultants did not correctly identify the correct number of teachers with five years or less teaching experience in agricultural education. Twenty one percent of the teachers who initially received a survey instrument were not eligible to participate in the study. This error is probably the result of the nomadic nature of agriculture teachers and the inaccuracy of data supplied by the State Department of Public Instruction. Furthermore, there are more than 100 local school districts in this state, and each district has the responsibility for hiring its own teachers. It is possible that the information regarding teacher tenure supplied to the state leadership for agricultural education by local school districts is inaccurate. This raises the important question of whether or not all of the teachers with less than five years of teaching experience have been correctly identified for inclusion in this study. It is possible that teachers who were eligible to be included in the study were not. Furthermore, the inaccuracy of beginning teacher data makes in-service education for beginning teachers difficult because there exists the potential to exclude some beginning teachers from much needed induction programs.

With regard to how agriculture teachers view the quality of their teacher preparation experience, it is important to note that the respondents believed that they had been adequately prepared to teach. Overall, teachers feel good about the job they do in the classroom and they believe they possess the adequate skills necessary to promote student learning to acceptable levels. They also believe in their ability to teach critical thinking skills and help students develop socially within the classroom. The teachers believe that they were adequately prepared to use technology in the classroom to engage students in the lesson and that same technology can be used to assess and track student achievement. Teachers believe that the methods that better enabled them to understand learners better. Teacher preparation methods helped the respondents learn how to prepare good learning experiences for students by introducing them to the importance of understanding the whole student. A student is more than just the person sitting in a class during a given class period. Teachers in the survey indicated that they understood that the student is a complex individual with a unique family and cultural background, and that the student is influenced by their present state of social, emotional, physical and cognitive development.

Teachers in this study believed that their preparation for the classroom included the development of leadership skills. Consequently, our teachers are confident in assuming leadership responsibilities and have skills in a collaborative problem solving. The mean scores for interpersonal conflict resolution in the classroom were relatively lower than other items related to instructional leadership. While the teacher education programs can teach prospective teachers the foundations of classroom management including conflict resolution, perhaps this skill is best refined on the job. Objective two of this study sought to determine if a relationship existed between a teacher's overall sense of preparedness and teacher efficacy. This study found some significant positive relationships between teacher preparation and efficacy. The more that a teacher felt prepared to teach, the more likely they were to feel that they were being effective in the classroom. Specifically, teachers who felt they were well prepared to teach also were confident in their ability to handle visible problems in the classroom. Furthermore teachers who felt well prepared to teach also felt confident in their ability to teach students to high levels, and that they were making a difference in the lives of students. Teachers who also were well

prepared to teach also were confident in the ability to integrate information technology in the classroom. This study found that the higher of the teachers sense of preparation, the less likely they were to feel powerless in their influence over students. This finding is congruent with other studies in the profession. Because of the stress and workload associated with the first few years of teaching (Stoner and Wankel, 1986), it is a positive sign that teachers see pre-service preparation for the classroom as a key factor in their teaching effectiveness.

Objective three of the study sought to determine whether or not a difference existed between agriculture teachers prepared for pre-service program and teacher education institutions and those agriculture teachers who had no formal preparation experience. Although only 13 teachers in this study came into the profession with no prior teaching experience, this researcher had expected to see more than just the minor difference between those teachers and those prepared by a teacher education institution. The only difference that this research study found was in the area of learning styles. Teachers to graduated from teacher education institutions had a better grasp of how different students were learning in the classroom. While it is reassuring to know that the majority of teachers have indeed learned something about teaching from their teacher education institution, the responses from teachers who did not go through a teacher education institutions raises a major concern. Either teacher education does not make a strong difference in the preparation of teachers for the classroom, or those teachers who have no pre-service experience do not have a valid interpretation of their skills and abilities. Since other studies have found that teacher education does work, perhaps the reason teachers with no pre-service experiences rated their abilities so highly is because they do not know what they do not know.

There is one other possibility that may explain the lack of difference between teachers with pre-service experience and those teachers with no pre-service experience. In the state where this study was performed, teachers with no pre-service experience generally go to the teacher education institutions for coursework that fulfills provisional licensure requirements. So, the reason why so many teachers with no pre-service experience rated their abilities as comparable to teachers with pre-service experience could be due to the fact that they both received or are in the process of receiving instruction from the same teacher education institutions. This argument reduces the differences between pre-service trained teachers and in-service trained teachers to a matter of timing – some teachers took education courses in college and some took them, or are taking them, while actively engaged in teaching.

Recommendations

It is recommended that the teacher education departments in this state develop a valid and reliable method for collecting a common core of data regarding beginning and experienced teachers. If teacher educators can devise a system for accurately collecting data about teachers in the field, it is possible to reduce the potential for sampling error in research. Teachers educators could create a common core of data that regularly collects data regarding teacher tenure, teaching responsibilities, agricultural education program characteristics, and demographic information. It is also recommended that this study be conducted on a regional or national level. It would be unwise to draw inferences about differences between traditionally prepared teachers and

alternately licensure teachers given the low number of teachers in this study with alternate licensure.

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The Effectiveness of Teacher Education as Perceived by Beginning Teachers

A Critique

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This study is another of a fairly long series of papers in agricultural education that address the perceived effectiveness of a teacher education program and differences that may be attributed to the type of program completed for certification. While the title does not include any hint that teacher preparation program differences are central to the study, the theoretical framework clearly leads the reader to that conclusion. In addition, the question could be raised regarding how appropriate it is to collect such data from teachers who have taught so little. A statement in the discussion section addresses this point.

The author addressed a potential problem with the study, noting that frame error was, indeed, a problem that arose during the study. There was no indication that any measures were taken to re-validate the list of teachers who should have been included in this population study. Moreover, non-response error was purportedly controlled by comparing early and late respondents. There is no case made that this technique for controlling non-response error is the most appropriate. Coupled with the stated frame error concern, the results of this study should not be generalized beyond the respondents. The statistical tests reported in Table 7 are therefore not appropriate.

The problems that are investigated in this study are much more complex than presented here. It would be helpful to know how and where this particular line of inquiry appears in a framework for research and investigation. Everyone in this profession knows that better preparation makes better teachers, and, with all else equal, a four-year teacher education program is superior to anything less. What do we really want to know and need to know about teacher education via a baccalaureate degree program and teacher licensing via alternative programs? And what difference will it make? Do we merely want to collect information that helps us survive, or do we want to improve the preparation of high school teachers of agriculture, regardless of the source of candidates? The final conclusion draws attention to the notion that perhaps both avenues of teacher preparation in North Carolina are similarly successful because leadership for the programs is provided by the same people.

Back to the statement regarding the respondents' potential inability to reflect accurately upon their preparation – it could also be asked whether teachers with less than three or four years of experience are adequately prepared to respond to the statements on the survey. At what point do we truly have it all together so that we know what we know and how we acquired what we know?

Supervisory Practices Used by Teacher Educators in Agriculture: A Comparison of Doctoral/Research Extensive and Research Non-Extensive Institutions

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Abstract

The purpose of this study was to compare student teacher supervision among doctoral/research extensive and research non-extensive institutions. Results of this census study provide benchmark data on supervisory practices followed by teacher educators in doctoral/research extensive and research non-extensive institutions.

The doctoral/research extensive (N=111) and research non-extensive (N=34) teacher educators who participated in the study were male and had received formal training on supervision. In addition, these teacher educators devoted, on average, 19% of their academic appointment to supervision, conducted three on-site visits lasting approximately four to five hours, and had served as a cooperating teacher for two student teachers. On average, teacher educators from doctoral/extensive institutions had been a university supervisor for 14 years and research non-extensive teacher educators had been a university supervisor for 12.5 years.

Based on the Supervisory Options for Instructional Leaders (SOIL) Model, respondents from the doctoral/research extensive and research non-extensive institutions used components of clinical supervision to a greater extent than contextual or differentiated supervision. The most frequently used level of the SOIL Model utilized by teacher educators of doctoral/research extensive institutions was the structured level; however, the moderately structured level was the most frequently utilized by teacher educators of research non-extensive institutions.

Introduction/Theoretical Framework

Supervisors were once inspectors of teaching instead of partners in helping teachers to become better educators (Bolin & Panaritis, 1992). However, this situation appears to be changing. Sullivan and Glanz (2000) define supervision today as "a process of engaging teachers in instructional dialogue for the purpose of improving teaching and increasing student achievement" (p. 24). In addition, supervisors of the 21st century will be expected to collaborate more with teachers (Sullivan & Glanz, 2000) and employ non-threatening supervisory approaches (Glickman, Gordon, & Ross-Gordon, 2001).

Non-threatening supervision may exist if a variety of supervisory models are utilized by teacher educators for different situations. Fritz and Miller's (2003b) Supervisory Options for Instructional Leaders (SOIL) Model, a revised version of the Escalation Model (Fritz & Miller, 2002), is a continuum of various supervisory models from which supervisors and teachers of agricultural instruction may select.

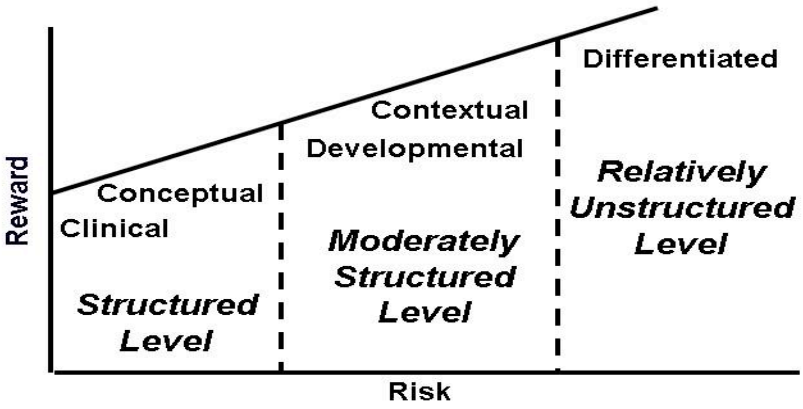

Figure 1. Supervisory Options for Instructional Leaders (SOIL) Model

The SOIL Model (Figure 1) consists of three levels: structured, moderately structured, and relatively unstructured. Each level consists of models that could help supervisors and teachers develop professionally over time. There are two specific features of the model: risk and reward. Risk is defined by Mish (1989) as "the exposure to possible loss or injury" (p. 632). Some possible risks to a supervisor could be loss of job title, criticism of work ethic by colleagues, and accountability for teacher performance. Reward is defined as "something given or offered for some service or attainment" (Mish, 1989, p. 628). Although the readiness level of a teacher is not a major component of the SOIL Model, an instructional leader should consider it when choosing to use a particular supervision approach. Hersey, Blanchard, and Johnson (2001) define readiness as "the extent to which a follower demonstrates the ability and willingness to accomplish a specific task" (p. 175).

The structured level in the SOIL Model consists of clinical and conceptual models of supervision. Goldhammer, Anderson, and Krajewski (1993) and Cogan (1973) identified five major steps in clinical supervision: planning conference, classroom observation/data collection, analysis/strategy, supervision conference, and postconference analysis. The conceptual model developed by Edmeirer and Nicklaus (1999) outlined organizational factors (e.g., work load, classroom climate, support of colleagues, decision making, role conflict, support from supervisor via supervision) and personal factors (e.g., life stage, teaching assignment, interpersonal, intrapersonal, conceptual level, experience in education, knowledge of subject) that influence teacher commitment and trust in the teaching system as well as how these factors directly reflect the performance quality of a teacher.

The moderately structured level in the SOIL Model consists of developmental and contextual models of supervision. Supervisors using the developmental model (Glickman et al., 2001) provide three types of assistance: directive, collaborative, and nondirective, depending on a teacher's conceptual level of thinking, expertise, and commitment to teaching. In the contextual model (Ralph, 1998), supervisory styles are matched to a teacher's development or readiness level to perform a particular teaching task. The four supervisory styles are directing,

coaching, supporting, and self-regulating. These models could be appropriate for an intermediate level of supervisor maturity.

The supervisory model recommended for the relatively unstructured level is differentiated supervision. Differentiated supervision is a unique approach to supervision because it allows a teacher to choose which type of supervisory technique he/she will receive (Glatthorn, 1997). The techniques that are embodied in differentiated supervision are: intensive development (special approach to clinical), cooperative professional development, self-directed, and administrative monitoring**.**

Since supervision plays a significant role in the teaching and learning process, one might expect to find a significant amount of discipline specific studies related to the supervision of student teachers. In recent efforts by Fritz and Miller (2003a), the supervisory process that exists in agricultural education has been surfaced. Moreover, one conclusion drawn from their study was the high value teacher educators in agricultural education place on student teacher supervision. But, is the supervision of student teachers uniformly valued by teacher educators in agricultural education across different types of institutions? Recently, a department head at a doctoral/research extensive university, commented that supervising student teachers occupied valuable time of teacher educators. He eluded that faculty's time could be better spent researching and securing extramural funding. One may argue that pressures to obtain extramural funding and research responsibilities differ slightly across different classifications of institutions.

Prior to 2000, institutions were classified as Research I and II, Doctoral I and II, MA I and II, and BA I and II (McCormick, 2000). Since 2000, the classifications have changed to Doctoral/Research Extensive (DR Ext), Doctoral/Research Intensive (DR Int), Master's (Comprehensive) Colleges and Universities I (MA I), Master's (Comprehensive) Colleges and Universities II (MA II), Baccalaureate Colleges-Liberal Arts (BALA), Baccalaureate Colleges-General (BA Gen), and Baccalaureate/Associate's College (BA AA) (McCormick, 2000).

There are three primary types of institutions that prepare agricultural education teachers 1) doctoral/research extensive, 2) doctoral/research intensive, and 3) master's (comprehensive) colleges and universities. McCormick (2000), a scholar for the Carnegie Foundation, defines DR Ext as an "institution that has a wide range of baccalaureate programs and awards 50 or more doctoral degrees per year across 15 disciplines" (p. 7); DR Int as an "institution that offers a wide range of baccalaureate programs and awards at least 10 doctoral degrees per year across three or more disciplines, or at least 20 doctoral degrees per year overall" (p. 7); and MA I as an "institution that offers a wide range of baccalaureate programs and awards 40 or more master's degrees annually across three or more disciplines" (p.7).

Although arbitrary, scholars (Boyer, 1990; Noll, 1998) have attempted to differentiate between the mission statements of different types of institutions. Faculty members of primarily research extensive institutions tend to devote approximately 25 to 75 percent of their time to teaching, devote a significant part of teaching to advanced degree students, are promoted based primarily on research endeavors, and obtain extramural funding that is a substantial portion of the universities' budget (Boyer, 1990; Noll, 1998). Furthermore, teaching becomes a second

priority and, therefore, the organization becomes a research institution that "engages in on the job training" (Noll, 1998, p. 6).

Faculty members of research non-extensive institutions focus a greater amount of their efforts to teaching and the primary mission of the university is teaching (Boyer, 1990; Noll, 1998). In addition, the staffing decisions reflect these teaching efforts and therefore research and securing external funding is valued as a second priority (Boyer, 1990; Noll, 1998).

One might reasonably hypothesize that the type of institution would influence supervisory practices of student teachers in agriculture; however, no research-based evidence exists. Therefore, the question remains: Does the type of institution influence the supervisory practice of student teachers?

Purpose and Objectives

The purpose of this study was to compare student teacher supervision among doctoral/research extensive and research non-extensive institutions. Three objectives guided the study.

Objectives:

1. Describe and compare characteristics of teacher educators in doctoral/research extensive and research non-extensive institutions that supervised student teachers in agriculture from September 2000-May 2001.

2. Determine the extent to which teacher educators in doctoral/research extensive and research non-extensive institutions in agricultural education used select models of instructional supervision.

3. Describe and compare the percentage of teacher educators in doctoral/research extensive and research non-extensive institutions who used structured, moderately structured, and relatively unstructured supervisory models.

Methods and Procedures

This census study was descriptive in nature. The population consisted of 167 teacher educators from 67 institutions who were responsible for supervising student teachers from September 2000-May 2001. Regional representation of participating institutions was 93% for the western region, 86% for the central region, 73% for the eastern region, and 68% for the southern region. There were 88 institutions listed in the American Association of Agricultural Education (AAAE) directory (Dyer, 2000). The 88 institutions were contacted by email or phone and 67 agreed to participate. Therefore, the 67 institutions represented 76% of the agricultural teacher education programs in the United States. The list of teacher educators was obtained by contacting the administrator of each agricultural education department or section in universities throughout the United States. The reader is cautioned not to generalize beyond the 67 institutions that participated in the study.

A questionnaire was developed by the researchers based on a review of literature about supervision and from the proposed Escalation Model developed by Fritz and Miller (2002). Portions of the questionnaire that were relevant to this report included behavioral questions that were related to a particular supervisory model and demographic questions.

Respondents were instructed to indicate to what extent they engaged in a specific behavior related to student teacher supervision. One behavior appeared in each. This behavior related to a specific type of supervisory model. Types included were clinical supervision, contextual supervision, and differentiated supervision. The total number of questions representing each type of supervisory model was: five for clinical supervision, five for contextual supervision, and one for differentiated supervision. This section was quantified using a Likert-type scale consisting of the following choices: Never=1, Sometimes=2, Often=3, and Always=4. One model was selected to represent each level of the SOIL Model. Clinical supervision represented the structured level, contextual supervision represented the moderately structured level, and differentiated supervision represented the relatively unstructured level.

A panel of experts on instructional supervision determined the content and face validity of the questionnaire. This panel consisted of Dr. Edwin Ralph, founder of contextual supervision, from the University of Saskatchewan; Dr. Allan Glatthorn, founder of differentiated supervision, from East Carolina University; and Dr. Robert Martin, a teacher educator in agricultural education who has published research on instructional supervision, from Iowa State University. In order to establish a test-retest reliability coefficient, the questionnaire was initially pilot tested with a group of nine secondary education supervisors from the College of Education at Iowa State University. The test-retest interval was two weeks. Questions with reliability coefficients of less than .70 were revised. A participant from the pilot study group was consulted about how best to revise these questions. A second pilot-test group, consisting of five teacher educators in agricultural education from Iowa State University, participated in a test-retest of the revised questionnaire. The test-retest interval for the second pilot study was two weeks. Reliability coefficients, based on data from the second pilot study, were .86 for clinical supervision, .71 for contextual supervision, and .80 for differentiated supervision.

Data were collected by mailed questionnaire. In May 2001, the questionnaire, accompanied by a cover letter and a stamped return envelope, was sent to 167 teacher educators responsible for supervising student teachers in agricultural education. In June 2001, a second mailing (consisting of a cover letter, questionnaire, and a stamped return envelope) was sent to all nonrespondents, stressing the importance of their participation.

In total, 145 out of 167 questionnaires were completed and returned, for a response rate of 87%. Nonresponse error was handled by comparing early to late respondents (Miller & Smith, 1983). Deciding which respondents would be treated as early or late was influenced by the work of Barrick, Na, and Catri (1994). Early respondents were classified as the first half of respondents to return the survey, and late respondents were the second half of respondents to return the survey. No statistically significant differences were found on the supervisory behavior questions or the demographic variables between the early and late respondents.

In addition, all individual surveys were separated into two categories: doctoral/research extensive or research non-extensive institutions. Doctoral/research extensive classifications were determined by The Carnegie Foundation for the Advancement of Teaching (McCormick, 2000) and the research non-extensive institutions were a combination of the doctoral/research intensive and MA I institutions. There were 111 returned questionnaires identified as doctoral/research extensive and 34 returned questionnaires identified as research non-extensive.

All data were analyzed using SPSS. The statistics deemed appropriate for the study included frequencies, percentages, means, and standard deviations.

Results/Findings

Demographic Characteristics

Table 1 displays the demographic characteristics of teacher educators from doctoral/research extensive and research non-extensive institutions. The majority of doctoral/research extensive and research non-extensive teacher educators participating in this study were male professors. In addition, teacher educators from both institutional types had received tenure and formal training on supervision. The doctoral/research extensive teacher educators utilized more non-faculty members (visiting professor, instructors, and graduate students) than research non-extensive teacher educators to supervise student teachers.

Table 1

Demographic Characteristics of Doctoral/Research Extensive (DRE) and Research Non-Extensive (RNE) Teacher Educators

	DRE		RNE	
Characteristics	*f*	%	*f*	%
Academic Rank				
Professor	39	35.5	14	41.2
Associate Professor	27	24.5	3	8.8
Assistant Professor	19	17.3	12	35.3
Visiting Professor	1	.9	0	0.0
Instructor	8	7.3	1	2.9
Graduate Assistant	11	10.0	0	0.0
Other Professionals	5	4.5	4	11.8
Total	110	100.0	34	100.0
Formal Training				
Yes	79	71.8	28	82.4
No	31	28.2	6	17.6
Total	110	100.0	34	100.0
Tenure				
Yes	67	60.4	21	61.8
No	44	39.6	13	38.2
Total	111	100.0	34	100.0
Gender				
Male	98	89.1	31	91.2
Female	12	10.9	3	8.8
Total	110	100.0	34	100.0

Table 2 summarizes respondents' summary characteristics. On average, teacher educators from doctoral/research extensive institutions had 14 years of supervisory experience at the university level, six years of high school teaching experience, and two experiences as a cooperating teacher. On average, research non-extensive teacher educators had 12.5 years of supervisory experience at the university level, seven years of high school teaching experience, and two experiences as a cooperating teacher. Both doctoral/research extensive and research non-extensive teacher educators devoted, on average, 19% of their time during the 2000-2001 academic year to supervising student teachers. On average, doctoral/research extensive and research non-extensive teacher educators made three on-site visits to each student teacher; however, each visit lasted approximately 5.4 hours for doctoral/research extensive teacher educators and four hours for research non-extensive teacher educators. For the 2000-2001 academic year, there was an average of 17 student teachers per doctoral/research extensive institution, with six student teachers assigned to each supervisor. Research non-extensive teacher educators had, on average, 10 student teachers/department, with seven student teachers assigned to each teacher educator.

Table 2

Summary Characteristics of Doctoral/Research Extensive (DRE) and Research Non-Extensive (RNE) Teacher Educators

	DRE				RNE			
Item	*N*	*Range*	*M*	*SD*	*N*	*Range*	*M*	*SD*
Years of teaching high school agricultural education	111	0-21	5.68	3.73	34	0-37	7.41	7.67
Cooperating teacher experience (number of student teachers)	109	0-14	1.66	2.69	32	0-15	1.88	3.05
Percentage of time devoted to supervising student teachers from September 2000-May 2001	104	0-45	19.36	44.74	31	0-50	19.02	13.26
Years supervising student teachers at the university level	110	1-37	13.66	10.14	34	1-42	12.49	9.73
Student teachers from September 1, 2000-May 31, 2001 for the agricultural education program	109	0-50	16.77	10.43	33	0-31	9.91	7.76
Number of student teachers supervised from September 1, 2000-May 31, 2001 by each supervisor	110	1-30	6.00	5.74	34	0-20	6.71	5.28
Hours spent with each student teacher/visit	111	1.50-9	5.40	1.83	34	2-8	3.93	1.67
On-site visits to each student teacher	111	1-9	2.93	1.32	34	1-5	3.07	1.03

Use of Supervisory Models

Table 3 displays the extent to which teacher educators from doctoral/research extensive and research non-extensive institutions used a particular supervisory model. Each level of the SOIL Model is represented by one supervisory model. Clinical supervision represents the structured level, contextual supervision represents the moderately structured level, and differentiated supervision represents the relatively unstructured level.

The components of the clinical supervision model were used by both doctoral/research extensive and research non-extensive teacher educators to a greater extent than the components of the contextual or differentiated models. Doctoral/research extensive teacher educators always (M=3.60) used components of the clinical model, often (M=3.48) used components of the contextual model, and sometimes (M=1.75) used components of the differentiated model. Research non-extensive teacher educators often (M=3.41) used components of the clinical, often (M=3.38) used components of the contextual models, and sometimes (M=1.59) used components of the differentiated model. The differentiated model was the least used of the supervisory models in both types of institutions. Differentiated supervision consists of four options. The extent to which the teacher is allowed to choose the option he/she will receive was the variable of interest. Teacher choice, not particular options, is the essence of this model.

Table 3

The Extent That Teacher Educators in Doctoral/Research Extensive (DRE) and Research Non-Extensive (RNE) Institutions Used Components of Different Supervisory Models

	DRE			RNE		
Supervisory Model	*N*	*M*[a]	*SD*	*N*	*M*[a]	*SD*
Structured Level *Clinical Supervision*	108	3.60	.34	34	3.41	.51
Moderately Structured Level *Contextual Supervision*	108	3.48	.42	34	3.38	.54
Relatively Unstructured Level *Differentiated Supervision*	106	1.75	.96	34	1.59	.66

[a]Note. Likert Scale: 1-1.5=Never, 1.51-2.5=Sometimes, 2.51-3.5=Often, 3.51-4=Always

Level of the Escalation Model Used

Table 4 displays the level of the SOIL Model that doctoral/research extensive and research non-extensive teacher educators in agricultural education tended to use most often. A mean was calculated for each respondent on the extent to which each of the supervisory levels was used. The level with the highest mean was coded as the most frequently used on a new variable "level." Half (50.48%, N=52) of the doctoral/research extensive teacher educators in agricultural education most frequently used the supervisory model from the structured level; however, approximately 62% (N=21) of the teacher educators from research non-extensive institutions most frequently used the moderately structured level. Exclusively, only seven (6.80%) of the teacher educators from doctoral/research extensive institutions utilized the relatively unstructured level.

Table 4

Doctoral/Research Extensive (DRE) and Research Non-Extensive (RNE) Teacher Educators Most Frequently Used Level of the SOIL Model

	DRE		RNE	
Level of Supervision	*f*	%	*f*	%
Structured	52	50.48	13	38.24
Moderately Structured	44	42.72	21	61.76
Relatively Unstructured	7	6.80	0	0.00
Total	103	100.00	34	100.00

Conclusions/Implications/Recommendations

The data from this study was gathered from 67 of the 88 institutions listed in the AAAE (Dyer, 2000) directory. The reader is cautioned that the results of this study cannot be generalized to all teacher education programs but only to the 67 that agreed to participate.

The characteristics of the doctoral/research extensive and research non-extensive teacher educators illustrate the high value placed on student teacher supervision. On average, both groups of teacher educators devoted 19% of their academic time to supervising student teachers and conducted three on-site visits. The visits lasted approximately 5.4 hours for doctoral/research extensive teacher educators and four hours for research non-extensive teacher educators.

One of the major disparities between the two types of institutions was the assistance in supervising student teachers. The research non-extensive institutions only had one instructor, zero graduate students, and four other professionals versus one visiting professor, eight instructors, 11 graduate students, and five other professionals from the doctoral/research extensive institutions. Based on the work of Boyer (1990) and Noll (1998), one may conclude that more non-faculty members are utilized in doctoral/research extensive institutions for student teacher supervision to permit time for tenure track faculty members to focus more on research agendas. In addition, a student teacher at a doctoral/research extensive institution is more likely to receive supervision from a non-tenure track faculty member than a student teacher at a research non-extensive institution.

Based on the SOIL Model, the most frequently used level by doctoral/research extensive teacher educators was the structured level; however, the most frequently used level used by the research non-extensive teacher educators was the moderately structured level. Moreover, doctoral/research extensive teacher educators spent approximately one and a half more hours per visit supervising student teachers than research non-extensive teacher educators. According to Boyer (1990) and Noll (1998), faculty members from primarily research institutions focus more on research; therefore, the amount of supervision for student teachers may be limited to a more structured process. In addition, the more structured process would be a straightforward training tool for graduate students and other professionals involved in the supervisory process. The structured process is less complicated to use but it is more time consuming. One may conclude that if doctoral/research extensive teacher educators employ more teacher driven supervisory models, the supervisory process may be more efficient. In addition, teachers would have more input on the teaching and learning process. According to the SOIL Model (Fritz & Miller, 2003b), teacher driven approaches may be more risky; however, the rewards could be greater for both the teacher and teacher educator.

Future research is still needed to answer questions that surfaced from this study. Research should strive to answer the following:

1. How do tenure track and non-tenure track faculty differ on supervisory models used with student teachers?

2. Do non-tenure track faculty spend more time on the supervision of student teachers?

3. What supervision trends might emerge if this study were replicated every three to five years?

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Supervisory Practices Used by Teacher Educators in Agriculture: A Comparison of Doctoral/Research Extensive and Research Non-Extensive Institutions

A Critique

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This was a census study of teacher educators in agriculture who provided supervision of student teachers in a given period of time. The study is well grounded in a theoretical model that was previously espoused by these researchers, which was based on existing theory and practice in supervision. This study is an excellent example of building upon previous work, drawing from study outside of agricultural education, and continuing on a pathway of inquiry over time. Hopefully the researchers will continue to develop a research program agenda in this arena.

Why is this important? Research extensive institutions are often regarded as "having it all" no matter what the field. Granted, many of the largest colleges of education are in these institutions. An interesting comparison exists, however, knowing that many of the other institutions were actually founded as teacher colleges or normal schools. An uninformed conclusion could be that, when it comes to teacher preparation, the research non-extensive institutions would "have it all."

Now we know – at least for the 67 respondents in this study. There are not many differences between the two types of institutions on the characteristics studied. The one difference is disturbing. How could we have let other duties surpass student teacher supervision in terms of the role of tenure-track faculty at major universities?

The major line of inquiry, however, was within the supervisory model studied. And here there were differences. The researchers are very clear in describing those differences without going overboard in concluding that one type of institution is better than the other. And some excellent questions are posed for additional inquiry. Keep up the work in this important area. We invest huge resources in on-site supervision. We need to be sure that it is providing the outcomes we want.

One methodological flaw must be mentioned. The utilization of the early-late respondent comparison is not justified. Further, the additional work cited was misused. In the cited work, various cut-off dates were used on a set of data, only to show how volatile the cutoff date for early and late could be. That article does not propose that first half and last half comparisons are necessarily appropriate. We must be more careful in addressing non-response error.

Agriculture Teacher Education Programs: A Synthesis of the Literature

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Abstract

The role of teacher education programs and the demand place upon those programs is changing. This study sought to synthesize research related to pre-service agricultural teacher education programs in the following areas: (1) demographics of teacher educators, (2) demographics of teacher education programs, (3) responsibilities of teacher education programs, (4) student selection, (5) preservice curriculum, (6) teacher education program models, and (7) field experiences. After a review of the literature in these areas, deficiencies in the current literature base were identified.

Introduction

The role of the teacher educator has changed over the past several years (Hillison, 1998). Yet, the preparation of individuals for teaching in middle school and high school agricultural education programs still remains as the focal point of most agricultural education programs (Anderson, Barrick, & Hughes, 1992). Even though the goal of such programs is agreed upon by the profession, the means by which to best achieve that goal is largely still unique to individual programs. The course requirements, experiences, and admission requirements of teacher education programs differ considerably in some regards (Graham & Garton, 2001; Shinn, 1997; Swortzel, 1999).

Even as teacher educators take on additional responsibility divergent from the aforementioned focal point of teacher preparation, the needs of middle school and high school agriculture teachers are changing. Teachers of agriculture in the secondary schools are being called upon to integrate curriculum that addresses standards in science, mathematics, and other content areas. Success of this integration is being measured by state mandated standardized tests (Edwards, Leising, & Parr, 2002). Therefore, not only are teacher educators learning new roles, they need to evaluate their traditional roles to be sure to prepare teachers to meet these new demands. In the midst of this inconsistency there is void of research on teacher education in agriculture (Swortzel, 1999). This lack of empirical research leaves teacher educators with only anecdotal evidence on the development of teacher preparation programs.

Lytle (2000) warns that teacher education programs are becoming dated and marginal. Constant reflection is needed by teacher educators of their programs to find the most effective ways in which to fulfill their new roles as described by Hillison (1998) and their traditional roles of teacher preparation with the changing focus described by Edwards et al. (2002). Findings presented in this article provide a comprehensive review of research related to agriculture teacher education programs published 1989 – 2002.

Objective

The objective of this paper was to synthesize research related to pre-service agricultural teacher education programs in the following areas: (1) demographics of teacher educators, (2) demographics of teacher education programs, (3) responsibilities of teacher education programs, (4) student selection, (5) preservice curriculum, (6) teacher education program models, and (7) field experience. A second objective was to identify areas of deficiency in research related to agricultural teacher education programs.

Procedures

Three sources were used to gather data to meet the objectives of the study: *Journal of Agricultural Education*, doctoral dissertations from *Dissertation Abstracts International*, and Proceedings from Regional and National Agricultural Education Research Meetings. These references were located through a computer library search completed at a Research I institution.

Findings

Demographics of Teacher Educators

The cadre of agriculture teacher educators in the United States is quite homogenous. According to Swortzel (1996), the majority of agricultural teacher educators are Caucasian males who grew up in a traditional family in a small town atmosphere. Most are married, middle-aged, and employed at 1862 land grant institutions. Most have tenure and hold the rank of professor (Swortzel, 1998), indicating an aging profession. The majority of agricultural teacher educators are former secondary agricultural education teachers with little administrative experience before becoming a teacher educator. Although many teacher education programs have experienced a substantial increase in the number of urban and female students, the composition of teacher education faculty has not changed to reflect the new demographics. Swortzel (1998) reported that those females that do enter the professorate generally do so to take advantage of personal and professional development opportunities. He noted that males enter the profession wanting to share their interest in pedagogy and to receive external benefits associated with the job. Swortzel also noted that Ethnic minorities enter the education professorate because they want to assume a leadership role in teacher education and to influence other minorities to enter the teaching profession.

Demographics of Teacher Education Programs

A number of institutions with agricultural education programs are not actively producing certified agricultural education instructors. In 1996, agricultural education programs could be found in 93 institutions. Of these programs, 84 were active in teacher preparation. Of those, 79 graduated any qualified students in 1995 (McLean & Camp, 2000).

The administrative location of agriculture teacher education programs differs from institution to institution. Currently, almost 60% of the agricultural teacher education programs

are administratively housed within colleges of agriculture. Approximately 23% are located within colleges of education (Swortzel, 1999).

As might be expected, the curricular structure of the various programs differs greatly between institutions as well. McLean and Camp (2000) noted that the most common courses taught were methods of teaching, program planning, and student teaching. A large majority (81%) of programs offer a four year degree certification curriculum. Certification is completed on a five-year course plan at 18% of the institutions.

There is great variability in the size of the various teacher preparation programs in agricultural education. Enrollment in the programs ranges from 0 to 200 students with a mean near 41 students. The agricultural education faculty teaching equivalent (FTE) within each program ranges from 0 to 6.12 with a mean of 1.7. Most programs report one FTE in agricultural education. Almost all (96%) of the programs reported that they are accredited through a regional or national association (Swortzel, 1999).

The composition and length of the course of study for pre-service agriculture educators also varies widely across institutions. Degree programs at 4-year institutions require an average of 130.5 semester hours of course work. Of that, 44.7 hours is required in general studies, 42.8 hours in technical agriculture courses, and 35.8 hours in professional education coursework. Programs with a 5-year degree program require 138.7 semester hours, consisting of 51.2 hours of general studies, 47.3 hours in technical agriculture, and 46.6 hours of professional education coursework. Based upon percentage of total course plan, the 4-year and 5-year programs are nearly equal in number of hours in general studies (34% and 37%, respectfully), and technical agriculture (33% and 34%, respectfully). The major difference is in the percentage of professional education coursework. In the 4-year programs, professional education coursework comprises 27% of the course requirements, as compared to 34% in 5-year programs. Within this coursework, 71% of the programs require courses in multicultural education, 75% require courses in exceptional children, and 88% require classes in computers/instructional technologies. Students complete an early field experience prior to student teaching in 93% of the programs. These experiences ranged from 16 to 200 hours, with a mean near 60 hours. Student teaching experiences lasted an average of 12 weeks with a range of 10 to 24 weeks (Swortzel, 1999).

In general, students who complete teacher education programs are pleased with their experience. According to McGhee and Cheek (1990) students who graduate from teacher preparation programs perceived the adequacy of the coursework they received as above average to good in the areas of pre-professional studies, technical agriculture, and agricultural education. They rated agricultural education coursework highest, followed by technical agriculture and pre-professional coursework. The student teaching experience received the highest rating of any single course. Graduates indicated that the amount of technical agriculture courses should be increased, while the amount of pre-professional and agricultural education coursework should stay the same. Graduates also perceived the involvement in the agricultural education student organization as being of some to much value.

Like their teacher educators, preservice agricultural education students tend to be similar on certain characteristics. Students enrolled in preservice agricultural education programs tended

to be field-independent in their learning style. Likewise, females in agricultural education programs tended to be more field-independent than the national norm for females. Interestingly, students in agricultural teacher education programs tended to prefer learner-centered instruction. This contradicts what one would expect from a field-independent learner (Raven, Cano, Garton, & Shelhamer, 1993).

Responsibilities of Teacher Education Programs

The teacher educator's role has changed from one of preparing future teachers and providing professional development to current teachers, to including many other duties (Hillison, 1998). These other duties may include college and university faculty development, recruitment of students, and/or teaching college-wide courses. Even with this change in the roles of the teacher education faculty, the agricultural education community of secondary agriculture teachers and state agricultural education staff perceive that the greatest professional responsibility of teacher educators is providing preservice teacher preparation These groups also feel that teacher educators have the greater responsibility to coordinate and deliver professional development programs rather than funding such programs (Anderson et al.).

Student Selection

No teacher certification measure was found to be predictive of agriculture teacher classroom teaching performance. The best predictor of teaching performance was found to be agricultural education coursework grade point average. However, the majority of secondary school administrators perceived higher academic abilities to be negatively related to a teacher's ability to relate and connect with students (Graham & Garton, 2001).

Graham and Garton (2001) concluded that current teacher preparation program admission and certification measures may be excluding potential agriculture teachers. Muller and Miller (1993) reported that teachers with lower grade point averages were more likely to remain in teaching after one year. However, no significant difference was found in graduation grade point average, high school rank, or ACT score of graduates of a teacher education program versus other graduates.

Pre-service Curriculum

The goal of preservice teacher education is to make the most effective use of the time available to prepare future educators for the task awaiting them. However, as Lytle (2000) stated, "Clearly, it is unrealistic to assume that any preservice teacher education program can prepare prospective teachers for the wide array of tasks awaiting them as teachers" (p. 174). With this understanding, a number of studies have been completed that investigated the components included in the preservice curriculum of agricultural education (Selassie, 1989; Shelley, 2002; Shelley-Tolbert, Conroy, & Dailey, 2000; Shinn, 1997). In his evaluation of the curriculum included in agricultural teacher preparation programs, Swortzel (1996) noted that teacher education programs continued to use a traditional curriculum to teach preservice students, however, the curriculum that students will be expected to teach once they reach the secondary classroom has changed.

In investigating the teaching methods used by in-service teachers of agriculture to teach this changing curriculum, some commonalities have been reported. The most commonly used teaching methods in secondary agriculture classrooms were found to be lecture/discussion and general discussion (Selassie, 1989). However, no differences were found in the frequency of methods used due to years of experience in teaching. According to Selassie, teachers select the teaching method used to present material to their students based on professional training and subject matter knowledge. The criterion of "nature of students" and matching domains of learning with student intellectual development are less frequently used in the selection of the method by which material would be presented. Shinn (1997) reported that the most influential factor in the selection of teaching strategy and method is the number of courses taken in teaching and learning. Of the teaching strategies used, the most effective, as reported by teachers, are demonstrations, discussions, laboratories, projects, contests, using real objects, and supervised experience (Shinn).

Teachers see the need to adapt the agriculture education curriculum and teaching strategies to close the gap between agricultural and academic education (Eaton, 1994). In an effort to fill that gap, Balschweid and Thompson (1999) called for providing preservice education for both agriculture and science teachers on the benefits of integrating science in the agriculture curriculum. To encourage teachers to make this integration, some states have provided a biological science endorsement for agricultural education teachers (Giustino & Straquadine, 1994).

Teachers define agriscience differently. Although no agreement has been reached on an exact definition of the term, most teachers agree that agriscience is an important part of the total curriculum (*Understanding agriculture: New directions for education*, 1988). With its relatively new inclusion into the curriculum, the methods by which science can be integrated should have greater emphasis (Connors & Elliot, 1994; Shelley, 2002). Balschweid (1998) reported that teachers who have completed a teacher education program with an integrated agriculture and science curriculum are positive about integrating science into the agriculture curriculum and are more willing to attend workshops about the integration of science.

Teacher Education Program Models

The model for agricultural education in the public schools has changed. Events that have occurred to necessitate the change in the model include changes in the agriculture industry, student population, society, educational system (graduation requirements, testing) and changes in the work place (*Understanding agriculture: New directions for education*, 1988). In addition, there is an increased demand in the school-based agriculture programs to promote agricultural literacy to the general public (Hughes & Barrick, 1993), resulting in a need for curriculum revisions in teacher preparation programs.

Even in this time of curriculum revision, the primary focus of teacher preparation programs should be on the process of teaching and learning. The setting in which this process takes place (high school, extension programs, etc) should be of secondary concern (Barrick

1993). The first premise of Barrick's model is that the preparation of teachers is the central mission of the department. Barrick emphasizes his point saying,

> To pretend that the original purpose should be changed or has been changed would be detrimental to the advancement of the department. Instead, as other programs are added the mission the centrality of the teaching/learning process becomes even more important. The one part of a department which separates it, makes it unique, when compared to other departments in agriculture is instruction in teaching and learning (p. 12).

According to Barrick, all of the various components of a department should be related to this central mission of teaching and learning. He suggests that program mergers of convenience seldom work and can lead to division among the personnel involved.

Field Experience

Participating in an early experience opportunity aides students in their decision to pursue a career in agricultural education. As part of this early experience, the interaction between pre-service teachers and secondary agriculture students has been found to be the most influential factor, both positively and negatively (Zuch, 2000).

Students often express different attitudes at the conclusion of their student teaching internship than they do before the experience. The most important elements of student teaching as ranked by student teachers prior to their internship, were: a cooperating teacher who is a mentor, a cooperating teacher who communicates clear expectations, and a discipline management plan used in a structured environment (Harlin, Edwards, & Briers, 2001). Harlin et al. noted that the lowest rated elements of student teaching by student teachers prior to the experience were: diversity within a student's supervised agricultural experience (SAE) program and a history of successful participation in the FFA. However, after the experience, the most important elements of student teaching, as rated by student teachers, were: a well-rounded program emphasizing instruction, SAEs, and youth leadership activities; and a student teacher who is willing to be mentored by the cooperating teacher. The lowest rated elements of the experience, as rated by student teachers after the experience, were: all students meeting state SAE requirements with accurate record books and diversity within students' SAEs (Harlin et al.).

For prospective agriculture teachers, the cooperating teacher and the student teaching center are two of the most significant components of the student teaching experience (Edwards, Harlin, & Briers, 2002; Harlin et al.). A positive attitude by the cooperating teacher positively affects the student teacher's perception of the agriculture teaching profession (Edwards et al.).

Cooperating teachers have a great influence on student teachers (Edwards, Harlin et al., 2002; Garton & Cano, 1994; Harlin et al., 2001; McKee, 1991). The teaching methods and strategies espoused by the cooperating teacher affect those practices used by the student teacher. When cooperating teachers utilize the problem-solving approach to teaching, their student teachers were more likely to also utilize the problem-solving approach during student teaching and beyond (Garton and Cano, 1994; McKee, 1991). Garton and Cano also reported that both cooperating teachers and student teachers spent less than one fifth of their instructional time

utilizing the problem-solving approach. Some never used this method, while others utilized the approach considerably. Neither cooperating teachers nor student teachers implemented all of the procedures of the problem-solving approach (Garton & Cano).

In addition to the relationship between the cooperating teacher and the student teacher, the relationship between the cooperating teacher and the university supervisor is also very important. Regarding this relationship, Deeds, Flowers, and Arrington (1991) reported that most cooperating teachers agreed with university expectations of student teacher performance, however, almost a fifth of the cooperating teachers did not know what was expected of them in their role.

Deficiencies in the research base

An analysis of the research conducted in preservice teacher education revealed deficiencies in the following areas:

1. Evaluation of coursework and experiences needed throughout the teacher preparation program to best prepare future teachers of agriculture.

2. An investigation of why more female and ethnic minorities are not entering the agricultural education professorate. In addition to identifying obstacles, solutions to these problems also need to be investigated.

3. A trend analysis of teacher education faculty numbers and identification of duties beyond traditional teacher education.

4. The importance of agricultural education student organizations in the preparation of future teachers of agriculture and in the recruitment and retention of students into teacher preparation programs.

5. An analysis of alternative certification practices for secondary teachers of agriculture.

6. Characteristics of successful cooperating teachers.

7. Characteristics of successful pre-service teachers.

8. Identification of predictors of success for student teachers.

9. Evaluation of the teacher education program model to determine if the current model is still the best fit for teacher education programs to fulfill growing and diverse roles and responsibilities.

Conclusions and Recommendations

The profession of agricultural teacher education is dominated by white males. There is a need to investigate why females and ethnic minorities in the secondary ranks are not choosing to enter the professorate. As more females are enrolling in programs, the need for female role models is increasing at the university level. Once these obstacles are identified, research should be conducted to identify means by which to address these impediments.

The most current information that the profession has on its demographic make-up is becoming dated. The profession of agricultural education needs to continually monitor itself. It is recommended that an ongoing project be sanctioned by the professional organization to assess the composition of the profession at regular intervals.

The majority of agriculture teacher preparation programs include a four-year program of study, including courses in teaching methods, program planning, and student teaching. On average, current programs of study are comprised equally of coursework in general studies, technical agriculture, and professional education courses (Swortzel, 1999). Further study is needed to identify the most effective coursework configuration. In addition, with the rise in the number of five-year programs, studies should be conducted to investigate the need for the extended coursework beyond the traditional degree programs. Furthermore, no research was found in the literature base that investigates the experiences needed to best prepare future teachers throughout the program. Whereas the coursework configuration is important in the preparation of teachers, the experiences students receive in those courses may be of greater concern.

The importance of agricultural education student organizations has been mentioned briefly in the literature base, yet is in need of greater study as to its worth. Research should to be conducted to determine the value of such organizations to preservice teachers both while enrolled in teacher preparation programs and once employed as teachers of agriculture. Moreover, if value is found in such organizations, studies should be conducted to indicate what activities conducted by these organizations are the most effective in accomplishing the tasks of teacher preparation and student retention.

Several studies indicated the effect of including instruction on the problem-solving approach. Yet little has been done on the effectiveness of including methods of science integration into the curriculum. The societal changes that have occurred in the secondary agriculture programs have necessitated a change in teacher preparation programs. Major emphasis is being placed on how agricultural education can contribute to the academic achievement of students in the areas of science, mathematics, and reading. Research is needed to identify how agricultural education can fill this gap. Once this information is obtained, studies are needed to identify the best methods teacher educators can employ to prepare teachers for this expanded role.

Agricultural teacher preparation programs are primarily administratively housed within colleges of agriculture and include a wide range of faculty FTEs. It appears that the majority of individuals in the profession have concluded after the debates of the 1970s (Binkley, 1977;

Knebel, 1977) that the best fit for the agricultural education programs on university campuses is within colleges of agriculture with cooperative agreements with colleges of education. With the wide range of faculty FTEs reported for teacher education faculty and that the role of the teacher educator has expanded beyond just the preparation of teachers, further research is needed to investigate the trends in the number of teacher education faculty located within these programs and their duties beyond teacher education.

Whereas research has not yet been able to identify variables that are effective in predicting teacher success, this search should continue. Research suggests that teacher preparation programs have admission requirements that are often arbitrarily put into place. This could be excluding individuals that would be excellent agriculture teachers. If such predictive variables could be identified and used as admission criteria, the resources of teacher education programs could be more effectively focused on those individuals.

The importance of early field experience and the student teaching experience have been found to have an impact on preservice teachers. However, the literature base is silent on characteristics of the individuals that should be selected as cooperating teachers for these experiences. Since these are such pivotal experiences in the teacher preparation program, more research is need in this area.

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Agriculture Teacher Education Programs: A Synthesis of the Literature

A Critique

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This report is a change of pace from most studies that are being reported at national meetings and in the journal. We have often criticized ourselves for conducting a string of research studies that are not adequately anchored in research within and outside of our discipline, and for moving to the next area of inquiry after merely skimming the surface of the current topic. This paper helps to bring focus to recent research (1989-2002) on seven distinct areas of pre-service agricultural teacher education.

Many of the conclusions are very predictable. The demographics, while having changed over the period of this synthesis, do not reflect the potential in terms of gender and ethnicity. The work reported by Ball and Knobloch appears to be a good start in assessing the content of teacher education programs. More of this work is needed. There was mention of student organizations, yet there was little information provided to lead to the statements that were reported. Perhaps an important question is the purpose of such organizations. How do they differ from other undergraduate student organizations? Are they primarily a social organization, or are they a laboratory for learning how to operate and advise an organization?

The researchers provided a list of nine deficiencies in the agricultural education research base. How do these differ from the Shinn and Buriak studies of ten years ago? Have we made any headway at all in these important dimensions of agricultural teacher education? Why has not more progress been made?

Perhaps there is a bit of grasping at straws in the list of research deficiencies and the recommendations. Perhaps good use of our time would be to truly decide what matters and then go after that. Perhaps a concentrated focus on what teacher education should be about is sufficient. It seems that everything else is a subset of that item – what model of teacher preparation brings about the best results? This has little to do with location, source of students, cooperating teachers, and other characteristics we study. It has everything to do with preparing competent teachers, and that is what we should be doing and studying.

Constructivism as a Theoretical Foundation for Inquiry Based Pedagogy in Agricultural Education

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Since the early days of the 20th century, pedagogy in agricultural education has been based primarily on a problem solving approach to teaching. In the broad context of general education inquiry or problem-based learning (PBL) are more generally used terminologies than problem solving, but the fundamental aspects of problem solving and inquiry or PBL are analogous. The use of this approach to pedagogy is essentially a pragmatic issue in agricultural education. The purpose of this paper is to delineate a theoretical foundation for the use of problem solving, inquiry, and PBL in agricultural education. The theoretical assumptions underlying the use of such pedagogy are examined through the lens of constructivism. Constructivism is a theoretical perspective on learning that emphasizes learning as the self-construction of knowledge based on personal experience. Specifically, constructivism involves the active creation and modification of thoughts, ideas, and understandings as the result of experiences that occur within a socio-cultural context. Problem solving, inquiry, and PBL are inductive methods of instruction that emphasize the exploration of authentic problems. Problem solving, inquiry, and PBL are examined and identified as following a flexible six-step process of investigation, (a) problem identification, (b) problem clarification, (c) hypothesis generation, (d) data collection, (e) information evaluation, and (f) solution development. These six processes emphasize the student's active role in knowledge acquisition. The match between constructivism and inquiry can be seen by relating the pedagogical and philosophical principles of constructivism to the pedagogical and philosophical principles of inquiry. Ultimately, constructivism provides sound theoretical support for the use of a problem solving, inquiry, problem-based pedagogy in agricultural education.

For most of the previous century, pedagogy in agricultural education has been based primarily on a problem-solving approach to teaching (Crunkilton & Krebs, 1982). Within the agricultural education literature, Newcomb, McCracken, and Warmbrod (1993) emphasized the importance of inquiry in a problem-solving approach to teaching as did Borich (2000) in general education.

The implementation of a problem solving approach to pedagogy has long been a matter of pragmatism. This pragmatic use of problem solving, inquiry, or problem-based pedagogy has survived several different paradigm changes within the arena of the learning sciences. The

predominant theory of learning during the time when agricultural educators were developing the problem solving approach to teaching was behaviorism (Dobbins & Camp, 2000). Although behaviorism is very effective in explaining traditional approaches to career and technical education such as competency-based education (Dobbins, 1999), a problem solving or inquiry oriented approach to teaching has never fit under the behaviorist umbrella (Doolittle & Camp, 1999). In recent decades, however, a new consensus has emerged within learning science regarding the nature of learning, i.e. constructivism, which provides theoretical support for the use of inquiry or problem-based pedagogy.

A widely-used terminology today for an analogous concept is Problem-Based Learning (PBL) as described on PBL web sites managed by the Illinois Science and Mathematics Academy (2001), the University of Hawaii School of Medicine (2001), and the University of Delaware (2001), among many others. The PBL web site managed by Queens University (2001) in Ontario Canada provided links to 28 different PBL academic web sites as of April 24, 2001. Because Problem-Based Learning is the dominant term in educational literature, for the remainder of this paper, problem solving, inquiry, and problem based learning will be referred to collectively as Problem Based Learning (PBL).

The examination and delineation of the theoretical foundation of inquiry or problem-based pedagogy in agricultural education is important because it provides both grounding for current practice and a justification for future practice. The proposed theoretical foundation lies with constructivism; a theory that states that learning is the self-construction of knowledge based on personal experience (Steffe & Gale, 1995). Since the late 1800s, learning theory has developed from behaviorism to information processing to constructivism (Mayer, 1996); that is, from learning as the acquisition of stimulus-response pairs, to learning as the processing of information, to learning as the construction of knowledge.

This movement in the learning sciences has been independent of the practices within agricultural education. The purpose of this paper is to offer a vision under which the pedagogical practice of agricultural education and the theoretical foundations of learning science form a coherent totality.

Constructivism

Constructivism, succinctly defined, is the belief that learners construct their own knowledge from their experiences. Fosnot (1996) provided a more eloquent and expansive definition,

> Learning from this perspective is viewed as a self-regulatory process of struggling with the conflict between existing personal models of the world and discrepant new insights, constructing new representations and models of reality as a human meaning-making venture with culturally developed tools and symbols, and further negotiating such meaning through cooperative social activity, discourse, and debate. (p. ix)

Therefore, constructivism involves the active creation and modification of thoughts, ideas, and understandings as the result of experiences that occur within a socio-cultural context. It is this combination of learner autonomy and holistic perspective that has thrust constructivism to the forefront of learning science and education. Learner autonomy is the concept that learners

are active participants in the learning process and ultimately responsible for their own learning. The holistic perspective is a non-reductionist approach that emphasizes learning in context.

The integration of learner autonomy and a holistic perspective places constructivism at the nexus of philosophy, psychology, and pedagogy. A foundational issue in this philosophical, psychological and pedagogical morass is the role of epistemology; that is, what is the nature of knowledge and how does the knower come to know (Ernst, 1995). From this epistemological perch, the pillars of constructivism have emerged as:

1. Knowledge is not passively accumulated, but rather, is the result of active cognizing by the individual;

2. Cognition is an adaptive process that functions to make an individual's behavior more viable given a particular environment;

3. Cognition organizes and makes sense of one's experience, and is not a process to render an accurate representation of reality; and

4. Knowing has its roots in both biological/neurological construction and in social, cultural, and language-based interactions (see Garrison, 1998; Gergen, 1995; von Glasersfeld, 1998).

Thus, constructivism emphasizes the active role played by the individual learner in the construction of knowledge, the primacy of experience (both social and individual) in the process of learning, and the realization that the knowledge attained by the learner may vary in its accuracy as a representation of reality. These four pillars, while illuminating, allow for great variability in what is typically called "constructivism" (Phillips, 1995; Prawat, 1996). Steffe and Gale (1995) and Moshman (1982) described this variability as a continuum with three main divisions, radical constructivism, social constructivism, and cognitive constructivism.

Radical Constructivism

Radical constructivism represents the most extreme form of constructivism, emphasizing the <u>internal</u> nature of knowledge. The foundation of radical constructivism is the concept that while a reality external to the individual may exist, the true nature of this reality is unknowable. Extending this concept, knowledge then becomes the subjective construction of the individual, resulting from the cumulative experiences of the individual (von Glasersfeld, 1995). This subjective construction reflects the radical constructivist's supposition that knowledge is not passively transmitted from the environment to the individual, but rather that knowledge is the result of active cognizing by the individual for the purpose of satisfying some goal. In addition, the ultimate goal of knowing is not ontological "truth," that is, the construction of internal mental structures that mirror or correspond to a world that exists outside of the individual; but rather, the ultimate goal of knowing is the construction of internally coherent mental structures that are adaptive and that lead to efficient and effective thinking and behaving (von Glasersfeld, 1984, 1998). Therefore, knowing is the active, subjective construction of experience that proves adaptive or useful in the context of one's goals or purposes.

This positing of individual subjective knowing leads to a de-emphasis on social processing in favor of individual cognizing. Indeed, for radical constructivists, other humans are simply additional environmental entities, much like a door or snow, with which one has personal experiences and must adapt. There is nothing special about socialization in the knowing process for radical constructivists. Ultimately, for radical constructivism, truth is a measure of the coherency of one's personal mental structures.

Social Constructivism.

Social constructivism represents a moderate form of constructivism, emphasizing the social nature of knowledge. Social constructivism, like radical constructivism, eschews the belief that an individual can come to know ontological reality in any meaningful way. Unlike radical constructivism, however, social constructivism emphasizes social interaction as the source of knowledge, rather than individual cognizing (Garrison, 1998; Gergen, 1995). Indeed, for social constructivists "the process of personal meaning-making takes a backseat to socially agreed upon ways of carving up reality….the community is the prime source of meaning for objects and events in the world" (Prawat, 1996). Specifically, knowledge is the result of social interaction and negotiation, language usage, and established cultural norms.

This reliance on a social source of knowledge brings to the forefront language, culture, and context. According to Gergen (1985, 1995), language is the source of all knowledge and that the use of language always occurs within a cultural context. Similarly, Vygotsky (1978, 1981, 1986) stressed both language and the socio-cultural context of knowledge acquisition, stating "Any function in the child's cultural development appears twice…first it appears on the social plane, and then on the psychological plane" (1981, p. 163). Finally, Dewey (1896) emphatically argued that knowledge was attained at the intersection of language, culture, and context, and that to separate these entities was to degrade the unity of the whole act. Ultimately, for social constructivism, truth is adaptive, socially determined meaning.

Cognitive Constructivism

Cognitive constructivism represents a conservative form of constructivism, emphasizing the external nature of knowledge. Cognitive constructivism, unlike radical and social constructivism, embraces the notion that one can come to know reality, ontological truth, as it exists external to the individual (Mayer, 1996; Prawat, 1996). Thus, knowledge is objective and knowledge acquisition is the (re)construction of external reality into internal mental structures. This (re)construction process is addressed significantly within the modern information processing literature. Specifically, knowledge is a function of our experiences with concepts, objects, and persons, and the mental processing that accompanies these experiences (Anderson, 1993). This mental processing may entail several different iterations, such as the sensation and perception of the experience, relating the experience to prior knowledge, generating a plan of action based on the experience and one's prior knowledge, and implementing the plan of action with concurrent monitoring of progress. The essential goal of these processes is not merely a plan of action that works, but rather an understanding of the causes and effects that exist in the real world.

For the cognitive constructivist the search for knowledge is the search for how the world really works and the value of knowledge is determined by its correspondence with the real world. Ultimately, for cognitive constructivism, truth is a mental structure that corresponds or mirrors the external world.

The three types of constructivism cover a fairly wide area of thought; however, the fundamental nature of these types is similar, that is, knowledge is the creation of the individual and is influenced to a greater or lesser degree by prior knowledge, social interaction, and context. Before progressing to a discussion of the value of constructivism as a theoretical foundation for inquiry or problem-based learning, general pedagogy based on constructivism will be briefly discussed.

Constructivist Pedagogy

Pedagogy, of any type, is at least once removed from any theoretical underpinning. The movement from theory to pedagogy must be taken carefully and with forethought. Constructivist pedagogy suffers from the variability inherent within its theoretical base. These cautions notwithstanding, several authors have proposed models of constructivist pedagogy (see Brooks & Brooks, 1993; Duffy & Cunningham, 1996; Hendry, 1996). Doolittle and Camp (1999) stated the core pedagogy of these various models as:

1. **Learning should take place in authentic and real-world environments.** Learning is a function of experience; thus, in general, the more appropriate the experience, the better learning that occurs. Authentic experiences provide the learner with the myriad of context-dependent learning cues that facilitate later behavior/task completion.

2. **Learning should involve social negotiation and mediation.** Learning does not occur within a vacuum; rather learning is enhanced and promoted by socialization. A student's language, dress, behavior, and even thought processes are influenced by the people and cultural around them. Therefore, social interactions with peers, professors, novices and experts should be emphasized to increase student learning.

3. **Content and skills should be made relevant to the learner.** Learning occurs as the individual interacts within the world. Students will tend to interact with knowledge and skills that they find interesting, necessary, and goal related. Thus, students learn best when they see both the purpose and need for learning a set of knowledge and skills; that is, when they find the knowledge and skills relevant to their situation.

4. **Content and skills should be understood within the framework of the learner's prior knowledge and experience.** The key to all learning is what the student brings to the learning situation – prior knowledge. The student must have the necessary prior knowledge and experience to relate the new information/skills to previous information/skills or the new information/skills will not be learned. Therefore, the construction of learning activities must be made relative to the prior knowledge of the student who will engage in these activities.

5. **Students should be assessed formatively, serving to inform future learning experiences.** Teachers must comprehend a student's current level of understanding in order to guide the

student through future experiences that will lead to effective learning. Formative assessment, assessment during instruction, allows the teacher to gain an understanding of a student's current thinking and respond appropriately.

6. **Students should be encouraged to become self-regulatory, self-mediated, and self-aware.** The ultimate goal of education is the development of autonomous individuals capable of directing their own lives effectively, both personally and professionally. Students must be encouraged to be self-regulatory, self-mediated, and self-aware by being directed to set their own goals, monitor their own progress, and monitor their own thought processes and understandings.

7. **Teachers should serve primarily as guides and facilitators of learning, not instructors.** Traditionally, teachers have been thought of as conveyors of knowledge; constructivism requires that teachers become more facilitators of knowledge. The teacher's role is to create experiences within which students will learn and then guide the students through those experiences.

8. **Teachers should provide for and encourage multiple perspectives and representations of content.** Not only do different students learn differently, but also the same student learns differently in different situations. Therefore, knowledge and skills should be presented in different ways and in different situations to maximize both the learning among individuals and the learning within each individual.

Consequently, students learn best when they are socially interacting within an authentic situation that is relevant to their prior knowledge and goals, and that fosters autonomous and self-directed functioning. The teacher's role in this learning situation is to comprehend the student's understanding and to construct future experiences for the student that advance the student's learning, and to serve as a resource during this knowledge acquisition process.

Does the aforementioned constructivist theory and pedagogy support the specific use of problem solving teaching strategies? The following section examines problem solving teaching strategies followed by a synthesis of constructivist theory and inquiry-based pedagogy.

Inquiry and Problem-Based Learning

Inquiry and problem-based learning (PBL) are inductive methods of instruction; that is, both processes stress student-led exploration, data gathering, and drawing inferences. Inquiry and PBL employ a pedagogy that stresses the exploration of authentic problems using a rigorous approach similar to the traditional "scientific method." According to Collins and Stevens (1983), inquiry and PBL emphasize both the development of declarative knowledge (i.e., concepts, facts, and principles) and procedural knowledge (i.e., procedures, methods, and routines). It is this emphasis on the development of procedural knowledge, the knowledge to inquire and solve problems, which differentiates inquiry and PBL from more traditional pedagogy.

Inquiry and PBL are versatile instructional methods that can be used to teach basic content, problem-solving, critical thinking, self-assessment, resource management, decision making, social and group skills, leadership skills, and communication skills. The prototypical

process of inquiry and PBL involves the general steps presented in the following paragraphs (see Joyce & Weil, 1996; Kindersvatter, Wilen, & Ishler, 1996).

Generation, presentation, or identification of a problem. All inquiry begins with a problem. These problems, however, may have several sources of germination. Problems may originate from the teacher and/or the curriculum, the student's life and/or interests, or serendipitously from the interaction between the teacher and student in the natural course of instruction. If the goal of instruction is the development of inquiry skills, and not specific domain knowledge, then the problems are more likely to be student or serendipitously generated; while, if the goal of instruction is the development of domain specific knowledge then the problems are more likely to be teacher generated.

In order to be motivating to the student, the problems identified should be related to the student's prior knowledge and current needs and goals. For example, a teacher of a Natural Resources Management course in California may show her students a video of the 1999 wildfires that destroyed thousands of acres of forest in Southern California and threatened a multitude of homes. Through the course of a subsequent class discussion, the teacher may lead the students to the problems of how do forest fires develop, how are forest fires controlled, and how can forest fires be prevented. Obviously, in this case the problem is teacher determined, although certainly this type of problem might develop through student interest or serendipitously if the class is located near a fire zone. Another mechanism for making the problems directly relevant to the students is to structure them around real dilemmas that the students must resolve. For instance, if several of the students in a class have the same supervised agricultural experience programs, the problems might be structured around actual decisions the students will be required to make Deyoe (1953) described the traditional model of farm project programs, which could be used as a primary source of production-related problems that would have been directly internal to the students involved on particular farm projects and vicariously relevant to their classmates. Later, as agricultural education changed, Newcomb, McCracken, and Warmbrod (1993) described the use of a problem solving approach to teaching that could rely on a wider range of supervised experiences as proposed by Camp, Clarke, and Fallon (2000), to provide real-world problems that students could be expected to face.

Clarify, structure, and understand the problem. Once a problem has been stated in general terms, it is necessary to explore the problem in detail. Terms should be defined by the students and concepts operationalized. In addition, students should identify what knowledge they might not have that is necessary to understand the problem. Any needed knowledge should be attained, whenever possible, before proceeding. How the problem is understood at the beginning of the inquiry process will greatly affect how the problem is investigated and ultimately the types of solutions that are developed. Continuing the forest fire example, the students may determine that the problem of greatest interest and concern relates to understanding how forest wildfires may be fought and controlled. This general problem would necessitate the students clarifying what it means to fight a fire and what it means to control a fire. Further, student analysis of the structure of fire fighting and control may lead to a realization that this problem involves sub-components such as:

(a) What are the natural conditions that contribute to a forest fire?
(b) What natural conditions lead to the extinction of a wildfire?
(c) What human generated conditions lead to the extinction of a wildfire?

Generate and clarify hypotheses. As the problem is delineated, students often begin to generate potential solutions to the problem. These potential solutions form the hypotheses that further drive the inquiry. Students should be encouraged to list as many different possible solution hypotheses as possible, a form of brainstorming. These hypotheses should then be discussed, determining the potential viability of each hypothesis and the resources necessary to evaluate each hypothesis. At this point, depending upon classroom resources such as time, students may need to narrow the hypotheses they pursue. In the forest fire example the students may list several possible solutions to the problem of extinguishing a wildfire, such as hoping it rains, dousing the fire with water from fire trucks, using some form of chemical agent on the fire, covering the fire with dirt, or letting the fire burn itself out.

Collect resources, conduct experiments, and gather data potentially relevant to problem. At this stage of the inquiry process, students have constructed a problem and delineated possible solutions. It is now time to gather information, evidence, and data that supports or rejects the various constructed hypotheses. This information may be attained through library searches, Internet searches, interviews with professionals, experiments (field-based or laboratory-based), documentaries (television or film), and myriad other ways. In this process, students must develop the skills necessary to inquire skillfully, determining reliable sources from unreliable sources, primary sources from secondary sources, and the possible existence of bias in sources. Finally, in the course of this data gathering the students may reveal the existence of a viable alternative, which was not listed during the original generation of hypotheses, which must now be considered. In the case of the forest fire example, conducting an experiment or field test may be unsafe and beyond the students' capabilities; however, the students may certainly inquire using the library and Internet, and possibly conducting interviews. A creative use of the Internet and email may allow students to use the Internet to identify firefighters and then use email to contact them and interview the firefighters using email correspondence.

Organize, analyze, synthesize, and evaluate the attained information. As the information and data are gathered, the students must evaluate the information and data relative to their support or refutation of the hypotheses under scrutiny. This evaluation process involves organizing the knowledge and data meaningfully, and then analyzing and synthesizing it. In addition to evaluating the supportiveness of the gathered information and data, the students must also evaluate the nature and quality of the source. This process is often referred to as hypothesis testing. Organizing, analyzing, synthesizing, and evaluating the forest fire knowledge and data will depend upon the knowledge and data collected. However, the students could create a chart for each hypothesis (e.g., controlling a fire should involve the use of applications of soil to smother the fire and back fires to remove fuel in front of the advancing fire) that lists the relevant knowledge in one of three columns, "evidence supporting," "evidence refuting," or "evidence neutral" (Armstrong, 1980).

Develop tentative generalizations, explanations, or solutions relative to the problem. The final component of inquiry is the delineation of acceptable solutions and an explication as to why the solutions are valid. An important aspect of this process is the explicit realization that solutions to inquiry are rarely final and should always be considered tentative. The tentative nature of inquiry solutions acknowledges that the solutions are based on current information and understanding, and the level of understanding of both humankind and the inquirer will change with time. Finally, at this tentative end to the inquiry process the student should question the

entire process. Was the problem adequately understood, initially? Was sufficient data collected relative to the problem under inquiry? Are the ultimate conclusions sufficiently supported? What data are missing that would strengthen or further test the hypotheses? In the final stage of the forest fire inquiry the students would determine the viability of each hypothesis through the application of the collected and organized data. In addition, the students would evaluate the entire process of their inquiry.

These six components to inquiry and PBL emphasize the student's active participation in the learning process, although the exact roles of the students and teacher in inquiry are variable. Inquiry and PBL can be fairly restrictive when the teacher provides the problem to be solved and the resources and methods necessary to solve the problem. However, inquiry and PBL can also be quite unrestricted when the student is given the freedom to choose their own problem, seek their own resources, and evaluate their own data. The teacher's role in restricted inquiry is quite substantial and central, while the teacher's role in unrestricted inquiry is peripheral, that of guide, questioner, and encourager. Often teachers will begin by using a more restricted inquiry approach to familiarize students with the basic process of inquiry, and then, later, progress to less structured inquiry.

The question remains, following this discussion of constructivism and inquiry, whether or not constructivism can provide a theoretical foundation for the use of inquiry pedagogy. According to Orlich, Harder, Callahan, and Gibson (1998), "In our opinion there is nearly a perfect match between the notion of constructivism and the inquiry model of learning" (p. 294).

Constructivism and Inquiry

This "nearly perfect match" between constructivism and inquiry can be seen by relating the eight pedagogical principles of constructivism to the six pedagogical principles of inquiry. Specifically, both constructivism and inquiry agree upon the following statements.

1. Learning is enhanced by the use of authentic or real-world problems. For both constructivism and inquiry, the use of authentic problems leads to increased student motivation and the development of knowledge and skills that are more applicable in the "real-world" of agriculture.

2. Socialization should be included as a core component of pedagogy. Social interaction provides diversity of opinion and perspective in all facets of inquiry, resulting, ultimately, in a more thoroughly explored solution.

3. The problems used in inquiry and instruction need to be related to the student's needs and goals. The use of authentic problems that relate to a student's needs can be expected to increase that student's motivation and commitment to the inquiry process.

4. The problems used in inquiry and instruction must lie within a student's past and present experience in order for the student to be able to adequately participate in the learning and inquiry process. A student that cannot relate the problem situation to his or her own experiences will not be able to sufficiently understand nor investigate the problem.

5. Students should be assessed formatively to assure that the students are accurately engaging in the inquiry process, as well as developing the knowledge and skills of the domain under study. These formative assessments are essential to the teacher's role as guide. In order to guide appropriately the student's endeavors, the teacher must comprehend the student's current understanding.

6. The ultimate goal of learning and the inquiry process is for students to become self-regulatory, self-mediated, and self-aware. According to Arends (1998), "Guided by teachers who repeatedly encourage and reward them for asking questions and seeking solutions to real problems on their own, students learn to perform these tasks independently later in life" (p. 351).

7. The role of the teacher is that of guide and facilitator, not of knowledge conduit or conveyor of knowledge. The onus, in both constructivism and inquiry, for learning is squarely on the shoulders of the learner. The teacher's role is to provide support for learning based on a comprehension of the student's current understanding and the domain in which the student is investigating.

8. A component of the teacher's role as facilitator is to encourage the students to examine a problem from multiple perspectives, using multiple modes of representation. The teacher needs to continually challenge student assumptions and prod students to explore new sources of information.

In addition to the fit between constructivist and inquiry pedagogy, the underlying philosophical tenets of constructivism support the pedagogical process of inquiry in agricultural education. First, constructivism emphasizes the active role of the learner in the learning process. The inquiry and PBL approaches to agricultural education certainly emphasize this as well. In inquiry and PBL the student takes the lead in investigating and solving the problems at hand. Second, constructivism posits that learning is an adaptive process designed to make an individual more competent, both cognitively and behaviorally. This process of adaptation is basically one of confronting and overcoming problems. If there were no problems, there would be no need to adapt. Inquiry and PBL both use this process of overcoming problems. The root of agricultural education involves the student understanding and adapting to the fundamental constitution of nature. Third, constructivism asserts that cognition is designed to make sense of one's experiences. This concept underlies all that is inquiry. The process of inquiry and PBL is designed to make sense of our experiences of the world around us. In addition, the tentative nature of inquiry solutions emphasizes the constructivist belief that it is our experiences that we come to understand, not "truth." Finally, constructivism states that knowing is both an individual and a social process. Inquiry and PBL involve both individual and social processes. That is, student understanding is the result of individual experiences within a social setting. The individual comes to comprehend knowledge that is negotiated between the individual's prior knowledge and social interactions.

The preceding discussion demonstrates that constructivism provides sound theoretical support for the use of inquiry and problem-based pedagogy in agricultural education. The discussion also provides a rationale for the future use and refinement of inquiry and problem-based pedagogy in agricultural education. The continued use of pedagogy that facilitates

students' experience with problematic situations and promotes critical thinking in the solution of these situations will benefit both students and society.

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Constructivism as a Theoretical Foundation for Inquiry Based Pedagogy in Agricultural Education

A Critique

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From nearly the beginning of the 20th century the problem solving approach to teaching has served as the pedagogical foundation of agricultural education. Even though the problem solving approach to teaching is widely considered the pedagogical underpinning in agricultural education its use within the classroom is sporadic at best. Yet in other areas such as science education the use of inquiry based or problem-based learning is increasing. It is paradoxical that agricultural education appears to be moving away from its pedagogical heritage as its content becomes more science oriented while at the same time traditional science education seems to be embracing an inquiry based approach. Therefore it is not surprising that there is an increase in the philosophical discussion of the problem-solving approach to teaching and the theoretical assumptions underlying it and closely related pedagogical approaches.

This paper sought to delineate a theoretical foundation for the use of the problems solving approach to agricultural education. The authors used the theoretical perspective of constructivism in order to accomplish this purpose. This was accomplished by examining the core of constructivist pedagogy as well as the examination of problem solving teaching strategies followed by a synthesis of constructivist theory and inquiry-based pedagogy. In doing so the authors delineated the match between constructivism and inquiry-based pedagogy by relating the eight pedagogical principles of constructivism to the six pedagogical principles of inquiry. Specifically the authors concluded that both constructivism and inquiry based approaches agreed upon eight statements. Upon examination of these eight statements one can also see embedded the various principles of learning that have been espoused by various agricultural educators over the years such as Stewart (1950) and Newcomb, McCracken, and Warmbrod (1993). The authors build strong a case that constructivism provides sound theoretical support for the use of inquiry and problem-based pedagogy in agricultural education.

The authors noted that problem-based learning is the dominant term in educational literature and as a result used it throughout the paper even when discussing the problem solving approach to teaching. Is problem-based learning the same as the problem solving approach to teaching? No doubt they are related but many educators use problem-based learning as a teaching technique whereas the problem solving approach to teaching is not a singular teaching technique but rather a philosophical mindset where multiple teaching techniques are used.

Overall the paper is superbly written. The authors did an excellent job of providing a thorough foundation of constructivism and then overlaying problem-based learning over it. This type of philosophical paper and its conclusions add to the knowledge base by taking what is known in agricultural education and combining it with what is known in other areas of education, in this case the learning sciences and synthesizing new ideas. Additionally, the authors build a solid case for the future use and refinement of inquiry and problem-based pedagogy in agricultural

education. The authors are to be commended for utilizing constructivism to analyze the theoretical assumptions of the pedagogical foundation of agricultural education and presenting their thoughts in such a clear and coherent manner.

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Student Competencies with Graphing Calculators and Achievement in the Texas FFA Agricultural Mechanics Career Development Event

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Abstract

This study was designed to describe student performance in the Texas FFA agricultural mechanics Career Development Event (CDE) by access to, experience with, and use of a graphing calculator. A census of CDE participants was conducted in 2003. Data were collected in-person by the researchers during registration at the contest site. Hembree and Dessart (1986) established a positive link between use of calculators and increased student achievement and attitudes. Johnson (1993) extended their conclusions to student achievement in agricultural mechanics CDEs. Findings of this study show that most participants had access to a graphing calculator for routine class work, extra curricular activities, homework, and standardized testing. Students in this study perceived that the use of a graphing calculator improved their achievement in mathematics, agricultural science, and science. Students overall, however, did not perceive that they were experts in using a graphing calculator for mathematics, agricultural science, and science. A student's current classification and whether or not they indicated they owned a graphing calculator were the only variables in this study that were positively associated with higher levels of achievement on the agricultural mechanics CDE.

Introduction

Career development events (CDE's) are an important part of agricultural education. These educational events are organized by the National FFA Organization and state FFA associations, and sponsored by postsecondary education, business and industry, and individuals (Texas FFA, 2003). State rules generally follow national rules, with adaptations for conditions in each state. State CDE activities are based on competencies suggested by the National FFA Organization. (National FFA, 2002). Each state association is represented in at least one National FFA CDE. Forty-six states competed in the National Agricultural Mechanics CDE in 2002. Twenty-nine chapters competed in the 2003 Texas FFA Agricultural Mechanics CDE at the state level.

Career development events are an opportunity to perform real-world assessment of student skills. Students must develop abilities to solve complex problems to be successful in the workplace (TEA, 1998). Career development events in agricultural mechanics are designed to identify students who have developed the competencies and skills needed for success in the constantly changing workplace. Career development events are designed to incorporate the most current teaching technology. Students must apply a wide range of technologies to be successful in the

workplace (IMS, 2002). Ozgün-Koca (2001) stated that instructional programs should enable students to use representations to interpret physical and mathematical situations. The use of technology-based tools in career development events improves student success by enhancing the instructional process (NRC, 1988).

Current educational technology includes graphing calculators. The curriculum implemented in Texas in 1996 requires the use of graphing calculators in high school mathematics courses. Nelson (2002) directed school districts to ensure that adequate numbers of graphing calculators are made available to students for high-stakes testing situations. The state education agency has already provided significant funds to districts for the purchase of graphing calculators. Students should have multiple opportunities to work with calculators. Nelson (2001) noted that science assessments also necessitate the use of graphing calculators. Accordingly school districts must ensure that students in grades 9-11 have adequate access to graphing calculators, and also for daily classroom practice, homework, and extra curricular activities.

Theoretical Framework

The theoretical framework for this study is grounded by the seminal work of Hembree and Dessart (1986). Their findings established a positive link between use of calculators and increased student achievement and attitudes. A study by Hawkins, Stancavage, and Doosey (1998) found increased use of calculators improved student achievement on standardized tests. The use of calculators enhances students understanding of complex scientific and mathematical concepts by providing them with more time to focus on the concept and problem (Dossey, McCrone, Giordano, & Weir, 2002).

Students who are competent users of graphing calculators are more successful (Mokros, & Tinker, 1987). These authors found a substantial and positive relationship between student understanding of science topics and use of graphing calculators to solve problems. Students who solve problems that involve the use of CBL (calculator-based laboratory) probes are able to collect actual data on motion, sound, temperature, and light. Students with greater mathematical ability and experience tend to be more successful in agricultural mechanics CDE's (Johnson, 1991). Data has shown that Texas agricultural mechanics students score as well as their peers in end-of-course assessments (TEA, 2002). Johnson (1993) found also that the use of a calculator is strongly related to success in the career development event.

Teachers who provide opportunities for students to work with graphing calculators increase student success. Opportunities exist for agricultural science teachers to provide this type of instruction. According to the National FFA (2002), approximately 60% of the agricultural science programs in the United States include agricultural mechanics in their curriculum. Simulation-type problems have been shown to be effective vehicles for teaching many concepts of agricultural mechanics (Agnew, & Shinn, 1991). Nelson (2002), however, noted many teachers are not familiar with us and instruction of graphing calculators. Nelson also noted that although school districts have graphing calculators on hand, they hare used primarily for testing situations.

Graphing calculators are first introduced as a component of standardized assessment in Texas at the 8th grade level. Before this time, math teachers have generally provided their students with opportunities for guided practice. In many cases, science teachers have not provided these same opportunities. This is generally due to lack of familiarity with graphing calculators. The use of graphing calculators is more often viewed as a math skill rather than a science skill. Gathering data is often perceived as being a science skill, not a math skill. Interpreting the data contained in graphs is more often perceived as a math skill.

Opportunities should be provided for teachers and students to work with graphing calculators across a curriculum (Ozgün-Koca, 2001). Corporate entities are currently making attempts to expand the teacher knowledge base about graphing calculators with a variety of efforts. Texas Instruments (2003), for example, has developed an agricultural preparation curriculum (TI Ag Prep) and provides training to teachers through workshops offered around the country. The objectives of the TI Ag Prep curriculum are to: Reinforce agricultural education content across disciplines, promote the relevance between science and mathematics, enhance student learning experiences with real world activities, encourage the use of technology and hands-on learning by teachers, enhance student problem solving skills with real world activities, prepare students to use cutting-edge technology, and promote teacher collaboration across the curriculum.

Opportunities to integrate graphing calculator techniques with real-world application of this technology are provided at several locations. One way to improve student skills is through the use of graphing calculators (Ozgün-Koca, 2001). Extending instruction that involves graphing calculators to agricultural science classrooms should not result in budget increases, but will allow districts to make better use of equipment already in place. Research indicates the need for integrated educational activities anchored in real-world frameworks. Oakes (1997) suggested that a method combining discovery science with real-life situations will increase student understanding of calculator use and a greater understanding of science concepts. Balschweid (2002), however, noted that little evidence exists to show that general education teachers support their teaching with real-life examples in agricultural contexts. As early as 1983, the National Science Board recognized the need to incorporate more hands-on science experiences for students (NRC, 1988).

Scientific relevancy could be increased for students that seem to be uninterested with "traditional" approaches to science and mathematics through the use of curriculums that support science and math education (Balschweid, 2002). "Experiential" or problem-based learning may provide a transfer opportunity for many types of students. It has been demonstrated that problem-solving increases student retention. Solving real-world type problems in agricultural science classes incorporates the use of the scientific method and leads to student success (Boone, 1990). Complex calculations are an integral component of the world around us, and are contained in the Agricultural Mechanics CDE. Ozgün-Koca (2001) states that graphs are an effective means of summarizing complex information. Also, understanding and using graphs are a critical skill in the career development process for all students. Gliem and Warmbrod (1986) suggested that the utilization of practical mathematical problems should be an integral component of agricultural mechanics courses.

The 2003 Texas Agricultural Mechanics CDE involved teams of students using graphing calculators to solve problems. Slavin (1995) found that cooperative problem-solving increases student effectiveness. Problem solving with graphing calculators and interaction between team members is an effective method of instruction when the problem is carefully chosen (Grouws &, Cebulla 2000). Students experience greater success when solving problems because concepts and skills can be employed jointly. The agricultural mechanics CDE is an event that is balanced between problem-solving and individual skill performance.

To enhance the mathematical skills of high school agricultural science students, their teachers must become better teachers of mathematics skills. This can be done through the development of teacher opportunities that focus on the application of mathematics to agricultural problems (Miller, & Gliem, 1994). A need exits for in-service opportunities that incorporate specific problem-solving skills utilizing graphing calculators. The research presented in this paper is an attempt to expand the work of Johnson (1991, 1993) and Gliem and Warmbrod (1986) within the theoretical framework of Hembree and Dessart (1986) by looking at the impact of student access to, experience with, and use of graphing calculators for testing, class work, homework, and extra curricular activities on achievement in the Texas agricultural mechanics CDE. This research, further addresses the "School-Based Programs" research priority established by the AAAE Southern Region membership (Osborne, 2003).

Purpose

The purpose of this study was to describe student performance in the Texas FFA agricultural mechanics Career Development Agricultural Event by access to, experience with, and use of a graphing calculator. The objectives of the study were:

1. Describe participants' perceptions of whether their school allowed them to use their personal graphing calculator or provided them with access to a graphing calculator for standardized testing (TAKS), routine class work, homework, or extra curricular activities.
2. Describe participants' perceptions of their experiences with graphing calculators.
3. Describe participants' perceptions of their use of graphing calculators.
4. Describe participants' perceptions with individual performance and personal characteristics.

Methods

The research design used for this study was descriptive in nature. The target population was all high school students participating in the Texas FFA Career Development agricultural mechanics Event held May 3, 2003. The population consisted of 107 students who qualified for the state event through regional competitions. A census of the defined population was conducted. Data for this study were collected in-person by the researchers during registration at the contest site. Because a census was conducted, analysis of the data are reported as parameters.

The Agricultural Mechanics competition consisted of six parts and students were allowed to use a graphing calculator during the entire competition. The six parts included three individual activities (power and machinery, electricity, agricultural structures), one team activity (problem

solving), and two multiple choice examinations (cognitive skills and critical thinking). Competition rules allowed participants to use a graphing calculator on any part of competition. The competition's technical experts indicated that the use of a graphing calculator would likely improve students' scores, minimize mathematical errors, and increase student efficiency. For the team activity, all participants were provided with and allowed to use only TI 83 graphing calculators, which were supplied by Texas Instruments. The team activity was specifically designed to engage the students in new and challenging situations that involve mathematical concepts (Dossey, McCrone, Giordano, & Weir, 2002). The activity required students to "recognize and formulate the situation in mathematical terms; determine which relationships are necessary and which are sufficient; select relevant strategies, data, and models; use reasoning (spatial, inductive, deductive, or statistical) in new setting; and judge the reasonableness and correctness of outcomes" (Dossey, McCrone, Giordano, & Weir, 2002).

The research instrument was designed to measure participants' perceptions of access to, experience with, and use of graphing calculators in a variety of in-school and extra-curricular activities. A limitation of this study is that students self-reported their perceptions. The first part of the instrument was designed to gather information on students' ownership of a graphing calculator (brand and model if known) and school classification. The second part was designed to gather information on students' use of a graphing calculator for standardized testing, routine class work, and extra curricular activities using a nominal scale. The third part of the instrument was designed to gather information on students' experiences with graphing calculators using a five-point Likert-type scale. The points on the scale were: 1=strongly disagree; 2= disagree; 3=neither agree or disagree; 4=agree; and 5=strongly agree. The fourth part of the instrument was used to gather data on students' use of a graphing calculator using a five-point Likert-type scale. The points on the scale were: 1=never; 2=seldom; 3=some; 4=lots; and 5=always. Additional data were gathered on student and team performance upon completion of the competition. Student responses to the instrument were then matched with their individual and team scores.

The instrument was developed with assistance of the Agricultural Mechanics technical experts, judges, and Texas Instrument AgPrep Academic Coordinator. Content and face validity of the instrument were established by a panel of experts consisting of university faculty, technical experts, and contest judges. Minor wording and formatting changes were made based of the recommendations of the panel.

A pilot study was conducted on March 29, 2003 at qualifying CDE's with 75 students. Reliability for the instrument was estimated by calculating a split-half procedure on the first construct and a Chronbach's alpha coefficient on the second and third constructs. Reliability for access to a graphing calculator was estimated at .65. Reliability for the section could be increased to .78 by removing the question on access to a graphing calculator on the day of TAAS/TAKS testing. Based on the researchers need to gather descriptive information on students' access to a graphing calculator on the day of testing, this question was retained. Reliability for the construct involving students' experience with a graphing calculator was estimated at .90. Reliability for the third construct measuring students' use of graphing calculators was estimated at .83.

As a measure of instrument stability, a paired samples t-test was conducted on 33 students participating in the March 29, 2003 qualifying CDE's and the results of those same students participating in the May 3, 2003 State CDE's. There were no statistically significant differences between student responses at the qualifying event and the State content. It appears, therefore, that the instrument is stable.

Findings

This section presents a summary of findings by objectives. One-hundred seven high school students participated in the event. Approximately 41% of the students were seniors, 42% juniors, 16% sophomores, and 1% freshman. Approximately 42% of the students indicated that they owned a graphing calculator. Of those students indicating they owned a graphing calculator, 37 students reported owning a Texas Instrument graphing calculator and one student reported owning a Casio graphing calculator.

Objective 1

The first objective of this study was to describe participants' perceptions of whether their school allowed them to use their personal graphing calculator or provided them with access to a graphing calculator for standardized testing (TAKS), routine class work, homework, or extra curricular activities. Table 1 shows that 93.1% of students indicated that their school allowed them to use a graphing calculator for routine class work, 87.1% for extra curricular activities, 80.6% for homework, and 77.5% for standardized testing.

Table 1
Student Access to Graphing Calculators (*N*=107)

Student Access	Yes		No	
My school allowed me to use my personal graphing calculator or provided me with access to a graphing calculator:	*f*[a]	*%*[b]	*f*[a]	*%*[b]
• for **routine class work**	95	93.1	7	6.9
• for **extra curricular activities** such as CDE	88	87.1	13	12.9
• for **homework**	83	80.6	20	19.4
• on the day of **TAAS/TAKS testing**	79	77.5	23	22.5

Note. [a]Frequencies may not sum to N=107 due to item nonresponse. [b]Valid percent.

Objective 2

The second objective of this study was to describe participants' perceptions of their experiences with graphing calculators. As shown in Table 2, students agreed or strongly agreed with the statement, my teachers have instructed me how to appropriately us a graphing calculator for TAAS/TAKS testing (66.2%) and extra curricular activities such as CDE (55.9%). Students agreed or strongly agreed with the statement, I am comfortable using a graphing calculator for

TAAS/TAKS testing (77.4%) and extra curricular activities such as CDE (76%). Students agreed or strongly agreed with the statement, I think I am an expert in using a graphing calculator for mathematics (45.7%), agricultural science (40.2%), and science (33.1%). Students agreed or strongly agreed with the statement, the use of a graphing calculator improves my achievement in mathematics (83.3%), science (71.6%), and agricultural science (68.6%).

Table 2
Student experiences with graphing calculators (N=107)

Student Experiences	Strongly Disagree		Disagree		Neither Agree or Disagree		Agree		Strongly Agree	
My teachers have instructed me how to appropriately us a graphing calculator for:	*f*[a]	%[b]	*f*[a]	%[b]	*f*[a]	%[b]	*f*[a]	%[b]	*f*[a]	%[b]
• **TAAS/TAKS testing**	2	1.9	20	19.4	13	12.6	58	56.3	10	9.9
• **extra curricular activities** such as CDE	3	2.9	25	24.5	17	16.7	45	44.1	12	11.8
I am comfortable using a graphing calculator for:										
• **TAAS/TAKS testing**	0	0	11	10.8	12	11.8	60	58.8	19	18.6
• **extra curricular activities** such as CDE	1	1.0	11	11.0	12	12.0	54	54.0	22	22.0
I think I am an expert in using a graphing calculator for:										
• **Mathematics**	6	5.8	17	16.5	33	32.0	42	40.8	5	4.9
• **Agricultural Science**	7	6.9	22	21.6	32	31.4	37	36.3	4	3.9
• **Science**	9	8.7	24	23.3	36	35.0	29	28.2	5	4.9
The use of a graphing calculator improves my achievement in:										
• **Mathematics**	2	2.0	3	2.9	12	11.8	65	60.8	23	22.5
• **Science**	3	2.9	9	8.8	17	16.7	53	52.0	20	19.6
• **Agricultural Science**	4	3.9	7	6.9	21	20.6	51	50.0	19	18.6

Note. [a]Frequencies may not sum to N=107 due to item nonresponse. [b]Valid percent.

Objective 3

The third objective of this study was to describe participants' perceptions of their use of graphing calculators. Table 3 shows how often students used a graphing calculator in their school classes. Students indicated that used a graphing calculator lots or always in their math classes (59.4%), science classes (30.7%), agricultural science classes (15.9%), and in any/all other classes (8%).

Table 3
Student use of graphing calculators (N=107)

Student Use	Never		Seldom		Some		Lots		Always	
How often do you use a graphing calculator in your:	*f*[a]	%[b]	*f*[a]	%[b]	*f*[a]	%[b]	*f*[a]	%[b]	*f*[a]	%[b]
• **Math classes?**	9	8.9	13	12.9	19	18.8	24	23.8	36	35.6
• **Science classes?**	22	21.8	19	18.8	29	28.7	20	19.8	11	10.9
• **Agricultural Science classes?**	26	25.7	26	25.7	33	32.7	12	11.9	4	4.0
• **In any/all other classes?**	33	32.7	29	28.7	31	30.7	5	5.0	3	3.0

Note. [a]Frequencies may not sum to N=107 due to item nonresponse. [b]Valid percent.

Objective 4

The fourth objective of this study was to describe participants' perceptions with individual performance and personal characteristics. The maximum score possible on the Agricultural Mechanics event was 223 point. The maximum score achieved was 177 points and the minimum score achieved was 73 points. The average score was 116.3 points (SD=24.2) with a median score of 110 points. Students (*f*=43) that indicated they owned a graphing calculator scored approximately seven points more than students (*f*=59) that indicated they did not own a graphing calculator. This point discrepancy translated into an average difference of nine places in the individual judging contest. Approximately 56% of sophomores, 42% of juniors, and 37% of seniors indicated that they owned a graphing calculator. The average score for seniors was approximately 122 points, for juniors 114 points, for sophomores 111 points, and freshman 102 points. Seniors, on average placed nine places higher in the judging that juniors, 11 places higher than sophomores, and 26 places higher than freshman. Seniors who owned a graphing calculator scored approximately one point more and one rank better than those who did not own a graphing calculator. Juniors who owned a graphing calculator scored approximately 14 points more and 18 ranks better than those who did not own a graphing calculator. Sophomores who owned a graphing calculator scored approximately six points more and ten ranks better than those who did not own a graphing calculator.

To address whether an individual's overall score was related to access to, experience with, or use of a graphing calculator Pearson's *r* correlations were calculated. The magnitudes of relationships were described using Davis' convention (1971). The relationships between access to, experience with, and use of graphing calculators were negligible. The maximum score possible on the team activity was 25 point. The maximum score achieved was 18 points and the minimum score achieved was 0 points. The average score was 6.9 points (SD=4.6) with a median score of six points. To address whether an individual's score, on the team activity that required the use of a TI 83 graphing calculator, was related to access to, experience with, or use of a graphing calculator, Pearson's *r* correlations were calculated; all relationships were negligible. Students, however, that indicated they owned a graphing calculator scored on average, four percent higher that those that indicated they did not own a graphing calculator.

Conclusions, Implications, and Recommendations

The agricultural mechanics CDE in Texas provides students an opportunity to demonstrate their competence and judges to perform authentic assessments of such competence. Overall student achievement ranged from 79% to 33% with an average achievement of 52%. Johnson (2003) noted that CDE "activities should be challenging and discriminate among contestants while still providing participants with the opportunity to achieve higher levels of success" (p. 44). Overall student achievement provides evidence that the event is both challenging and discriminating. These findings, however, suggest also that contest judges and technical experts need to re-examine the overall difficulty of the contest and provide students with a greater opportunity to achieve higher levels of success. With overall achievement of 48% in a study in the state of Mississippi, a similar recommendation was made by Johnson in 1993.

The Texas Education Agency requires school districts to provide students with access to graphing calculators for testing, class work, homework, and extra curricular activities (Nelson, 2001, 2002). The results presented in this study suggest that the requirement for school districts to provide students with access to graphing calculators may not translate into actual access or use. Because of the positive link between student use of calculators and achievement (Hembree, & Dessart, 1986) and the student perception or reality that access and use are not universal, students should be encouraged to purchase a graphing calculator if they do not already own one or if they do not have ready access to one.

Students in this study tended to perceive that the use of a graphing calculator improved their achievement in mathematics, agricultural science, and science. This finding is supportive of Hawkins, Stancavage, and Doosey (1998) and Hembree and Dessart's (1986) conclusions. Students overall, however, did not perceive that they were experts in using a graphing calculator for mathematics, agricultural science, and science. A majority of students perceived that they were comfortable using and had been adequately trained by their teachers to use a graphing calculator for standardized testing and extracurricular activities. Students indicated they were more likely to use a graphing calculator in their math classes, than science, than agricultural science, than any/all other classes. An implication exists that overall student achievement could be improved further through additional training and use across a school's curriculum. A majority of students indicated that the never or seldom used a graphing calculator in their agricultural science courses. An implication exists that student overall achievement in CDE events could be enhanced by the increased use of graphing calculators in agricultural science courses. This implication is supported by the findings of Johnson (1993) and Gliem and Warmbrod (1986).

A student's current classification and whether or not they indicated they owned a graphing calculator were the only variables in this study that were positively associated with higher levels of achievement on the agricultural mechanics CDE. Students perceived access to, experience with, and use of a graphing calculator were not associated with achievement on the CDE. A limitation of this study was that there was not a control variable for actual use of a graphing calculator on the agricultural mechanics CDE contest. Future studies on this topic should attempt to control for actual use of a graphing calculator during a portion of the contest. To ensure students are not disadvantaged by being placed in the control group (which would be

predicted), a non judged activity could be scheduled at the end of the contest. Further research should also include questions on whether the participant had access to and used a graphing calculator during the contest and on which portions of the contest. Additional measures of access to a graphing calculator may improve the reliability of this section of the questionnaire.

The results of this study will be used by the Texas FFA Association to improve the agricultural mechanics CDE contest. In addition to incorporating the most up-to-date agricultural mechanics technologies into the contest, technical experts need also to ensure that contests take advantage of new and emerging educational technologies that are associated with deeper and more meaningful student learning experiences. While the literature and findings of this study highlight the relationship between student achievement and use of graphing calculators, future research should also address other emerging technologies that may also be related to student achievement. Examples of which include global positioning systems, personal digital assistants, mobile computing laboratories, point-to-point video conferencing, expert systems, 3D and virtual modeling, bar coding, total station systems, and lasers. By maximizing the use of such technologies into the CDE, deeper and more meaningful learning experiences may be produced.

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Student Competencies with Graphing Calculators and Achievement in the Texas FFA Agricultural Mechanics Career Development Event

A Critique

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Career development events (CDE's) are designed to reflect students' demonstration of real-world skills learned in the classroom. As the world changes so do the skills students need to possess. Instructional technology is an area that is constantly changing and some times have implications in terms of new skill requirements for students as is the case with the use graphing calculators in instruction. Therefore it is appropriate to investigate students' competencies with graphing calculators as they relate to a CDE, in this case the Texas Agricultural Mechanics Career Development Event.

This study sought to describe student performance in the Texas FFA Agricultural Mechanics Career Development Event by access to, experience with, and use of a graphing calculator. This census study was descriptive in nature and utilized an instrument developed by the authors. The authors correctly pointed out that a limitation of the study was that students self-reported their perceptions of access to, experience with, and use of graphing calculators. Results indicated that most students had access to graphing calculators for a number of routine instructional activities such as homework and standardized testing. Students perceived that use of a graphing calculator improved their achievement in mathematics, science, and agricultural science. However, they did not perceive that they were experts in using a graphing calculator. There was not much association between the variables in the study and higher levels of achievement on the agricultural mechanics CDE.

The authors' attempt to study how a CDE reflects students' demonstration of skills learned in the classroom is commendable. It is important that links between activities like CDE's and classroom learning are studied and reported. The authors' conclusion that the Texas Education Agency's requirement of graphing calculator accessibility may not actually be occurring is interesting. Often requirements involving instructional technologies such as computer-type equipment are only funded with one-time money which quickly results in a gap between requirement and reality. Another interesting result was that students reported that they were more likely to use a graphing calculator in a math or science class than an agricultural science course. A majority of students indicated that they never or had seldom used a graphing calculator in an agricultural science course. If science and math courses are using graphing calculators and agricultural science courses are being considered science courses shouldn't the use of graphing calculators be just as pervasive in these courses as in science courses. Perhaps increasing the need for graphing calculators in CDE's may result in an increased use of them in agricultural science courses. The authors' suggestion of continued research especially in the area of other emerging technologies is an excellent one and would be a great area for both curriculum development and related research.

The authors are to be commended on the overall methodology of the study. The purpose was clear and the methods used were sound. The development of the instrument was well documented and appropriate steps were taken to help insure both validity and reliability. Results were clearly reported and appropriate conclusions and recommendations were made. It is pleasurable to read a study and concentrate on the findings without having to worry about potential problems regarding the methodology. The authors are to be commended on a well designed study and equally well written report of their findings.

Inquiry-Based Instruction in Secondary Agricultural Education: Problem-Solving—An Old Friend Revisited

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Abstract

In the quest for more effective teaching and learning methods, one particular approach has surfaced as a "method of choice" for science educators: inquiry-based learning. A careful examination of this method suggests that it is very similar to the problem-based learning approach employed by many agricultural educators. This study sought to synthesize research reported by earlier researchers—science educators and agricultural educators—who examined inquiry-based learning and who researched the problem-solving approach. It was also designed to examine similarities between the two approaches and describe their level of "pedagogical congruence." Future research should attempt to measure the science achievement of agricultural education students and its relationship to teachers' use of the problem-solving approach. If significant positive associations are established, then professional development and learning resources supporting use of the problem-solving approach should be developed and delivered.

Introduction and Conceptual Framework

It is widely accepted that students' learning contexts should be coupled with multiple opportunities in which they "construct" or make meaning of their learning as it begins, progresses, and escalates. This approach to learning, identified as one of several forms of *constructivism*, owes its philosophical and theoretical roots to philosophers and theorists such as Jean Piaget, John Dewey, and Lev Vygotsky (Doolittle & Camp, 1999). Further, recent discoveries by cognitive and developmental psychologists suggest strong support for much of the epistemological basis posited by constructivist theorists (Bruer, 1999; Caine & Caine, 1991; D'Arcangelo, 2000). To a great extent, *inquiry-centered, inquiry-oriented,* or *inquiry-based learning*, as it is practiced in secondary science education (e.g., the "Learning Cycle"), is deeply rooted in a constructivist or *hands-on/minds-on* (Haury & Rillero, 1994; National Research Council, 1996; Von Secker & Lissitz, 1999) approach to learning (Haury, 1993/2002).

The National Science Education Standards state that, "Inquiry into authentic questions generated from student experiences is the central strategy for teaching science." And, that, "Developing understanding presupposes that students are actively engaged with ideas of science and have many experiences with the natural world" (National Research Council, 1996). Rettig and Canady (1996) reported that in schools where active learning methods prevail, the students demonstrated "significantly higher achievement as measured by the National Assessment of Educational Progress" (p. 2). Moreover, Darling-Hammond and Falk (1997) concluded,

> Teachers in these [successful] schools offer students challenging, interesting activities and rich materials for learning that foster thinking, creativity, and production. They make available a variety of pathways to learning that accommodate different intelligences and learning styles, they allow students to make choices and contribute to some of their learning experiences, and they use methods that engage students in hands-on learning.

Their instruction focuses on reasoning and problem solving . . . . (p. 193)

Instruction in secondary agricultural education inculcates much of what these (Darling-Hammond & Falk, 1997; National Research Council, 1996; Rettig & Canady, 1996) and other scholars (Bloom, 1974; Carroll, 1989; Glaser, 1963) have identified as variables required for cognitive learning to occur effectively, including learning in science. These propositions are congruent with the prevailing philosophy of agricultural education: experiential learning that is rich in opportunities for problem-solving delivered through the many authentic contexts comprising the agricultural, food, and natural resources system.

Historically, learning in agricultural education has been both "hands-on" and "minds-on" in intent, design, and delivery. It is an appealing and robust curriculum in which students can learn scientific laws, concepts, and principles in a contextual fashion (Conroy, Trumbull, & Johnson, 1999). In fact, Shepardson (1929) proclaimed that, "Agriculture is a meeting-ground of the sciences. Physics and chemistry lie at its base. To these elements biology adds its conception of organism. Mathematics is their common instrument" (p. 69). Further, Hillison (1996) concluded that from passage of the Hatch Act in 1887 until implementation of the Smith-Hughes Act three decades later agricultural education was known for its strong scientific basis for its close ties to the USDA, including, in some cases, Congressional District Agricultural Schools that were integral components of agricultural experiment stations, and for teachers who were well-grounded in, and prepared to teach, scientific laws and principles in the context of agriculture, food, and the natural world. Concomitantly, Conroy et al. (1999) posited that secondary agricultural education "provides a conduit for motivating students to learn science and mathematics, and provides hands-on practical experiences to complement theory."

Dewey also described an inquiry or problem-based approach that he called "reflective thinking" (Lass & Moss, 1987, p. 279); it involved five specific steps or aspects: " 'felt difficulty, its location and definition, suggestion of possible solution, development by reasoning of the bearings of the suggestion, further observation and experiment leading to its acceptance or rejection'" (as cited in Lass & Moss, 1987, p. 279). Dewey's model is consistent with that recommended by *The National Science Education Standards* (National Research Council, 1996) and with the problem-solving approach advocated by numerous agricultural educators (Boone, 1990; Crunkilton & Krebs, 1982; Flowers & Osborne, 1988; Krebs, 1967; Lancelot, 1944; Newcomb, McCracken, & Warmbrod, 1993; Phipps & Osborne, 1988). The presumption of a "common pedagogical denominator" between the two disciplines—science education and agricultural education—served as the basis of inquiry for this study

Purpose of the Study and Related Research Questions

The primary purpose of this study was to provide a synthesis of selected research describing the inquiry-based and problem-solving approaches to teaching and learning with emphasis on implications for improving student achievement in science. Research questions supporting this purpose follow: (1) What have science education researchers concluded about inquiry-based teaching and learning in science education and its role in improving student achievement? (2) What have agricultural education researchers concluded about the problem-

solving approach to teaching and learning in secondary agricultural education and its role in improving student achievement? (3) Are the inquiry-based and problem-solving approaches to teaching and learning substantially similar? (4) What are implications for future practice and research in agricultural education regarding use of problem-solving as an inquiry-based teaching and learning approach and its potential for improving student achievement in science?

Procedures

Sources of data included findings, conclusions, implications, and recommendations made by theorists and practitioners in science and agricultural education, respectively, who have described and, in some cases, explored the inquiry-based and problem-solving approaches to teaching and learning, and their potentials for influencing student achievement. The literature reviewed included doctoral dissertations, national commission reports, articles from professional journals and magazines, books, papers from research conferences, on-line Internet publications, and related resources. Studies appearing in these references were found through library system searches at a Land-Grant University and through on-line search engines. Cited manuscripts were published from 1918 through 2002. All references were subjected to internal and external criticism; and, selected guidelines for writing curriculum history were followed: authority, interpretation, significance, context, and perspective (Davis, 1991, pp.79-80).

Findings

What Science Educators Have Said About How Students Learn Science Best

The National Science Education Standards posit five assumptions about science teaching, including the belief that, "What students learn is greatly influenced by *how* they are taught" (National Research Council, 1996). Moreover, in 1996, the Standards called "for a pedagogical shift from a teacher-centered to a student-centered instructional paradigm" (Von Secker & Lissitz, 1999, p. 1110). It was thought that teaching practices closely identified with teacher-centered instruction were incongruent with students acquiring higher-order thinking skills and problem-solving behaviors. Further, it was held that a more student-centered approach to learning "engages students in socially interactive scientific inquiry and facilitates lifelong learning" (p. 1110). Moreover, science educators assert that fundamental to a student-centered approach to learning science is the practice of *inquiry*. The National Science Education Standards describe *inquiry* as

> a multifaceted activity that involves making observations; posing questions, examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Inquiry requires identification of assumptions, use of critical and logical thinking, and consideration of alternative explanations. (National Research Council, 1996)

Inquiry-based learning has been praised for requiring the student to do more than just report on a topic. The student must go beyond the simple memorization of facts and regurgitation of information and into the realm of creating new and deeper understanding

through identification and subsequent application of solutions to a specific topic (Owens, Hester, & Teale, 2002). To this end, Gerber, Marek, and Cavallo (1997) concluded that, "In [science] classes taught by inquiry, individuals are actively engaged with others in attempting to understand and interpret phenomena for themselves; and social interaction in groups is seen to provide the stimulus of differing perspectives on which individuals can reflect" (p. 3).

Inquiry-based (-oriented or -centered) instruction is frequently implemented as the "Learning Cycle Approach" in science education (Abraham, 1997; Gerber, et al., 1997; Sunal, n.d.; Trowbridge & Bybee, 1996). Gerber et al. (1997) posited that, "Teachers can facilitate the development of scientific reasoning abilities of their students through the incorporation of inquiry-oriented teaching strategies, such as the learning cycle" (p. 11). In support, Musheno and Lawson (1999) concluded that, "Research has supported the effectiveness of the learning cycle in encouraging students to think creatively and critically, as well as in facilitating a better understanding of scientific concepts, . . . improving science process skills, and cultivating advanced reasoning skills" (p. 24). The learning cycle is steeped in the Piagetian model about how humans acquire, interpret, and, eventually, transfer learning, especially, as it relates to concept formation or cognitive construction and then to future application (i.e., "transfer") toward problem resolution (Fosnot, 1996; Lind, 1999). Moreover, Sunal (n.d.) maintained that,

> the learning cycle is designed to adapt instruction to help students become aware of their prior knowledge, foster cooperative learning and a safe positive learning environment, compare new alternatives to their prior knowledge, connect it to what they already know, construct their own 'new' knowledge, and apply the new knowledge in ways that are different from the situation in which it was learned.

Accordingly, some researchers (Abraham, 1997; Hofstein & Lunetta, 1982; Johnson & Lawson, 1998; Lind, 1999; Musheno & Lawson, 1999; Sunal, n.d.) describe the learning cycle model as having three distinctive phases or parts: "exploration (experience), invention (interpretation) and expansion (elaboration)." Trowbridge and Bybee (1996) further operationalized the model as comprising five stages: engagement, exploration, explanation, elaboration, and evaluation. (See Sunal for a comparative explanation of the learning cycle and its application in science teaching.)

What Science Education Researchers have reported about Student Achievement in Science

Gerber et al. (1997) compared the effects of science classroom teaching procedures—non-inquiry versus inquiry—on students' scientific reasoning abilities. The investigators found that the scientific reasoning ability of seventh-grade students who received science instruction in inquiry-based classrooms was significantly higher than their counterparts who had not. Von Secker and Lissitz (1999) evaluated the effects of teachers implementing "instructional emphases [, i.e., learner-centered methods such as laboratory inquiry,] recommended in the National Science Education Standards" (p. 1111) on the achievement of tenth-grade science students. The study's achievement test included questions about biology, earth science, physics, and chemistry, and stressed "higher-order thinking as well as understanding of fundamental concepts and mastery of basic skills" (p. 1114). The researchers found that, "Teacher-centered instruction is negatively associated with student achievement in science" (p. 1119). Specifically, students' mean science achievement was nearly one-half standard deviation lower in schools where teacher-centered instruction was one standard

deviation above average. In contrast, students' mean science achievement increased by nearly four-tenths of a standard deviation "for every 1 SD increase in the amount of emphasis placed on laboratory inquiry" (p. 1120). Von Secker and Lissitz concluded that, "The strongest empirical support for instructional recommendations set forth in the [National Science Education] Standards was observed for instruction that emphasized laboratory inquiry" (p. 1121). They also asserted that the learner-centered practice of laboratory inquiry was "invariably associated with higher achievement overall and with more equitable achievement among students with different demographic profiles" (p. 1121).

Johnson and Lawson (1998) compared gain in scientific reasoning ability of community college students (N = 366) enrolled in a biology course. Approximately one-half of the students received instruction through a teacher-directed approach while one-half learned via an inquiry-based approach. The investigators found that students who received biology instruction through the inquiry approach "showed greater improvement in [scientific] reasoning ability . . . than the expository students" (p. 100). The inquiry students also showed higher overall performance in biology achievement. Johnson and Lawson concluded that, "nothing of importance seems to be lost by switching to inquiry instruction, and much seems to be gained" (p. 100).

Problem-Solving as an Inquiry-Based Teaching and Learning Approach .

Science educators (Abraham, 1997; Gerber, et al., 1997; Hofstein & Lunetta, 1982; Johnson & Lawson, 1998; Musheno & Lawson, 1999; Sunal, n.d.; Trowbridge & Bybee, 1996) have asserted that the preferred pedagogical method for teaching science effectively is an inquiry-based instructional approach. Moreover, science education researchers (Gerber, et al., 1997; Johnson & Lawson, 1998; Musheno & Lawson, 1999; Von Secker & Lissitz, 1999) have demonstrated empirical evidence supporting that position. Frequently, an implicit component to systematic inquiry, especially, at the initial or "exploration" phase of learning, is the presentation of a "problem" and the subsequent pursuit of a solution**.** Glasgow (1997) operationalized the "problem-based approach" (p. 49) to learning as one that

> teaches self-directed learning techniques . . . as well as traditional lectures and discussions supporting problem solving. Students are expected to analyze problems, locate relevant materials and resources, use computer-based technology, and develop habits of lifelong learning and independent study. Students practice identifying problems and outcomes . . . . (p. 49)

Agricultural educators (Boone, 1990; Cano & Martinez, 1989; Conroy et al., 1999; Crunkilton & Krebs, 1982; Dyer & Osborne, 1996; Flowers & Osborne, 1988; Hammonds, 1950; Krebs, 1967; Newcomb et al., 1993; Nolan, 1918; Phipps & Osborne, 1988; Torres & Cano, 1995a; Torres & Cano, 1995b) have supported Glasgow's contentions about problem-based learning (PBL). Accordingly, inquiry-based instruction and problem-based learning are substantially similar in intent, process, and anticipated learning outcomes**.** See Figure 1 for a comparison of steps comprising the learning cycle approach (Trowbridge & Bybee, 1996) in science education and the steps in implementing the problem-solving method, as described by agricultural education researchers.

The problem-solving approach has long been considered a significant part of the

pedagogical foundation on which the educational philosophy of agricultural education rests. However, the reason(s) this method was adopted in such a wholehearted manner is somewhat unclear. Moore and Moore (1984) concluded that its acceptance was simply a "historical accident" (p. 5), one that occurred due to a convergence of events. The researchers claimed that problem-solving was adopted as a "method of choice" simply because of its popularity with the likes of Dewey, Kilpatrick, and others who supported that approach to learning. Moore and Moore went so far as to assert that secondary agricultural education might have evolved very differently in its approach to teaching and learning had it begun under a different era of educational philosophy. Lass and Moss (1987) supported their assertion: "Since Dewey was at the peak of his career when agricultural education emerged as a secondary school subject, many of the early teachers were influenced by Dewey's teachings and readings" (p. 280).

Figure 1. A Comparison of the Learning-Cycle Approach in Science Education and Selected Problem-Solving Approaches to Teaching and Learning in Agricultural Education.

Learning Cycle	**Newcomb et al.**	**Crunkilton & Krebs**	**Phipps & Osborne**
Engagement	Interest approach	Interest approach	Experience provocative situation
Exploration	Group objectives /questions	Group objectives	Explore references/sources
Explanation	Problem solution	Solving the problem	Arrive at a group solution
Elaboration	Testing solutions	Special events/activities	Attempt a trial solution
Evaluation	Evaluating results	Evaluation and application	Evaluate the effects

As early as 1918, Nolan recognized the value of the problem solving method and the importance of providing authentic situations in which problems arise and then are solved by students. Later, Lancelot (1944) also wrote of the effectiveness of this method. He stated, "In general, those teachers who keep their students thinking teach their subjects by means of problems . . . " (p. 144). Lancelot further contended that all subjects can be taught effectively through the use of problems and that much effort should be put forth to recognize and develop useful problems. Lancelot's position may have been directly influenced by Dewey considering the fact that he did graduate work at an institution where Dewey worked as an educator, and could have very easily been one of Dewey's students (Lass & Moss, 1987). Consequently, his work may have impacted other educators, e.g., Stewart's 1950 publication of the text *Methods of Good Teaching* described an approach to teaching and learning very similar to Lancelot's.

According to an historical analysis of problem solving conducted by Moore (1994), the approach became more prominent in agricultural education textbooks in 1952 when Phipps and Cook presented definitive steps that should be followed when implementing this type of instruction. Further, Krebs (1967) described his point of view concerning the practicality and usefulness of the problem-solving method when he stated, "One of the values inherent in a problem-solving approach in teaching is that it is not a process which is strange or unused by people in general" (p. 52). And, Phipps and Osborne (1988) posited, "Problem-solving teaching

is recognized as an effective means of developing and securing desirable learning. It stimulates interest; develops thinking ability; and helps students to evaluate, draw inferences from, and make decisions essential to the solution of a problem" (p. 150).

The problem-solving approach has been widely accepted among agricultural educators yet not unanimously: Moore and Moore (1984) expressed their discontent with the use of this method. The focus of their objection(s) stressed difficulties associated with implementing the approach effectively rather than with any inherent "theoretical" inadequacy. While the researchers left no doubt concerning their position on using the method exclusively, they did concede that, if used properly, the problem-solving method could be a useful pedagogical tool.

Arguably, a strong case can be made that the pedagogical analogue or "form" of inquiry-based teaching and learning operationalized in secondary agricultural education is the *problem-solving approach*: a method that is used by many teachers to facilitate and extend student learning. (See Figure 1.) To this end, Boone (1990) stated that, "The problem solving approach to teaching has been widely accepted as the way to teach vocational agriculture" (p. 18), and "When students solve real problems, use the scientific method to reason through a problem solution, test potential problem solutions, and evaluate the results of the solution, retention of knowledge learned through this activity has to be increased" (p. 25). Boone (1990) also opined that, "The problem solving approach to teaching increases the level of student retention of agricultural knowledge learned during an instructional unit" (p. 25). Further, Flowers and Osborne (1988) found "that for high level cognitive items [secondary agricultural education] students taught by the problem solving approach had less achievement loss than students taught by the subject matter approach" (p. 25). And, Dyer and Osborne (1996) concluded that "the problem solving approach is more effective than the subject matter approach in increasing the problem solving ability of [agriculture] students," and, moreover, that the "increase transcends [students'] learning styles" (p. 41). Their findings also indicated that the problem-solving ability of students who are field-dependent learners could be enhanced "to a level of effectiveness nearly equal to that possessed by field-independent learners" (p. 41) with proper instruction.

Warmbrod (1969) described the problem-solving approach as " . . . instruction [that] is student-centered rather than subject-centered; [where] instruction aims at the development of and change in behavior of individuals" (p. 231). Warmbrod also portrayed the approach as "teaching and learning [that] is a cooperative venture between the students and teacher rather than a completely teacher-dominated process" (p. 231). Further, Torres and Cano (1995a) posited that, "The use of thinking skills in problem situations is universally recognized as a prominent objective for all educational academies" (p. 46). In addition, Torres and Cano (1995b) argued that, "a more constant use of the problem-solving approach to teaching" could be a valuable method "by which we can excel in teaching higher-order thinking skills" (p. 9) in agriculture. (See Crunkilton, 1984, for a summary of benefits associated with problem-solving.)

Conclusions, Discussion/Implications, and Recommendations

Science education researchers have concluded that students achieve best in science when their learning experiences are constructivist (hands-on/minds-on) in design, i.e., active, relevant, applied, and contextual. Learning environments supporting sustained inquiry, e.g., a learning

cycle approach to instruction, that are rich in concrete experiences show the greatest promise for improving student achievement (Abraham, 1997; Gerber, et al., 1997; Haury, 1993/ 2002; Haury & Rillero, 1994; Hofstein & Lunetta, 1982; Johnson & Lawson, 1998; Lind, 1999; Musheno & Lawson, 1999; National Research Council, 1996; Trowbridge & Bybee, 1996; Von Secker & Lissitz, 1999). Agricultural educators have determined that the problem-solving approach is a very effective means of teaching and learning that has been, and continues to be, a vital part of agricultural education (Boone, 1990; Cano & Martinez, 1989; Conroy et al., 1999; Crunkilton & Krebs, 1982; Dyer & Osborne, 1996; Flowers & Osborne, 1988; Newcomb et al., 1993; Krebs, 1967; Phipps & Osborne, 1988; Torres & Cano, 1995a; Torres & Cano, 1995b). The literature reviewed in this study revealed substantial pedagogical agreement between the concepts of inquiry-based learning, as described by science education researchers, and the problem-solving method propounded by agricultural educators (Figure 1).

Significant agreement exists between what some eminent scholars (Bloom, 1974; Carroll, 1989; Darling-Hammond & Falk, 1997; Glaser, 1963; Rettig & Canady, 1996) have said is the recommended pedagogy for improving student achievement and teaching and learning in agricultural education. The problem-solving method, as employed by many agricultural educators, appears to be an effective means of implementing an inquiry-based learning approach, one similar to what science educators have described. Moreover, a comparison of steps for implementing the learning cycle and the steps described by agricultural education researchers for carrying out the problem-solving approach align very closely (Figure 1).

However, success rests upon agriculture teachers who are prepared to effectively use the problem-solving method as they facilitate student learning: planning and designing a problem-based learning experience (Glasgow, 1997), properly executing such an experience, and then assessing and evaluating its outcomes. Yet researchers (Boone, 1990; Moore & Moore, 1984; Osborne, 1999; Warmbrod, 1969) have also voiced doubts about the ability of some teachers to do so properly. To this end, Cano and Martinez (1989) recommended that, "Further research needs to be conducted to determine the extent to which problem-solving instruction, which has been the cornerstone of vocational agriculture, contributes to the cognitive ability and critical thinking ability development of the students" (p. 364). Boone (1990) also suggested further study about the effects of using problem-solving as measured by student achievement as well as training for teachers that would provide a clearer understanding of how to implement this practice. More recently, the National Agricultural Education Research Work Group has called on the profession to "identify current research in agricultural education that corroborates effective school-based educational practice, . . . and . . . to communicate and coordinate a research agenda that will aggressively examine research problems related to high school student achievement, particularly mathematics, science, and reading, . . ." (G. Shinn, personal communication, August 19, 2002). Findings of this study support that position and also suggest the need for more research.

Findings also suggest that the problem-solving method, in particular, is secondary agricultural education's "pedagogical analogue" to the inquiry-based teaching and learning practices heralded by science education researchers. Accordingly, future practice and research should include the following: (1) More empirically-based research should be conducted to explore the association between teachers' use of the problem-solving approach in the context of

secondary agricultural education and subsequent student achievement in science. The aforementioned work group supports this recommendation. (2) Implicit is a need to also determine whether specific scientific concepts and principles, e.g., life sciences as opposed to physical sciences (Johnson, Wardlow & Franklin, 1997), are learned better by students through problem-solving than via other methods. Additional inquiry should be conducted toward that end. (3) Investigations should be carried out to better understand how agriculture teachers operationalize and use, or do not use, the problem-solving approach (Osborne, 1999). Special attention should be given to identifying misconceptions or barriers that may prevent teachers from using the approach properly (Boone, 1990; Martinez, 1998; Warmbrod, 1969). Concomitantly, more should be learned about the "fitness" of existing curriculum materials as well as the need for new learning resources that may be better suited for the problem-solving approach to teaching and learning. (4) If a significant causal relationship is established between use of problem-solving in agricultural education and improved student achievement in science, then the profession should redouble its effort toward preparing pre-service and in-service teachers to use the method effectively (Boone, 1990; Osborne, 1999).

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Inquiry-Based Instruction in Secondary Agricultural Education: Problem-Solving – An Old Friend Revisited

A Critique

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As educators continue to strive for more effective teaching and learning methods it sometimes pays to look to the past. Therefore the recent "discovery" and adoption of inquiry-based learning in areas such as science education is interesting given the long history of it in agricultural education in the form of the problem solving approach to teaching. Consequently, it would be intriguing to determine the similarities between the approaches of science and agricultural educators.

This paper sought to synthesize research reported by earlier researchers who have studied inquiry-based learning and/or the problem solving approach to teaching. Primarily the authors tried to examine the similarities between the two approaches as well as to determine their level of pedagogical congruence. The literature reviewed included dissertations, national commission reports, articles from professional journals and magazines, books, papers from research conferences, on-line publications, and related sources. The authors followed selected guidelines for writing curriculum history: authority, interpretation, significance, context, and perspective. The authors found substantial pedagogical agreement between the concepts of inquiry-based learning, as described by researchers in science education and the problem solving approach to teaching espoused in agricultural education.

The authors provided a well structured theoretical framework that built the presumption of a common pedagogical denominator between the two disciplines of science education and agricultural education which served as the core theme of the paper. The purpose was clearly stated and research questions supported the purpose. The procedures were appropriate for this type of scholarly paper.

The findings clearly show the similarities between the inquiry approach used by science educators and the problem-solving approach of agricultural educators. Both are grounded in a student-centered approach rather than a teacher-centered approach. Furthermore both science educators and agricultural educators are interested in students learning at the higher levels of cognition and have found that these approaches are more effective in doing so. As the authors succinctly summarized "inquiry-based instruction and problem-based learning are substantially similar in intent, process, and anticipated learning outcomes". The authors also commented that the problem solving approach to teaching has long be considered a significant part of the pedagogical foundation of agricultural education. If this is true, and given that science education has moved to an approach that is very similar to the problem-solving approach and also considering the emergence of agriscience over the past two decades why do only a few agricultural educators actually use the problem solving approach to teaching? This paper is an excellent start in synthesizing what is known about the use if inquiry-based learning in science education and the problem solving approach to teaching in agricultural education. However, it

raises many more questions than it can answer and the authors' suggestions for future practice and research outline a point for others to start.

This paper adds to the existing knowledge by taking what we already know and combining it to create new knowledge. It is intriguing that as agricultural education has moved more toward the content taught by science educators that at the same time science educators have moved toward the methods traditionally used by agricultural educators to teach. The authors are to be commended for examining the similarities of the two approaches and synthesizing those similarities.

Growing the Seeds of Change: The Effectiveness of Teaching for Critical Thinking in the Context of Plant Biotechnology

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Abstract

The study involved restructuring an undergraduate general education course in the food and agricultural sciences in order to focus on teaching students to think critically within the discipline specific context of food biotechnology. This study evaluates the effectiveness of the course restructuring by comparing it to a similar control group that was not privy to the critical thinking teaching methodology. Students in the biotechnology course had higher gains in the specific sub-skills of Analysis and Inference, while the control group's scores decreased for each sub-skill including the Evaluation sub-skill. The researchers also concluded that the dispositions were harder to influence. Engagement scores were slightly higher for the experimental group and Cognitive Maturity scores were notably lower. Recommendations include calling on agricultural instructors to do more planning for, teaching with, evaluating, and publicizing the critical thinking focus in and of their courses; sustained attention to critical thinking development for dispositional influence; increased interactive activities to influence the Engagement disposition; and careful attention to impartiality when simultaneously teaching a controversial topic within a particular context such as agriculture and trying to foster critical thinking.

Introduction

Food biotechnology represents one of the most important domains of knowledge where the teaching of critical thinking will have great potential for enhancing the quality of education for students in the food and agricultural sciences. The development of critical thinking in agricultural learners has been identified as an important need, based on findings which suggest potential deficits in terms of students' ability to think critically (Rudd, Baker, & Hoover, 2000). Additionally, several studies (Newcomb & Trefz, 1987; Rudd, et al., 2000; Torres & Cano, 1995) have examined the effect of teacher delivery methods which foster higher order thinking, levels of cognition, and critical thinking in agricultural education. However, few studies have addressed the impact of teaching methods specifically designed to foster critical thinking in an agriculturally specific context such as food biotechnology.

Critical thinking is one of the most important attributes for success in the 21st century (Huitt, 1998). Meyers (1986) argued that for students to reach their fullest potential in today's society, they must learn to think and reason critically. Paul (1995) even reasoned that critical thinking is now a necessity for economic and societal survival. How much more important should critical thinking in and about food biotechnology and agriculture be for that same economic and social survival?

This study is part of a larger USDA grant project entitled, *Developing a Critical Thinking Instructional Model and Skills Assessment Instrument for Food Biotechnology*. The project

involved restructuring an undergraduate general education course in the food and agricultural sciences in order to focus on teaching students to think critically within the discipline specific context of food biotechnology. This study simply evaluates the effectiveness of the course restructuring by comparing it to a similar control group that was not privy to the critical thinking teaching methodology.

Theoretical Framework

Formal educational philosophies concerning critical thinking in the United States can be traced back to Dewey (1933), who believed that there were three attitudes necessary to reflective action (critical thinking); open mindedness, responsibility, and wholeheartedness. A decade later, Glaser (1941) claimed critical thinking is the "attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences; knowledge of the methods of logical inquiry and reasoning; and some skill in applying those methods" (pp. 5-6).

Critical thinking, still a common term in educational, psychological, and philosophical circles, has been defined by researchers and theorists as a “set of intellectual standards” that can be used by individuals while thinking (Paul, 1995). Rudd, et al. (2000) defined critical thinking as: “A reasoned, purposive, and introspective approach to solving problems or addressing questions with incomplete evidence and information and for which an incontrovertible solution is unlikely” (p.5).

Peter Facione (1990), who conducted a national Delphi study of experts to define critical thinking, constructed the following definition: "We understand critical thinking to be purposeful, self-regulatory judgment, which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based” (p.2).

Each of the aforementioned critical thinking researchers making major contributions to the development of critical thinking believed that critical thinking consisted of a “disposition” and “skill” dimension. Findings of some researchers (Facione, Facione, & Giancarlo, 1996; Jones, Ratliff, Tibbetts, & Glick, 1994; Giancarlo & Facione, N., 1994; Facione & Facione, 1997; Ricketts, 2003) have found there is a relationship between critical thinking skills and dispositions. This study considers the dual nature of critical thinking as it reports the pre-test and post-test critical thinking skills and dispositions of subjects.

While critical thinking skill and disposition can be defined as separate entities, both are thought to be open to educational influence, particularly when meaningfully, contextually bound (Brown, 1997). Critical thinking is a valuable skill that, once learned, can be applied in many different disciplines; however, researchers have contended that there is a need to think critically within specific disciplines. According to Glaser, critical thinking is, in part, “attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences (1941, p. 5-6). Ennis (1990) advocates contextual, domain, or subject specific critical thinking for several reasons. First, background knowledge is necessary for making justified critical thinking judgments. Second, critical thinking varies from discipline to discipline

and, third, a full understanding of a discipline requires the ability to think critically in the discipline.

The theoretical framework for this study is supported by the Delphi study of Peter Facione (1990). The critical thinking skills identified by the panel of experts in that study were Interpretation, Analysis, Evaluation, Inference, Explanation, and Self-regulation. Following the lead of Facione (2000) and the *Test for Everyday Reasoning (TER)*, three critical thinking skills, Analysis, Evaluation, and Inference were the skills measured in this study. The TER did not specifically try to measure interpretation, explanation, and self-regulation. Similarly, the skills used in this study (Analysis, Evaluation, and Inference) were selected to represent critical thinking skill because of their orientation to objective measurement; their indicativeness of all the critical thinking skills in the construct; and because subsequent studies have been conducted to validate their usage (Facione, 1990; Giancarlo, 1996; Ricketts, 2003).

For example, a student competent in the critical thinking skill of Analysis can effectively identify the relationship between statements, questions, concepts or descriptions to express beliefs, judgments or reasons. Students excelling at Inference consistently demonstrate the ability to draw reasonable conclusions and/or hypotheses based on facts, judgments, beliefs, principles, concepts or other forms of representation. Finally, students competent in the skill of Evaluation can effectively assess the credibility of statements and representations of others, and are proficient at assessing the logical strength of statements, descriptions or questions (Facione, 1998).

In addition to a complete list of critical thinking skills, the Delphi study identified a list of critical thinking dispositions that are needed for critical thinking. Facione (1998) has occasionally referred to the dispositions as approaches to life that characterize critical thinking. They are as follows:

> inquisitiveness with regard to a wide range of ideas, concern to become and remain well-informed, alertness to opportunities to use critical thinking, trust in the process of reasoned inquiry, self-confidence in one's own abilities to reason, open-mindedness regarding divergent world views, flexibility in considering alternatives and opinions, understanding of the opinions of other people, fair-mindedness in appraising reasoning, honesty in facing one's own biases, prejudices, stereotypes, or egocentric tendencies, prudence in suspending, making, or altering judgments, willingness to reconsider and revise views where hones reflection suggests that change is warranted (p. 8).

In the California Critical Thinking Disposition Inventory (CCTDI), which has been the standardized instrument used to measure the above approaches to life, the scales, Truth-Seeking, Open-mindedness, Analyticity, Systematicity, Self-confidence, Inquisitiveness, and Maturity are used (Facione, Facione, & Giancarlo, 2001). This study used a researcher-developed instrument that measured those same approaches to life. The researcher-developed instrument contained only three scales (Innovativeness, Maturity, and Engagement). Facione's Delphi study was used to develop the three-scale instrument, known as the EMI. A description of the researcher-developed critical thinking dispositions (scales) follow:

- The Engagement disposition measured students' predisposition to looking for opportunities to use reasoning; anticipating situations that require reasoning; and confidence in reasoning ability.

- The Innovativeness disposition measured students' predisposition to be intellectually curious and desire to know the truth.

- The Cognitive Maturity (Maturity) disposition measured students' predisposition to being aware of the complexity of problems; being open to other points of view; and being aware of their own and others biases and predispositions.

Purpose / Objectives

The grant, entitled *Developing a Critical Thinking Instructional Model and Skills Assessment Instrument for Food Biotechnology*, involved restructuring an undergraduate general education course in the food and agricultural sciences in order to focus on teaching students to think critically within the discipline-specific context of food biotechnology. The purpose of this study was to assess the efficacy of the *Seeds of Change* course, which was is an introductory course that focused on the role of genetically-altered plants in agriculture, the environment, foods, and medicine on the critical thinking skills and dispositions of the students enrolled. By recruiting a similar course in the college, which was not specifically designed to improve the critical thinking of students, the effect of the *Seeds of Change* course could be more completely realized. The following objectives guided the causal-comparative investigation.

1. Determine the demographic composition of students in the *Seeds of Change* course compared to those in the control (*Plants that Feed the World*) course.

2. Compare pre-test and post-test critical thinking skill scores for students in the treatment group (*Seeds of Change* course) and the control group (*Plants that Feed the World* course).

3. Compare pre-test and post-test critical thinking disposition scores for students in the treatment group (*Seeds of Change* course) and the control group (*Plants that Feed the World* course).

Methods / Procedures

The population for this study consisted of all students at the University of Florida who enrolled in a course pertaining to food and/or plant biotechnology. There were 34 students participating in this study from the *Seeds of Change* course, which was specifically designed to improve the critical thinking of both honors and non-honors students. There were 31 participants in the *Plants that Feed the World* course, which served as the control course. Both courses were administered in the Spring semester of 2003. The research design incorporated pretest-posttest comparisons and a casual comparative/*ex post facto* design, as outlined by Campbell and Stanley (1966).

Because of mortality, only 43 total students took both the pre-test and the post-test. Students in both classes were administered an online pretest designed to measure their critical thinking dispositions and critical thinking skills prior to exposure to a specific set of instructional delivery methods. At the end of all instruction in the courses, refined researcher-developed online and paper instruments were used to measure the critical thinking dispositions and skills of all the participants.

The researcher-developed critical thinking skills test measured the discipline-specific skills of Analysis, Inference, and Evaluation. A researcher-developed instrument was needed because contextual nature of critical thinking skills (Ennis, 1990). In other words, in order to measure a student's critical thinking skill in and about food biotechnology, a critical thinking assessment, which was in the context of food biotechnology was needed. The EMI instrument (Ricketts, 2003) measured student dispositions of Innovativeness, Engagement, and Cognitive Maturity. Prior to pilot testing, a panel of experts in critical thinking and food biotechnology checked the multiple-choice skills test and the 5-item-Likert-type EMI for content and face validity. After final testing, item analysis, and test re-configuration, Cronbach's alpha for each critical thinking sub-skill was 0.68 for Analysis, 0.85 for Inference, and 0.72 for Evaluation. Final Cronbach's alphas for the subscales of the EMI critical thinking disposition assessment were 0.82 for Innovativeness, 0.73 for Cognitive Maturity, and 0.89 for Engagement. These reliability ratings were deemed appropriate since Norris and Ennis (1989) recommended reliability ratings of 0.65 and 0.75 for any instrument testing a variety of critical thinking aspects.

The experimental group was consistently asked to discuss biotechnology concepts and issues, make decisions regarding the role of genetically altered plants, and hone their critical thinking skills. The *Seeds of Change* students were graded with assignments such as journaling, article and web-based video critiques, case studies, concept matrixes, readings, essay quizzes, and a final exam.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) 10.0. Frequencies, means, and standard deviations were calculated to compare the two groups' critical thinking skills and dispositions. Independent-samples t-tests were calculated to determine differences between the experimental *Seeds of Change* group and the control group. Cohen's *d* (1977) statistic was calculated to determine the effect sizes of the differences. According to Cohen, 0.2 represents a small effect size, 0.5 represents a medium effect size, and 0.8 represents a large effect size.

Results / Findings

Objective 1 - Determine the demographic composition of students in the Seeds of Change course compared to those in the control (Plants that Feed the World) course.

Respondents' ages ranged from 16 to 24 years old. Thirty four percent (n = 22) of the subjects were male and 66 percent (n = 43) were female. The ethnic make-up of the participants was comprised of 64.5% White, 16.9% Black or African American, 9.2 % Hispanic or Latino, 4.6% Asian, and 1.5% Hawaiian or Pacific Islander, and 1.5% self-reported themselves in the Other category. The majority of the participants (69.3%) were either from a large sub-urban area

or an urban area. The *Seeds of Change* students were 56% honors students compared the 6% of honors students in the *Plants that Feed the World* course. Additionally, students in the experiment group reported slightly higher grade point averages (M = 3.44, SD = 0.51) than the control group (M = 3.29, SD = 0.52).

Objective 2 – Compare pre-test and post-test critical thinking skill scores of the treatment group (Seeds of Change course) and the control group (Plants that Feed the World course).

Participants in the *Seeds of Change* course, which was specifically designed to improve the critical thinking of students, scored slightly higher on each construct of the food-biotechnology specific critical thinking skills pre-test (Table 1). The only statistically significant difference at the 0.05 alpha level at pre-testing was in the Evaluation sub-skill, $t(51) = 3.41$, $p < 0.05$, $d = 0.80$. However, post-test analyses in Table 2 reveal that students in the *Seeds of Change* experimental group scored significantly higher than the *Plants that Feed the World* control group on Analysis, $t(54) = 2.79$, $p < 0.05$, $d = 0.87$, Inference, $t(54) = 2.82$, $p < 0.05$, $d = 0.84$, and Evaluation sub-skills of critical thinking, $t(54) = 3.75$, $p < 0.05$, $d = 1.20$ (Table 2). According to scores on the post-test compared to the pre-test, students in the course specifically designed to improve critical thinking in and about food biotechnology improved their Analysis and Inference scores by four points, while the Evaluation score stayed the same. Conversely, the control group's critical thinking scores notably decreased at each sub-skill (Table 1).

Table 1.
Summary of critical thinking skill scores for the Seeds of Change treatment group and the Plants that Feed the World control group.

	Pre-Test			Post-Test		
	N	M	SD	N	M	SD
Treatment group (X)						
Analysis	28	76.43	14.96	31	80.29	17.62
Inference	28	81.01	15.48	31	85.81	26.93
Evaluation	28	78.57	13.80	31	77.82	19.02
Control group (O)						
Analysis	25	74.00	14.43	25	64.89	23.72
Inference	25	73.60	17.29	25	63.20	33.01
Evaluation	25	62.80	19.69	25	55.00	26.52

Table 2.
Statistical differences between the Seeds of Change treatment group and the Plants that Feed the World control group at each test administration

	Pre-Test				Post-Test			
	t	*df*	Sig.	*Cohen's d*	*t*	*df*	Sig.	*Cohen's d*
Analysis	0.60	51	0.55	0.17	2.79	54	0.01	0.87
Inference	1.66	51	0.10	0.48	2.82	54	0.01	0.84
Evaluation	3.41	51	0.00	0.80	3.75	54	0.00	1.20

Objective 3 – Compare pre-test and post-test critical thinking disposition scores of the treatment group (Seeds of Change course) and the control group (Plants that Feed the World course).

At pre-testing the participants in the investigational course specifically planned to improve the critical thinking of students scored higher on the Innovativeness and Engagement dispositions, but not on the Cognitive Maturity disposition (Table 3). The pre-test difference in the Innovativeness, $t(46) = 3.46$, $p < 0.05$, $d = 1.00$ and Engagement, $t(46) = 2.36$, $p < 0.05$, $d = 0.67$ critical thinking dispositions between the groups was statistically significant at the 0.05 alpha level, but a large effect size (Cohen, 1977) was only found for the difference in the Innovativeness disposition (Table 4).

Tables 3 and 4 reveal that the post-test critical thinking disposition differences between the groups are minimal for Innovativeness, $t(55) = 3.43$, $p < 0.05$, $d = 0.94$ and Engagement, $t(55) = 2.96$, $p < 0.05$, $d = 0.80$. However there was a large effect size when analyzing the difference between the two groups' post-test scores.

The control group's Cognitive Maturity scores remained the same from the pre-test to the post-test, the experimental group's Cognitive Maturity scores decreased slightly, yielding a significant post-test difference between the two groups with a large effect size, $t(55) = -4.21$, $p < 0.05$, $d = 1.40$.

Table 3.
Summary of critical thinking skill scores for the Seeds of Change treatment group and the Plants that Feed the World control group.

	Pre-Test			Post-Test		
	N	M	SD	N	M	SD
Treatment group (X)						
Innovativeness	28	86.43	9.29	32	87.63	9.30
Engagement	28	83.51	9.80	32	86.20	9.41
Cognitive Maturity	28	48.33	13.32	32	43.20	9.25
Control group (O)						
Innovativeness	20	77.13	9.04	25	78.88	9.88
Engagement	20	76.58	10.32	25	78.47	10.25
Cognitive Maturity	20	56.83	20.36	25	56.30	14.16

Table 4.
Statistical differences between the Seeds of Change treatment group and the Plants that Feed the World control group at each test administration

	Pre-Test				Post-Test			
	t	*df*	Sig.	*Cohen's d*	*t*	*df*	Sig.	*Cohen's d*
Innovativeness	3.46	46	0.00	1.00	3.23	55	0.00	0.94
Engagement	2.36	46	0.02	0.67	2.96	55	0.01	0.80
Cognitive Maturity	-1.75	46	0.88	0.40	-4.21	55	0.00	1.40

Conclusions

The *Seeds of Change* course may have improved students' ability to identify the relationship between statements, questions, concepts or descriptions to express beliefs,

judgments or reasons and their competence in demonstrating the ability to draw reasonable conclusions and/or hypotheses based on facts, judgments, beliefs, principles, concepts or other forms of representation. Analysis and Inference critical thinking skill scores improved for students in the experimental group. However, the control group actually went in a negative direction. This could be attributed to the syllabi, methodologies, and evaluation procedures in the two classes.

The experimental group was consistently asked to discuss biotechnology concepts and issues, make decisions regarding the role of genetically-altered plants, and hone their critical thinking skills. The *Seeds of Change* students were graded with assignments such as journaling, article and web-based video critiques, case studies, concept matrixes, readings, and essay quizzes, and a final exam. The control group (*Plants that Feed the World* students) was exposed to a grading system that was 75% lecture. Even the labs were simply about plant identification. Activities for the control group included food fact papers, plant ID labs, and multiple-choice quizzes and tests. If the instructor is the greatest factor in influencing the thinking opportunities of students as Whittington (1997) suggested, then this finding would call on instructors build curricula that incorporate specific teaching methodologies that seek to improve the discipline specific critical thinking skills of students. The drastic drop in the control group scores may also indicate that the traditional lecture only method, which lacks these teaching strategies that are designed to improve critical thinking causes students to lose critical thinking ability. Why should one use critical thinking when all they have to do to make an A is memorize?

Critical thinking dispositions are harder to influence. There was little disposition improvement for both groups for the Innovativeness and the Engagement construct. This was not surprising for the Innovativeness construct, since other researchers (Reed & Kromrey, 2001) have found that critical thinking dispositions are harder to change, especially concerning a student's predisposition to be intellectually curious and desire to know the truth. The researchers had hoped the Engagement disposition would have improved more than it did for the experiment group since student activities in the course called on them to be entrenched in the curriculum with various passive, active, and interactive assignments. Encouragingly, the construct increased more than any other disposition for experimental group. In order to positively influence dispositions instructors and agricultural education framers of curricula should probably incorporate many of the teaching methodologies like the ones used in the *Seeds of Change* course over the course of an agricultural student's educational career.

Cognitive maturity disposition scores fell for the *Seeds of Change* students and stayed the same for the control class. When trying to improve discipline specific critical thinking skills in a certain context that tends to consistently find itself on one side of an issue, such as agricultural side of biotechnology issues, the Cognitive Maturity disposition of students may be negatively influenced. The educational component of the food biotechnology course caused students on the "fright" side of the biotechnology to see the agricultural side, and abandon their old feelings of fear about biotechnology. In other words they scored lower on their ability to be being open to other points of view and being aware of their own and others biases and predispositions because of the content of the course in relation to the issue.

Lastly, higher academically performing students were drawn to the course, which publicized the attention it would give to critical thinking. There was little demographic difference between the experimental *Seeds of Change* course and the control group with the exception academic performance indicators such as whether or not students were classified as honors or non-honors students. The fact that 56% of the students in the experimental course were honors students compared to 6% in the control group may indicate that a certain type of student is drawn to a general education elective that publicizes the fact critical thinking will occur as opposed to one that merely asks students to "know," "be familiar with," or "identify." This imbalance would also suggest that the experimental group would not be able to improve their scores as much as the control group since they started off scoring higher on critical thinking skills (Table 1) and dispositions (Table 3). This was not the case, though. Students in the *Seeds of Change* course were able to increase their critical thinking skill scores in Analysis and Inference.

Recommendations

First of all and most importantly, food biotechnology courses and those that are similar should plan for, teach with, evaluate, and publicize the critical thinking focus of their courses. If instructors want to improve the Analysis and Inference critical thinking skills of students, then assignments and activities such as journaling, article and web-based video critiques, discussion groups, case studies, concept matrixes, readings, and essay quizzes should be regularly incorporated into the curriculum. Consequently, it is also recommended that instructors should guard against letting the lecture methodology dominate their courses. Students actually lose the need to critically think when their competency is based on rote memorization. More scientific experimental research should evaluate specific strategies to understand the direct influence they have on agricultural students.

To influence the critical thinking dispositions of students, the effort needs to be a sustained, longitudinal effort. The attitudinal nature of the critical thinking disposition makes it harder to change. Therefore, educators should start as early as possible teaching about and with critical thinking in a discipline specific way. However, the specific disposition of Engagement may be more easily influenced according to the amount, frequency, and variety of activity in a course. Therefore, instructors should fill their agricultural course, such as food biotechnology with a repository of ways that students may look for opportunities to reason, anticipate situations that require reasoning, and gain confidence in their reasoning ability. Further research on the Engagement disposition and how it can be enhanced by teacher behaviors needs to be conducted.

The drop in Cognitive Maturity disposition score should cause teachers to make a special effort to remain impartial and objective themselves when attempting to influence critical thinking, while at the same time teaching content that lends itself to one side of a controversial issue such as biotechnology. Practitioners must figure out how to teach the agricultural side of plant and food biotechnology while fostering students' ability to see other points of view as potentially valid. Further research that evaluates and critiques the instructor practices, attitudes, and biases as they teach for critical thinking and about agricultural issues should naturally flow from this piece.

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Growing the Seeds of Change: The Effectiveness of Teaching for Critical Thinking in the Context of Plant Biotechnology

A Critique

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An important goal of any course at any level should be to improve students' thinking skills. Research in agricultural education has identified the development of critical thinking in agricultural learners as an important need. Therefore, it is an appropriate response to identify and investigate various teaching methodologies to meet the need for improvement of thinking among learners.

This study sought to evaluate the effectiveness of a course that had been restructured to incorporate critical thinking teaching methodologies. An undergraduate general education course in the food and agricultural sciences was restructured in order to focus on teaching students to think critically within the discipline-specific context of food biotechnology. The authors used a casual comparative/ex post facto design with pretest-posttest comparisons in order to determine if the restructuring of the course improved the critical thinking of students. The restructured course served as the treatment group and a similar course that did not incorporate critical thinking teaching methodologies was used as the control group. Students in the treatment group had higher gains in the critical thinking skills of Analysis and Inference while the control group's scores decreased in each skill area. The results also indicated that critical thinking dispositions were harder to influence. The authors are to be commended for investigating the efficacy of a restructuring a course with the specific goal of improving the critical thinking skills of students in the course.

The authors provided a well-structured theoretical framework related to critical thinking that led to a clear delineation of the purpose and objectives of the study. The authors are to be commended for integrating research conducted outside of agricultural education, especially in the areas of psychology and philosophy, into their theoretical framework. The various citations of Facione were significant contributions to the theoretical framework. The results of this study contribute to the body of knowledge regarding students' critical thinking skills and dispositions being open to educational influence.

An important result of this study was that not only did the incorporation of critical thinking teaching methodology into a course appear to improve students' critical thinking skills in the area of Analysis and Inference; it also appears that the lack of these methodologies can negatively impact students' critical thinking skills. Additionally, the finding that critical thinking dispositions are harder to influence indicate that a systematic approach is needed to integrate critical thinking teaching methodologies over many courses and not just selective courses in order to better able to positively influence critical thinking skills and dispositions of students.

The results of this study confirm what could be logically deduced in that students who are taught and required to use critical thinking will become better critical thinkers than students who are not

required to think critically. The ability to think critically is a skill like any other skill, one that needs to be taught, reinforced, and nurtured in order for it to become a true skill. This study provides very relevant and practical recommendations for practitioners to know what teaching methodologies can be incorporated to help foster critical thinking in their students. Furthermore, they make two salient points in terms of this needing to be a sustained, longitudinal effort as well as instructors need to be impartial and objective when dealing with topics where there are no clear cut answers.

When conducting research in a classroom setting it is often difficult if not impossible to design the study in a "classical" way. However, it is better to conduct a study that may contain some flaws rather than not conduct the study at all. This study used an appropriate design given the situation. However, the differences in the students between the treatment group and control group do raise some concern over the internal validity threat of selection. Did the authors consider using Analysis of Co-Variance in order to control for the unequal samples? Additionally, the high rate of mortality was another internal validity threat to this study. It would have been helpful if the authors had explained how they controlled these threats.

Overall this is an important area of research that the authors are to be commended on studying. This study and the bigger project that it was a part of is a classic case of how agricultural education can contribute to the improvement of agricultural instruction and learning in higher education as well as the more traditional area of secondary agricultural education.

LEADERSHIP INVOLVEMENT AND BEHAVIORS EXHIBITED BY FFA CHAPTER PRESIDENTS AND OFFICERS

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Abstract

This study identified leadership behaviors exhibited by FFA chapter presidents. It also examined the relationship between the chapter presidents' perception of their leadership behavior with the behaviors observed by their chapter officer team. The study included all chapter officer teams from the 2001-2002 school year in the Northeast District of a Midwestern state. These programs were notified of the study and were invited to have their officer teams participate while at the State FFA Convention. A quantitative descriptive design was employed to describe and compare the 35 chapter presidents and 136 other officers. Each completed a questionnaire to measure leadership behaviors exhibited by the chapter president.

Findings indicated that chapter presidents and other officers believed that the behaviors of Enabling Others to Act, Modeling the Way, and Encouraging the Heart were the most often exhibited by the chapter president. The chapter presidents, however, held inflated self-perceptions of their leadership behavior when compared to their officers' observations. This was consistent among all 30 statements within the five leadership practices.

Introduction/Theoretical Framework

The premise of this study rests upon a combination of educational and leadership theories. The learning theories utilized are the constructivist theory of Bruner (1966) and the experiential learning theory of Chickering (1977). The leader-member exchange theory, path-goal theory, team leadership approach, and the five leadership practices common to successful leaders by Kouzes and Posner (1987) are the main leadership theories in which the study is derived. All of these theories can be applied to the development of leadership skills and behaviors through the involvement in leadership development activities comprised in agricultural education and the FFA.

The constructivist theory, as given by Bruner (1966) implies that learning is an active process, where students construct new concepts or ideas based upon current and existing knowledge. Brunner reported that instruction should lead students to the discovery of principles and ideas on their own. The instructor should act as a translator, relating information to the learners' levels of comprehension. Knowledge will then, continually build from existing ideas, thus enabling the learner to construct hypotheses and make decisions.

Agricultural education is predisposed to first teach material in the classroom (Ricketts, 1982). Through Supervised Agricultural Experience and the FFA, the classroom learning is enhanced, reshaped, and reinforced (Ricketts & Newcomb, 1984). Learners follow a structure and sequence of events and through participation in events and contests; they may also receive rewards when developing their leadership potential. Through gaining experience in leadership development

activities, students will be able to construct their own thoughts and ideas of appropriate leadership, just as the constructivist theory implies. The constructivist theory of learning in agricultural education promotes the idea of allowing students to be actively involved in their learning through their own translations, creations, and experiences. Boatman (1989) advocated that the principle of student involvement in the learning process, and the incorporation of individualized experiences greatly enhance overall learning.

Phrases such as, *experience is the best teacher*, or *practice makes perfect* may best be used to describe experiential learning. Although there are various multifaceted models of this learning theory, Chickering (1977) placed it in simple terms, labeling experiential learning as an integral relationship between experience and knowledge. Walter and Marks (1981) described experiential learning as, "a sequence of events with one or more identified learning objective, requiring active involvement by participants at one or more points in the sequence (p. 1)".

Experiential learning may even be considered a tool for carrying out planning, implementing, and evaluating within student learning and experiences (Steinaker & Bell, 1979). Steinaker and Bell (1979) suggested that experiential learning enhances the widely used cognitive, affective, and psychomotor taxonomies that have been effective tools in planning, implementing, and evaluating, as a framework of understanding for the total human interaction experience is provided. Participants in experiential learning should be fully involved in relevant activities. They should develop responsibility for their own learning when the environment for learning is flexible and responsive (Walter & Marks, 1981).

Much cannot be learned without solid experience and practice (Chickering, 1977). This holds true for most of what is taught within agricultural education, including leadership. In theory, the utilization of many leadership skills and behaviors seem easy, but in actual practice they are more difficult, therefore, basic leadership theory and ideas have been taught in the classroom. The practice of leadership skills may take place within the FFA, and the experience gained through planning, implementing, and evaluating various organized chapter activities. These ideas all follow the principles of experiential learning.

Northouse (2001) describes the leader-member exchange theory as a leadership process that is centered on leaders and followers. Subordinates make contributions at a cost to themselves and receive benefits at a cost to other members or to the group as a whole (Bass, 1990). Communication and personal relationships between leaders and followers are key in conceptualizing this theory. Other variables relevant to this theory include power, status and esteem, and general relationships held between the leader and the followers.

The path-goal theory, as described by Bass (1990), is essentially an exchange theory of leadership. It is directed around motivation from leaders to followers in the accomplishment of goals (Northouse, 2001). The leader works to clarify group goals, as well as to remove obstacles creating clear paths to the goals (Bass, 1990). Rewards may also be provided to followers based on satisfactory performance in meeting the group goals (Bass, 1990). The leader may enhance the subordinates motivation, performance, and satisfaction when the path-goal theory is effectively practiced (Bass, 1990).

Both theories involve skills deemed necessary by society and its workforce such as communication, teamwork, goal-setting, and motivation. Members holding roles as FFA chapter officers have many opportunities to practice and experience the skills important in defining the above leadership theories (Rutherford, Townsend, Briers, Cummins, & Conrad, 2002).

The team leadership approach refers to assisting the group in accomplishing a task or goal, along with the maintenance in continuing that goal (Northouse, 2001). Sally Helgesen (1996), in *The Leader of the Future*, saw a true team as one that both defines its objectives from conception, and discovers ways to meet these objectives through execution. Team leadership requires competent team members with similar goals and commitment levels, a compatible climate, set standards, outside support, and recognition (Northouse, 2001). This approach also accounts for the changing role of the leaders and followers within the organization (Northouse, 2001). Blake and Mouton (1985) recognized team management on their Managerial Grid® as work accomplished through a committed people, or a common stake. Participation, openness, trust and respect, involvement and commitment, consensus, management by objective, mutual support, and development and change through feedback were all prescribed by Blake and Mouton (1981) for effective team leadership.

In the FFA, officers, committees, and members in general are encouraged to work as teams. Standards set by the team members usually take the form of goals for yearly activities, service, promotion, and fundraising. The groups outside support stems from its advisors, parents, school, and community. Recognition and rewards from within may be those motivational tools used by the chapter president and other group leaders when individual or group performance is satisfactory, as explained in the path-goal leadership theory. These factors of team leadership are needed among FFA chapters and their officer teams to be functional and effective.

The theories described above provided clues to the operation of leadership within the group. Leaders and followers exhibit many leadership behaviors during the group's leadership process, no matter what theory the group most likely embraces. Little is known as to what specific leadership behaviors FFA chapter officers and their leaders utilize. Kouzes and Posner, however, have identified five exemplary leadership behaviors, as practices common to successful leadership. These five practices have much in common with behaviors deemed as integral among the four previous leadership theories. Kouzes and Posner's (1987) behavioral practices included:

- Challenging the Process
- Inspiring a Shared Vision
- Enabling Others to Act
- Modeling the Way
- Encouraging the Heart

<u>Challenging the process</u> infers that leadership is an active process. Leaders are pioneers, as they take risks in order to find new and better ways of doing things. When leaders take risks, they do not always succeed, and should not always expect to succeed. Instead leaders and followers must learn from their mistakes and failures. Successful leaders <u>inspire a shared vision</u> or goal with their group members. Leaders must not only be imaginative, but they must have the ability to invoke their followers into the common vision. Leaders must also know their followers and their language to ignite them with the motivation and enthusiasm needed to be prepared to work

toward the vision and goals. Successful leaders must also continue from the development of motivation to enable others to act. Leaders enlist the support and assistance of all members involved in the project. These leaders use the word *we* rather than *I,* and *us* rather than *me*. They establish a strong sense of teamwork within the group and among those supporters outside of the group. Successful leaders have detailed plans. They must guide projects as they happen, measure performance, and take corrective measures when needed. As the leader directs the course of action, he or she must also model the way. This means that leaders must lead by example. Leaders must not only tell others what they believe, they are obligated to show others as well. Lastly, successful leaders encourage the heart of their followers along the path to their goals. When followers become frustrated and disenchanted, they may wish to give up. Leaders that encourage the heart may offer these followers rewards, tokens, and simple upbeat words of encouragement.

Leadership opportunities and activities contained within the FFA and agricultural education utilize various components of the leadership paradigms, theories and the leadership practices explained above. The constructivist and experiential learning educational theories paired with successful leadership behaviors also aid in the development of further training methods for leadership utilized in the FFA. The understanding of all of these principles will better enable their implementation through further leadership training.

Purpose/Objectives

The purpose of this study was to identify FFA chapter presidents' leadership skill development, and to describe the specific leadership behaviors exhibited they exhibited. In order to accomplish the purposes of this study, the following objectives were generated:

1. Describe the FFA chapter presidents' perceived levels of leadership behavior exhibited in five leadership practices, as described by Kouzes and Posner (1987).

2. Describe the FFA chapter officers' observations of their president's levels of leadership behavior exhibited in the five leadership practices.

3. Examine the relationship between the FFA chapter presidents' perception of their leadership behavior exhibited among the five leadership practices with the behaviors observed by their officer team.

Methods and Procedures

The population for this study consisted of FFA chapter presidents and other members of the corresponding chapter officer team from the Northeast Agricultural Education District of a Midwestern state. The Northeast district contained 80 schools. This district was chosen due to the diversity of school size as well as a mixture of rural, suburban, and urban schools within the district. An invitation to participate in the study was extended to all 80 chapters. Of the total population of 80 chapters, 35 FFA officer teams completed the survey. Data was collected at the state FFA convention near the end of April. In some cases all current FFA chapter officers did not attend the convention and were not able to participate. Chapters could only participate if the entire chapter FFA officer team was available to complete the assessment.

The Statistical Software Package for Social Sciences® (SPSS) 8.0 for Windows was used to analyze all data collected within the study. Descriptive statistics were used in data analysis to illustrate observations while inferential statistics were utilized to organize and understand the relationships between and among the groups of variables. Means and standard deviations were also calculated for some scale items for the sole purpose of comparing the groups within the study as recommended by Kerlinger (1986). An 0.05 alpha level was set for this study, providing a 95% level of confidence.

The instrument utilized within this study was the Leadership Practices Inventory (LPI) for leaders and observers developed by Kouzes and Posner (2001). The Leadership Practices Inventory was employed to assess the strength of the five practices of exemplary leadership as exhibited by the FFA chapter presidents. This instrument used 30 questions with responses based on a ten-point scale ranging from 1=almost never to 10=almost always. Studies indicate that a "high" score is one of 7 or above, a "low" score is one at 3 or below, and a score that falls between 3 and 7 is considered "moderate." This scale was used to define objectives one and two, as it measured behaviors on the following five independent scales:

1. Challenging the Process
2. Inspiring a Shared Vision
3. Enabling Others to Act
4. Modeling the Way
5. Encouraging the Heart

Two forms of the instrument were used; the leader form was labeled Chapter President, and the observer form labeled Chapter Officer, as the instrument was designed to be used by multiple raters.

Kouzes and Posner (2001) conducted numerous tests to determine the psychometric properties of the LPI as they were developing the instrument. From their tests, they found that the instrument is internally reliable. The six statements related to each leadership practice were highly correlated with one another (Kouzes & Posner, 2001). Test-retest reliability was also found to be high. The LPI, if given again within a time span of a few months and without any further leadership training would yield consistent and stable results (Kouzes & Posner, 2001). Kouzes and Posner (2001) also reported that the LPI contained both face and predictive validity, meaning that the instrument made sense to people and the results generated were significantly correlated with various performance measures, to be used for further predictions about leadership effectiveness.

The instruments were pilot tested on FFA chapter officer teams at seven schools not included in the population. Through pilot testing the instrument, some confusion was found in the generalized wording of the instrument. Therefore, it was suggested by the panel of experts to change headings and some wordings on the directions of the instrument to clarify respondent roles, and make the instrument more personalized to the FFA chapter presidents and officers completing this instrument. The meaning and intent of the questions themselves were not altered.

Data gathered on this instrument from the pilot was statistically analyzed to test the grouped items. Cronbach's alpha coefficient was determined for each of the five scales to measure internal consistency. The reliabilities for each practice were: Challenging the Process = .83, Inspiring a Shared Vision = .87, Enabling Others to Act = .82, Modeling the Way = .69, and Encouraging the Heart = .84. Chronbach's alpha for the Leadership Practices Inventory (LPI) was determined for the five practices within the study as well. The reliabilities for each of the practices within the study were: Challenging the Process = .93, Inspiring a Shared Vision = .94, Enabling Others to Act = .92, Modeling the Way = .94, and Encouraging the Heart = .94.

Results/Findings

All 35 chapter presidents and 136 chapter officers responded to this portion of the instrument. The chapter presidents completed the leader portion of the LPI, as it was used to assess the self-perceptions of the president's own actions within the five exemplary leadership practices. The chapter officers' observer portion of the LPI assessed the officers' observations of their chapter president's leadership behaviors among the five exemplary practices. Responses to questions within the five practices of leadership were based on a range from 1 to 10, therefore creating a combined total that could range from 6 to 60 for each of the five practices.

In the area, Challenging the Process, the 35 chapter presidents possessed an overall mean response of 44.34, while the 136 chapter officers generated a total mean response of 34.28 out of a possible 60 points. The statement, *I experiment and take risks in my work even when there is a chance of failure* exhibited the highest mean response of 8.06 (usually often) by the chapter presidents. The chapter officers also rated this statement as the highest they observed among their chapter presidents. The officers mean response, however, was 6.43 (sometimes). Adversely, the statement *I ask what can we learn when things do not go as expected* received the lowest mean response from both the chapter presidents and officers. The chapter presidents mean response of 6.77 (fairly often) for this statement was still higher than the chapter officers mean of 4.96 (occasionally). These differences are illustrated below in Table 1.

Table 1

Central Tendencies for Responses on" Challenging the Process"

	Chapter Presidents		Chapter Officers		Difference
Statement	Mean (n=35)	Standard Deviation	Mean (n=136)	Standard Deviation	
Seek challenging opportunities	7.14	1.80	5.63	2.92	1.51
Challenges people to try new approaches	7.51	1.69	5.51	3.01	2.00
Looks outside organization for ways to improve	6.89	2.19	5.51	2.86	1.38
Asks "What can we learn?"	6.77	2.46	4.96	2.88	1.81
Experiments and takes risks	8.06	1.71	6.43	2.76	1.63
Takes initiative to overcome obstacles	7.97	1.89	6.23	2.54	1.74
Total	44.34	8.89	34.28	14.76	10.06

Note: Scale, 1=Almost Never, 2=Rarely, 3=Seldom, 4=Once in a While, 5=Occasionally, 6=Sometimes, 7=Fairly Often, 8=Usually, 9=Very Frequently, 10=Almost Always**.**

The practice of Inspiring a Shared Vision accumulated a mean response of 43.60 by the chapter presidents and 34.56 by the chapter officers. The phrase, *I am contagiously enthusiastic and positive about future possibilities* received the highest mean score among the chapter presidents of 8.11 (usually often) and a mean response of 6.53 (fairly often) by the chapter officers. *I describe a compelling image of what our future could be like* obtained the lowest mean response of 6.71(fairly often) by chapter presidents and 5.35 (occasionally) by the chapter officers (Table 2).

Table 2

Central Tendencies for Responses on" Inspiring a Shared Vision"

	Chapter Presidents		Chapter Officers		Difference
Statement	Mean (n=35)	Standard Deviation	Mean (n=136)	Standard Deviation	
Talks about future trends	7.26	1.93	5.54	2.84	1.72
Describes compelling image of future	6.71	1.99	5.35	2.97	1.36
Appeals to others to share dream of future	7.03	2.11	5.67	2.97	1.36
Shows others how their interests can be realized	7.09	1.87	5.74	2.89	1.35
Is enthusiastic and positive about future	8.11	1.55	6.53	3.04	1.58
Speaks with conviction	7.40	2.44	5.83	2.86	1.57
Total	43.60	9.65	34.56	15.37	9.04

Note: Scale, 1=Almost Never, 2=Rarely, 3=Seldom, 4=Once in a While, 5=Occasionally, 6=Sometimes, 7=Fairly Often, 8=Usually, 9=Very Frequently, 10=Almost Always**.**

The practice termed Enabling Others to Act held a mean score of 50.34 by the chapter presidents, and a mean response of 40.40 by the chapter officers. The statement, *I treat others with dignity and respect* earned the highest mean score among chapter presidents in the practice of 9.11(very frequently). Chapter officers also rated this statement the highest with a mean score of 7.32 (fairly often).The lowest mean response provided by the chapter presidents was obtained by the phrase, *I support the decisions that people make on their own* at 7.80 (usually often). Chapter officers agreed with the statement as lowest, providing a mean response of 5.82 (sometimes). Table 3 shows these differences.

Table 3

Central Tendencies for Responses on "Enabling Others to Act"

	Chapter Presidents		Chapter Officers		
Statement	Mean (n=35)	Standard Deviation	Mean (n=136)	Standard Deviation	Difference

Develops cooperative relationships	9.06	0.97	6.94	2.97	2.12
Listens to diverse points of view	7.91	1.48	6.74	2.80	1.17
Treats people with dignity and respect	9.11	1.39	7.32	2.88	1.79
Supports other people's decisions	7.80	1.37	6.48	2.56	1.32
Let's people choose how to do their work	8.43	1.07	7.07	2.66	1.36
Ensures that people grow in their jobs	8.03	1.62	5.82	2.99	2.21
Total	50.34	4.46	40.40	14.26	9.94

Note: Scale, 1=Almost Never, 2=Rarely, 3=Seldom, 4=Once in a While, 5=Occasionally, 6=Sometimes, 7=Fairly Often, 8=Usually, 9=Very Frequently, 10=Almost Always.

The practice, Modeling the Way, elicited similar responses from chapter presidents and chapter officers, as it received a mean response of 49.11 from chapter presidents and a mean score of 38.38 from chapter officers. The statement, *I follow through on the promises and commitments that I make* earned the highest mean response of 9.17 (very frequently) by chapter presidents and 7.18 (fairly often) by chapter officers. The statement, *I spend time and energy on making certain that people's actions are consistent with the values and standards that have been agreed on* possessed a mean of 7.54 (usually often) by chapter presidents and a mean of 5.68 (sometimes) by the chapter officers (Table 4).

Table 4

Central Tendencies for Responses on "Modeling the Way"

	Chapter Presidents		Chapter Officers		Difference
Statement	Mean (n=35)	Standard Deviation	Mean (n=136)	Standard Deviation	
Sets example of what is expected	8.51	1.44	6.48	2.88	2.03
Ensures that people adhere to agreed –on standards	7.54	2.05	5.68	2.79	1.86
Follows through on promises and commitments	9.17	1.12	7.18	2.50	1.99
Is clear about his/her philosophy of leadership	7.97	1.76	6.31	2.82	1.66
Ensures that goals, plans, milestones are set	7.80	1.75	6.31	2.96	1.49
Makes progress toward goals one step at a time.	8.11	1.53	6.39	2.74	1.72
Total	49.11	6.82	38.38	14.57	10.73

Note: Scale, 1=Almost Never, 2=Rarely, 3=Seldom, 4=Once in a While, 5=Occasionally, 6=Sometimes, 7=Fairly Often, 8=Usually, 9=Very Frequently, 10=Almost Always.

The final practice of Encouraging the Heart yielded an overall mean score of 47.09 by the chapter presidents and an overall mean of 37.07 by the chapter officers. The highest scoring response, *I praise people for a job well done,* obtained the mean of 8.74 (very frequently) from the chapter presidents. This was the second highest statement rated among the chapter officers with a mean score of 6.51 (fairly often). The lowest scoring response in this practice was for the statement, *I publicly recognize people who exemplify commitment to shared values*, as it held a mean response of 7.06 (fairly often) among the chapter presidents and a mean value of 5.82 (sometimes) by the chapter officers (Table 5).

Table 5

Central Tendencies for Responses on "Encouraging the Heart"

	Chapter Presidents		Chapter Officers		Difference
Statement	Mean (n=35)	Standard Deviation	Mean (n=136)	Standard Deviation	
Praises people for a job well done	8.74	1.40	**6.51**	**2.96**	**2.23**
Expresses confidence in people's abilities	7.83	1.98	**6.05**	**3.14**	**1.78**
Creatively rewards people for their contributions	7.86	1.59	5.99	2.66	1.87
Recognizes people for commitment to shared values	7.06	2.21	5.82	2.85	1.24
Finds ways to celebrate accomplishments	7.37	1.99	6.10	2.87	1.27
Gives team members appreciation and support	8.23	1.57	6.57	2.91	1.66
Total	47.09	8.25	37.03	15.23	10.06

Note: Scale, 1=Almost Never, 2=Rarely, 3=Seldom, 4=Once in a While, 5=Occasionally, 6=Sometimes, 7=Fairly Often, 8=Usually, 9=Very Frequently, 10=Almost Always.

Descriptions of data from the Leadership Practices Inventory were provided for the purpose of defining objectives one and two. Table 6 shows the comparison of chapter president and chapter officer mean values for each of the five leadership practices. A two-tailed independent sample t-test was also performed at the 0.05 alpha levels to compare the mean scores, therefore testing the relationship between the chapter presidents and chapter officers' perceptions on each of the five exemplary leadership practices.

Table 6

Observed Differences Between Groups in the Five Leadership Practices (N=171)

Leadership Practice	Chapter Presidents Mean (n=35)	Chapter Officers Mean (n=136)	*t*-Ratio
Challenging the Process	44.34	34.28	5.122*

Inspiring a Shared Vision	43.60	34.56	4.298*
Enabling Others to Act	50.34	40.40	6.918*
Modeling the Way	49.11	38.38	6.315*
Encouraging the Heart	47.09	37.07	5.250*

*Note – significant at the 0.05 alpha level

Conclusions

The following conclusions were formulated based upon the analysis and interpretation of the findings:

1. Chapter presidents and their corresponding officers believed in the importance of leader's ability to gain assistance from the group when completing a project of activity, as both groups responded highest to statements describing the leadership behavior, Enabling Others to Act.

2. Although chapter presidents and their chapter officers identified the president as one willing to take risks, they rated the other five statements within the practice Challenging the Process very low. It can be concluded that the chapter presidents within the study were not great risk-takers, and they were less likely to pioneer new events or activities.

3. Leaders involve their followers in the group's vision. They are quick to act, and show progress as it happens. This practice was also rated as one of the lowest among both chapter presidents and chapter officers, concluding that chapter presidents were less likely to develop and share a strong common vision with their officers.

4. Chapter presidents and chapter officers almost always agreed upon the statement that most fit and least fit the chapter president in each of the five leadership practices.

5. Although both groups identified the same behaviors as the strongest and weakest exhibited, chapter presidents' perceived their leadership behaviors as much higher than their other officers observed them to be. Within all five practices, chapter presidents responded most often to the ninth response, *Very Frequently*, as their perceived level of the leadership practice. The other chapter officers most frequently reported the eighth response, *Usually Often*, as their observation of the president's leadership behavior.

6. Presidents held inflated self-perceptions among all 30 areas of the 5 leadership practices. This remains consistent with Bass and Yammarino's (1989) findings that in most surveys, leaders tend to give themselves inflated ratings in contrast to their associates' observations of their performance.

Implications/Discussion

Leadership is a necessity in life, as it impacts work, family, education, and society. Productive thinkers, communicators and workers are needed now and throughout the future. Although, many youth organizations position some emphasis on leadership training, the National FFA Organization has placed great importance on leadership development as a directional goal since its founding. Today, the leadership development and behaviors that members gain through the FFA remains varied, and is therefore widely examined.

This study sought to gain insight into the leadership behaviors utilized by the chapter presidents, as well as the observations made by their chapter officers within the examined population. Among the five main leadership behaviors examined, several leadership behaviors were consistently ranked higher, while the participants of the study marked other behaviors as the lowest perceived and observed. One of the lowest perceived and observed behaviors exhibited by chapter presidents was that of challenging the process. This inferred that chapter presidents within the study did not take many risks. They may have also had little influence the development of new chapter level programs and activities. The second lowest behavior exhibited by chapter presidents was inspiring a shared vision. This surmised that chapter presidents did not currently invoke practices that would include all FFA chapter members in future planning and visioning of chapter goals. This may limit the other chapter officers and members from providing input to important chapter goals and activities.

While many leadership behaviors were recognized by their frequency of use in this study, much more can be done to determine leadership components on a local chapter level. Chapter presidents and officers should periodically evaluate each other's job performance, equating such areas as leadership and organization. They should then provide each other with constructive feedback. All officers should be encouraged by their chapter advisors to participate in leadership training activities that emphasize successful leadership behaviors, visioning, initiating innovation, risk-taking, and collaboration. Finally, chapter presidents should also be encouraged to take risks, by challenging their officer teams and members to develop new activities from those in the past.

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Session: IIIA Discussant: Tracy S. Hoover

Leadership Involvement and Behaviors Exhibited by FFA Chapter Presidents and Officers

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This study provides an interesting perspective on leadership behaviors and perceptions of FFA chapter presidents and members of their executive committee. The authors provide a theoretical base and related literature to support their study. The value and importance of including leadership (for all students) into the curriculum is reinforced and supported in the document. An important piece of evidence to strengthen the study would be the incidence of and level of importance given to the development of a chapter Program of Activities in the district and state. Also some evidence on existing professional development programs for chapter officers would strengthen the study. There is little connection between previous research/literature and the conclusion and implication sections of the study.

Several questions arose as I read this study

1. Can chapter officers and even presidents truly make the connection between the statements on the LPI and perceived or observed leadership within their own chapter officer team?
2. While 80 chapters were in the Northeast Agricultural Education District only 35 officer teams participated in the study. According to the methods/procedures the entire FFA officer team had to be there to participate. If 136 chapter officers participated, does this mean there were only 3-4 officers on each officer team?
3. How long had they been in their current officer role when they took the LPI?
4. Have they attended any leadership and/or officer development conferences or seminars since elected? If so, was the content of the programs related to the duties and tasks of a specific office or did they participate in "leadership-based" sessions?
5. Does the officer team meet on a regular basis to develop and guide the leadership direction of their chapter

CONTRIBUTIONS OF AGRICULTURAL EDUCATION, FFA, AND 4-H STUDENTS TO AGRICULTURAL COLLEGES

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Abstract

University administrators have questioned the value of FFA and 4-H to agricultural colleges. Student leadership may be one unforeseen value of these organizations. FFA and 4-H have proclaimed to develop high levels of leadership in youth. To date, little research exists on the leadership outcomes of students who have participated in FFA and 4-H. Research presented in this paper identifies undergraduate student leaders in an agricultural college, delineates their prior leadership training and participation in high school activities, proposes relationships between involvement in FFA and 4-H and undergraduate student leadership in a land-grant college of agriculture, and identifies key leadership traits for students. The population studied in this research was undergraduate positional leaders (n=167) in an agricultural college at a southern land-grant university. Findings indicated that student leaders were involved in a variety of high school leadership organizations, one-third of which were FFA. Student leaders across the college served in an average of 1.33 offices and participated in 2.34 organizations. FFA and 4-H members held more offices, participated in more organizations, and in traditional agricultural college organizations, they held the majority of the leadership positions. Students determined honesty, responsibility, and teamwork as the most crucial leadership traits.

Introduction and Theoretical Framework

What is the value of agricultural education, FFA, and 4-H to a college of agriculture? How does secondary agricultural education benefit the university's endeavors to provide a balanced education for students, including academic classroom preparation, as well as opportunities for leadership through clubs and organizations? Many ascribe to theories that leadership is necessary, can be learned, and begins developing prior to entering college.

According to Gardner (1990), leadership is "the process of persuasion or example by which an individual (or leadership team) induces a group to pursue objectives held by the leader or shared by the leader and his or her followers" (p. 1). Bennis (1989) theorized that leadership is "first being, then doing," (p. 141) and "the single defining quality of a leader is the ability to create and realize a vision" (p. 194). Maxwell (1993) greatly shortened his definition of leadership as, "Leadership is influence" (p. 1). Leaders make a difference in their work, their community, and their families (Kouzes & Posner, 2002). Professionals in many industries and segments of agriculture cite the need for leaders and leadership development (Gardner; Kouzes & Posner; Maxwell; Schumacher & Swan, 1993). The world needs leaders on all levels, on communities, businesses, schools, unions, colleges, and governments (Gardner).

Leadership can be taught and learned (Bennis, 1989; Kouzes & Posner, 2002; Maxwell, 1993). Leadership may be inborn, but is more about practice and reflection on experiences than personality or genetic birthright (Bennis; Kouzes & Posner). Thus, colleges of agriculture and agricultural education departments have worked to develop leadership curricula for their

students. However, leadership development begins prior to enrollment in the university. Many undergraduate students initiated their leadership development through experiences and activities well before entering the collegiate setting. For many, leadership development began in high school and carried forward through college and into professional careers.

The theoretical framework for this research is Ajzen and Fishbein's theory of planned behavior (see Figure 1). The theory posits, "perceived behavioral control, together with behavioral intention, can be used directly to predict behavioral achievement" (Ajzen, p. 184, 1991). The *perceived behavioral control* construct builds upon a foundation of Bandura's research on self-efficacy. Students who served as officers in high school organizations developed self-efficacy about leadership and will serve as officers in collegiate organizations.

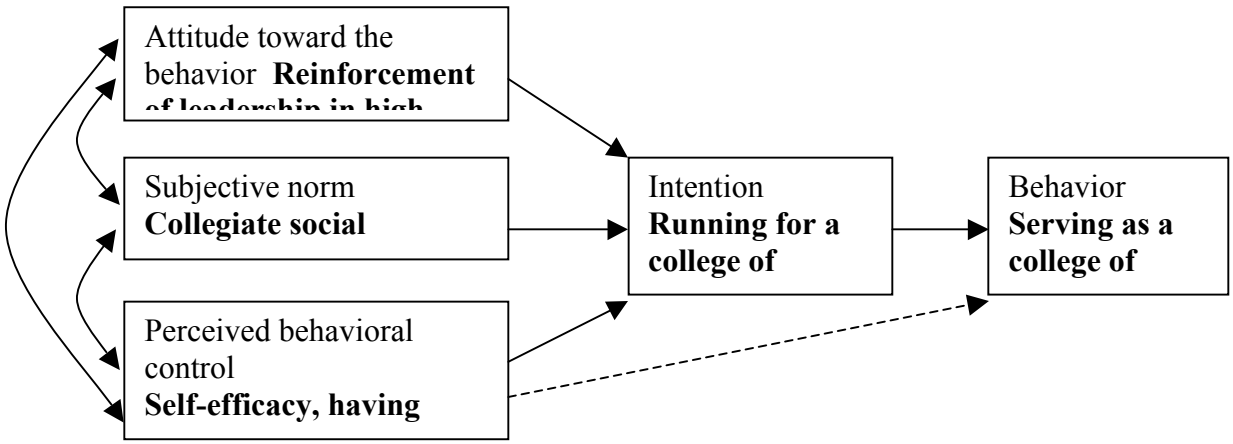

Figure 1. Theory of planned behavior.

Agricultural youth organizations focus on developing leadership in members. The National FFA Organization mission statement states, "FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education" (National FFA Organization, 2002, p. 4). To accomplish the mission, FFA "develops competent and assertive agricultural leadership" and "develops interpersonal skills in teamwork, communications, human relations, and social interaction" (National FFA Organization, p. 4). In meeting this need for leadership development, the National FFA Organization has undergone a process to develop leadership curricula, called *FFALifeKnowledge*, for all secondary agricultural education students. FFA is not alone in the plight to develop leadership in adolescents; the national 4-H website (National 4-H, 2003) professes that, "4-H builds the leaders of tomorrow."

Studies have indicated that participation in FFA enhances leadership abilities. Several researchers (Townsend & Carter, 1983; Wingenbach & Kahler, 1997) found a positive relationship between leadership skills scores and FFA participation. Ricketts (1982) concluded that FFA members possessed significantly higher leadership abilities than students who had not participated in FFA. Dodson (1996) found a low, positive relationships between both number of leadership positions-leadership skills and FFA involvement-perceived leadership skills. FFA participation translated into collegiate participation, as Al-Karni (1986) determined a positive

relationship between high school extracurricular participation and college participation in organizations. Brick (1998) found that FFA members who planned to attend college were confident in their leadership skills developed through participation as chapter FFA officers.

Most recently, Balschweid and Talbert (2000) through the Purdue University/Horatio Alger study of FFA members determined that FFA members earn higher grade point averages and participate in sports, school, and community activities more than non-FFA members. However, Balschweid and Talbert (2001) determined that only 43.2% of FFA members had served as a chapter officer, while only an additional 8.2% served as a committee chair. Nearly half of all FFA members have not served as a chapter officer. Balschweid and Talbert (2000) concluded that FFA members were more engaged in school and community activities and career preparations than either non-members or the "typical high school student."

Leadership development begins prior to enrollment in college and participation in collegiate organizations. Birkenholtz and Schumacher (1994) concluded that participation in student activities in high school and college was positively related to leadership development. Memberships in high school organizations, serving as club officers, and participation in community activities, such as 4-H, have been found to contribute to a student's leadership skills (Birkenholtz & Schumacher). Specifically, participation in FFA and 4-H were found to contribute to students' communication abilities (McKinley, Birkenholtz, & Stewart, 1993).

Enrollment in secondary agricultural education courses and participation in FFA has been shown to contribute to undergraduates' success in colleges of agriculture. Researchers concluded that undergraduates who enrolled in high school agriculture courses and participated in FFA and/or 4-H were more likely to complete their degree program than those students who did not participate (Ball, Garton, & Dyer, 2001; Cole & Bokor, 1989; Dyer, Breja, & Andreasen, 1999; Dyer, Lacey, & Osborne, 1996). Those students were also more inclined to select agriculture for their university major (Dyer, Lacey, & Osborne), less likely to change majors (Cole & Bokor), and earn higher grade point averages (Ball, Garton, & Dyer). College students who enrolled in high school agriculture courses spent less time completing their degrees than those who did not participate in such courses (Cole & Bokor). Dyer and Breja (1999) posited that more accurate predictors of student retention in college included enrollment in secondary agricultural education courses and experience in agriculture.

In *Returning to our Roots*, the Kellogg Commission on the Future of State and Land-Grant Universities (1997) report on the student experience called for the development of leadership in undergraduates as an important component of a student's total educational experience. The report recommended that universities assist students in developing critical thinking, communication, global perspectives, responsibility, leadership, and cooperation. Undergraduate students echoed this need for leadership development at the collegiate level. Schumacher and Swan (1993) noted that 87% of undergraduates in a study of 283 students believed leadership training was needed in college.

Agricultural colleges have realized the importance of undergraduate leadership development and have undertaken the development of students' leadership potential through

courses in leadership. Schumacher and Swan (1993) determined that a leadership development program in colleges of agriculture was needed. In the colleges housing the agricultural education department, Fritz and Brown (1998) found that 14 of 53 (25.4%) required undergraduate leadership courses for all agricultural and natural resources students enrolled in the institution, and 32 departments (58.1%) required leadership courses of all agricultural education students.

Students gain valuable leadership skills and practice those skills in activities outside of the traditional classroom. Organizations such as the FFA and 4-H are often promoted as an example of this premise. The extracurricular, out-of-class experiences of college students contributed greatly to their leadership development (Kuh, 1995). Participation in extracurricular activities prepared students with the skills necessary to be competent in the workplace (Kuh). Perhaps contributions agricultural education, FFA, and 4-H makes to agricultural colleges include preparing students for leadership experiences in college.

Purpose and Objectives

The purpose of this study is to describe the value of agricultural education, FFA, and 4-H to a college of agriculture. The following objectives for the study were:

1. To identify prior leadership experiences of undergraduate positional leaders at a land grant university,
2. To identify leadership positions held by students at the departmental, university, and community levels,
3. To determine the relationship between positions of leadership in a college of agriculture and prior high school FFA and 4-H experience, and
4. To determine the most valuable leadership traits determined by student leaders.

Methods and Procedures

The study was conducted utilizing a sample population survey of undergraduate students serving in leadership positions in a college of agriculture. According to Dillman (2000), sample surveys are conducted to "estimate the distribution of characteristics in a population" (p. 9). Web surveys are conducted in much the same way as paper surveys, except the web survey has the ability to use email as a means of contacting potential participants. Likewise, the link to the web page containing the survey may be embedded in the email. Additionally, making all of the contacts with survey participants via email is an acceptable means of communicating (Dillman).

The population for the study was undergraduate student positional leaders in an agricultural college in the 2002-2003 academic year. Undergraduate agricultural student organizations were identified by the listing of organizations on the college of agriculture website, the individual departmental websites within the college, and the Student Activities Center database of college organizations registered with the university. From these sources, 38 student organizations and 167 individual undergraduate student leaders (N = 167) were identified.

The study used a researcher-developed survey instrument consisting of the vital demographic characteristics and organizational participation as outlined by the study's objectives. The survey included 27 questions regarding student leadership positions within the

college of agriculture, on campus, and in the community. The survey also questioned students about their high school extracurricular participation and leadership roles, agricultural education enrollment, FFA participation and leadership, and 4-H leadership.

An expert panel consisting of four teacher educators and five current doctoral students, who previously taught agricultural education, evaluated the face and content validity of the instrument. The instrument was field tested for validity with a class of 15 undergraduate students enrolled in a departmental leadership course, who did not currently hold leadership positions. The instrument underwent minor revisions due to recommendations made by the expert panel and after field-testing. Reliability was not an issue with this instrument due to the nature of questions that comprised the instrument. Because all of the questions on the survey involved questions for which respondents had "an accurate, ready-made answer" (Dillman, 2000, p. 37); the questions did not elicit demands for considerable time, thought, nor variation; the items posed no considerable reliability risks (Dillman).

After securing contact information for undergraduate student leaders in the college, leaders were sent an email outlining their selection and procedures for survey participation. Data were collected from an online survey between December 8, 2002 and January 16, 2003. Five reminders were sent via email. The online survey garnered a 75.4% response rate ($n = 126$).

To control for non-response error, the researchers compared early to late responders (Ary, Jacobs, and Razavieh, 2002). Research has shown that late responders are often similar to early responders (Goldhor, 1974; Krushat & Molnar, 1993). Early responders were those participants who returned their survey prior to the first reminder, while late responders were those who responded after the fourth reminder. Researchers compared students based upon highest office, number of offices and organizations, student council participation, academic contest participation, 4-H involvement, FFA involvement, college grade level, gender, ethnicity, and enrollment at the university. No significant difference existed between early and late responders.

Results

Student leaders in the agricultural college were primarily upper classmen. Seniors accounted for 56.3% of the respondents, followed by juniors (26.2%), sophomores (7.9%), and one freshman. The majority of student leaders (59%) were admitted to the university as freshmen. Fifty students transferred to the university as juniors (41%). Females dominated the leadership positions with 72.2%, while 27.2% were males; this compares to the campus-wide population of 52% females and 48% males. Whites held 84.1% of the leadership positions, followed by African-Americans and Hispanics (4.8% each), Asian Americans (0.8%), and other ethnicities (4%). Campus-wide, whites constitute 77% of the population, followed by African-Americans (7.2%), Hispanics (9.6%), and Asian Americans (6.8%). Most student leaders (55.3%) attended a high school where agricultural education courses were offered ($n = 76$).

Fifty-one percent ($n = 23$) of FFA members were admitted to the university as freshmen, while 36.1% ($n = 13$) of 4-H members were admitted as freshmen. FFA members serving in collegiate office were 62.2% females and 37.8% males. They were also 88.9% white. 4-H members were 72.2% female and 27.8% male. They were 94.4% white.

Objective one sought to identify prior leadership experiences of undergraduate positional leaders. Several high school organizations were most often cited as providing leadership experiences for student leaders prior to their enrollment in college (see Table 1). These were academic contests (36.5%), student council (35.7%), FFA (32.5%), agricultural education (33.3%), 4-H (28.6%), foreign language clubs (24.6%), class officers (23.8%), and science clubs (23.0%). Several organizations fell into the middle range of participation: National Honor Society (16.7%), intramurals (16.7%), SADD (16.7%), volleyball (14.3%), swimming (13.5%), basketball (12.7%), soccer (12.7%), track (12.7%), and Beta (10.3%). Others had greater than five percent participation included softball (9.5%), cheerleading (8.7%), band (7.9%), football (7.9%), debate team (7.1%), and cross-country, drill and dance team, and Key Club (5.6% each).

Table 1
High School Organization Involvement[a] *(N=126)*

High School Organizations	Yes		No		
	n	*%*	*n*	*%*	**Rank**
Academic Contests	46	36.5	80	63.5	1
Student Council	45	35.7	81	64.3	2
Agricultural Education (missing = 3 (2.4%))	42	33.3	81	64.3	3
FFA (missing = 47 (37.3%))	41	32.5	38	30.2	4
4-H (missing = 4 (3.2%))	36	28.6	86	68.3	5
Foreign Language Club	31	24.6	95	75.4	6
Class Officer	30	23.8	96	76.2	7
Science Club	29	23.0	97	77.0	8
National Honor Society	22	17.5	104	82.5	9
Intramurals	21	16.7	105	83.3	10
SADD	21	16.7	105	83.3	10
Volleyball	18	14.3	108	85.7	12
Swimming	17	13.5	109	86.5	13
Basketball	16	12.7	110	87.3	14
Soccer	16	12.7	110	87.3	14
Track	16	12.7	110	87.3	14
Beta	13	10.3	113	89.7	17

Note. [a] Organizations with less than 10% participation are omitted. [b] Numbers represent duplicated participation.

Several organizations had less than five percent participation. These included baseball, ecology club, tennis, Fellowship of Christian Athletes, golf, Interact, yearbook, choir, drama / thespians, mock trial, Mu Alpha Tau, weight lifting, wrestling, Anchor, English honor society, Future Business Leaders of America, newspaper, rodeo, Amnesty International, Bible club, Campus Ministry, chess club, computer club, crew, equestrian, family and consumer science club, Future Educators of America, literary magazine, math team, pre-vet club, science honor society, Scouts, tae kwon do, varsity leadership club, Vocational Industrial Clubs of America, water polo, wildlife club, Youth Alive, Youth for Christ, and youth leadership.

Of members who participated in FFA, 78% were at least four-year members. Of 67 students who participated in FFA, 87.8% were officers. Twenty of these (29.8%) served as president. Nearly 50% of these offices were held at the chapter level. Five student leaders were state FFA officers, four served in the subdistrict, and five served at the district level, while two student leaders served as national FFA officers. Eight of the student leaders participated in 4-H for 10 years (27.8%). Fifty percent of former 4-H members had served as an officer in 4-H with 16 students (44.4%) as club officers, four as county officers, and one as a state 4-H leader.

Objective two sought to identify current leadership positions held by students. Twenty-eight college of agriculture ambassadors responded to the survey, of which 46.4% were FFA members and 25.0% were 4-H members (see Table 2). FFA members comprised 33.3% of the president positions and 39.9% of all officer positions in the college. 4-H members accounted for 25% of the president positions and 33.3% of all officer positions.

Table 2
Leadership in All College and Traditional Agricultural College Organizations

	All College Organizations						Traditional Agricultural College Organization			
	President		Ambassador		Total		President		Total	
	n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
All College	24		28		168		14		94	
FFA / Ag Ed	8	33.3	13	46.4	67	39.8	7	50.0	44	46.8
4-H	6	25.0	7	25.0	56	33.3	3	21.4	35	37.2

Many students held more than one leadership position during the year (see Table 3). Of the 116 students who reported leadership positions in the college of agriculture, 40 students (34.5%) held more than one leadership position. 4-H members, FFA members, and students who had completed secondary agricultural education programs held multiple leadership positions at a higher rate. Likewise, 17 4-H members (54.8%) held more than one leadership position throughout the year, as did 18 FFA members (42.9%). Two-thirds (67.8%) of undergraduate student leaders participated in more than one student organization (see Table 3). Throughout the college, 67.8% of student leaders participated in more than one organization. Nearly 88% percent of 4-H members and 86% of FFA members participated in multiple organizations.

Table 3
Participation in Offices and Organizations by Individual College Student Leaders

	Number of Offices				Number of Organizations					
	1	2	3	4	1	2	3	4	5	6
All College	76	30	8	2	39	34	27	9	11	1
4-H	14	12	3	2	4	8	11	3	7	0
FFA / Ag Ed	24	13	3	2	6	14	12	4	6	1

As noted in Table 4, nearly 47% of undergraduate leaders participated in organizations outside of the college and 49.2% participated in organizations outside the university. Nearly 42% of 4-H members and 40% of FFA members participated in both categories of organizations. Over 15% of FFA members and 13.9% of 4-H members served in leadership positions in

organizations outside the college compared to 11.1% of student leaders. Eleven percent of FFA and 4-H members led organizations outside the university compared to 7.1% of student leaders.

Table 4

Participation in Organizations Outside of the College of Agriculture by College Student Leaders

	Outside of CALS				Outside the University			
	Organization		Officer		Organization		Officer	
	n	%	*n*	%	*n*	%	*n*	%
All College	59	46.8	14	11.1	64	49.2	9	7.1
4-H	15	41.7	5	13.9	21	41.7	4	11.1
FFA / Ag Ed	18	40.0	7	15.6	18	40.0	5	11.1

Many agricultural college student organizations were specific to their own degree program. Some organizations are found at virtually all land-grant universities, whereas others were unique to the college being studied. These traditional organizations found at most land-grant universities were Agricultural Communicators of Tomorrow, Agricultural Education and Communication Society, Agricultural Operations Management Club, Agronomy / Soils Club, Alpha Gamma Rho, Alpha Zeta, American Society of Agricultural Engineers, Block & Bridle, College Ambassadors, College Student Council, Dairy Science Club, Environmental Horticulture Club, Food Sciences & Human Nutrition Club, Forestry Club, Food and Resource Economics – National Agri-Marketing Association, MANRRS, Pre-Vet Club, and Sigma Phi Alpha.

Students who participated in agricultural education, FFA, and 4-H held more leadership positions in these traditional agricultural college organizations. In these organizations, FFA members encompassed 46.8% of all leadership positions, while 4-H members accounted for 37.2% (see Table 2). Fifty percent of the presidents of these organizations were FFA members. Over 21% of the presidents were 4-H members (see Table 2).

Objective three sought to determine the relationship between current leadership positions and FFA or 4-H experience. On average, FFA and 4-H members held more than one office and participated in more than two organizations. As noted in Table 5, FFA members held 55.9% of their officer positions, for an average of 1.59 officer positions per person. They participated in an average of 2.9 organizations per person. 4-H members participated in the highest average number of organizations with 2.94 organizations per person and held 34.0% of their possible leadership positions for an average of 1.77 leadership positions per person.

Table 5

Leadership in Student Organizations

Secondary Organization		Offices			Organizations		
		n	%	_	*n*	%	_
All College		168	---	1.33	295	---	2.34
FFA	Yes	62	55.9	1.59	116	59.5	2.90
	No	49	44.1	1.48	79	40.5	2.25
4-H	Yes	55	34.0	1.77	97	35.8	2.94
	No	107	66.0	1.32	174	64.2	2.07

Objective four sought to determine the most valuable leadership traits determined by student leaders. Honesty, responsibility, and teamwork were the most important characteristics to student leaders (see Table 6). Agricultural college student leaders followed with social skills, critical thinking skills, and goal setting. FFA members followed with communications, goal setting, and social skills, while 4-H members followed with communications, goal setting, and organization.

Table 6
Traits of Student Leaders

Trait	All College		FFA / Ag Ed		4-H	
	_	*s*	_	*s*	_	*s*
Honesty	4.72	.52	4.71	.46	4.81	.40
Responsibility	4.57	.59	4.56	.59	4.64	.54
Teamwork	4.42	.65	4.49	.55	4.39	.64
Social Skills	4.28	.74	4.24	.65	4.28	.61
Critical Thinking	4.26	.71	4.02	.73	4.25	.77
Goal Setting	4.21	.74	4.29	.69	4.36	.72
Communications	4.17	.76	4.31	.70	4.39	.55
Organization	4.15	.83	4.11	.96	4.31	.79
Conflict Resolution	4.02	.77	4.02	.81	4.06	.75
Creativity	3.94	.83	3.84	.85	3.78	.83
Decisiveness	3.78	.84	3.71	.76	4.08	.81

Conclusions and Discussion

Student leaders participated in 65 different high school activities, ranging from athletics to academic organizations to community service and honorary organizations. They participated academic contests, student council, FFA, and 4-H most often. Diversity of prior leadership experiences may reflect the diversity of students attracted to a college of agriculture. Additionally, this study helps reinforce the idea that leadership is developed through the culmination of many opportunities to practice leadership skills. Students use the accumulation of organizational experiences and influences of diverse peers and mentors to form their perceptions of leadership (Bennis, 1989; Kouzes & Posner, 2002).

Many of the collegiate student leaders who participated in FFA served as officers and were four-year members, with 20 serving as presidents of their local FFA chapters. Ten-year 4-H members constituted a significant portion of those former 4-H members who served in collegiate leadership positions. This reinforces students' commitment to the organization, derivation of useful skills, and enjoyment in membership.

Many students responsible for leading organizations and recruiting new undergraduate students to the university were FFA and 4-H members. Half of the traditional agricultural organization student presidents were FFA members, and over 20% were 4-H members. Nearly half of the ambassadors were FFA members, and over a quarter were 4-H members. FFA and 4-

H affect these recruitment efforts as many of the ambassadors were trained in leadership and communication through either FFA or 4-H.

In traditional agricultural college organizations, FFA and 4-H members provided most of the leadership. FFA members, representing only one-third of student leaders, provided nearly half of the leadership to student organizations. 4-H members contributed an additional 37% of the leadership. Due to leadership in multiple organizations, 4-H and FFA members represent considerable student leadership potential to a college, especially in traditional organizations.

FFA and 4-H members served in more leadership positions and participated in more organizations than typical agricultural college student leaders. Nearly 68% of the total student leader population participated in multiple organizations, compared to 88% of 4-H members and 86% of FFA members. 4-H members led 1.77 organizations and participated in 2.94 organizations. FFA members held 1.62 offices per person and participated in 2.85 organizations. FFA and 4-H members participated in fewer organizations per person outside of the college of agriculture, but did lead those organizations at a slightly higher rate than their peers.

Students in the college of agriculture rated three traits as most important to leadership: honesty, responsibility, and teamwork, in rank order. They also valued three traits least: conflict resolution, creativity, and decisiveness, although in various orders. FFA members and 4-H members did not value social skills and critical thinking as highly as their colleagues, but ranked communication higher. Perhaps these differences were due to development through FFA or 4-H.

Implications and Recommendations

Leadership abilities are not generated from a sole source. Leadership development arises from participation in different activities with different people for different purposes. Student leaders in a college of agriculture participated in a wide array of organizations in high school, including student council, academic contests, FFA, and 4-H.

FFA membership in Florida was 12,781 including middle school memberships (National FFA Organization, 2003). Agriscience is being taught in 161 high school agricultural education programs in the state (Myers & Dyer, 2002). The Department of Education cites 963 schools in the state, which translates into agricultural education being taught 16.7% of the schools. There are 701,185 high school students in the state (Florida Department of Education, 2003). With FFA membership of 12,781, this means that only 1.8% of students are FFA members. Less than 17% of schools and less than 1.8% of high school students provided 32.5% of student leaders in the agricultural college and nearly 47% of the student leadership in traditional organizations.

FFA and 4-H members provide greater leadership potential than their student population would suggest. They lead and participate in more organizations than their peers. When questioning the value of FFA and 4-H to the college of agriculture, one source of contributions is the leadership in student organizations. Student organizations provide valuable experiences for the students, as well as contribute to the entire collegiate experience. FFA and 4-H contribute to further the undergraduate leadership experiences of students in agricultural colleges.

Implications posed by this study include the need for additional research across land-grant colleges of agriculture throughout the country to determine the generalizability of these findings. Deans of admissions may do well to offer scholarships to exemplary FFA and 4-H leaders if other universities feel the impact of FFA and 4-H. These leaders could be, and are used in recruitment efforts by the university, as well as provide valuable student leadership.

Questions have arisen about the ability of FFA and 4-H to develop leaders. This study provides a glimpse into the efficacy of these organizations to develop leaders. They are producing leaders who are more active and more willing to serve as leaders than their counterparts at land grant universities. Further study is needed to draw correlations between new leadership curriculum and existing leadership programming in both organizations.

Secondary agriscience instructors should encourage their students to expand their leadership experiences to encompass organizations outside 4-H and FFA. The diversity of experiences and people skills enhances a student's leadership potential. In order to communicate with leader peers and understand people of diverse backgrounds, students should share common experiences, such as student council, academic teams, and athletics. While FFA and 4-H prepare young leaders, they are not the sole source of leadership preparation for many young people.

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Session: IIIA Discussant: Tracy S. Hoover

Contributions of Agricultural Education, FFA and 4-H Students to Agricultural Colleges

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The authors provide an interesting and valuable piece of research on the leadership background and contributions of College of Agricultural Science student leaders and previous leadership experiences. This study provides evidence on the type, level of participation and leadership role between leadership experiences of youth at the secondary level and collegiate leadership participation.

While the authors provide a sound theoretical framework and supporting literature, little evidence exists to document leadership involvement of youth outside Colleges of Agricultural Science. For example, are there similar trends associated with collegiate student leadership in Colleges of Science, Liberal Arts, etc? Additional literature on 4-H members and their subsequent leadership roles and attributes would help strengthen the study. This study serves as a great springboard for additional research. Replication of this study with students who are members of collegiate organizations would be interesting.

A few questions about the procedures.

1. Did the survey assess current or current and previous collegiate level leadership positions held by the students?
2. How did the researchers report those students who were both FFA and 4-H members/officers?
3. How were the leadership traits reported under objective four selected for the survey? Did the student rank or select these traits?

A few questions about the results.

1. An interesting trend arises in the study related to gender and leadership. What is the trend related to gender and leadership positions at the secondary and post-secondary level? Is this a nationwide trend or just in Colleges of Agricultural Sciences?
2. Do the authors have any idea why 47 (37.3%) students did not respond to the question about FFA involvement? What does superscript b relate to in Table 1?
3. What are the implications for recruitment of student leaders into Colleges of Agricultural Sciences?
4. What was the scale of measurement for the leadership trait objective and how many students responded to this component of the survey?

A Longitudinal Study of the Economic Impact of Supervised Agricultural Experience in Iowa

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ABSTRACT

The focus of this paper is on the economic impact of Supervised Agricultural Experience (SAE) programs in Iowa using longitudinal data collected from 1991 to 2001. In order to accomplish the purpose of the study, student net income growth, growth of SAE program hours, SAE income per student and per program, and return on investment using tax dollars invested per student derived income were calculated. The results of this study show that there is a substantial economic impact related to SAE. The impact was consistent over the entire eleven year period of the study. The total value of SAE income peaked in 2000 with over $20.9 million dollars and grew at an annualized rate of 6.05% from 1991 to 2001. Unpaid SAE program hours grew considerably more annually (20.06%) than paid SAE hours (9.72%). Over the eleven year study, students with a SAE earned $1,443 on average while each agricultural education program earned $55,984. The return on investment ratio using tax dollars invested per student derived income through SAE was positive each year of the study. Students earn more money through SAE programs than school districts invest in salaries and travel for agricultural education programs.

INTRODUCTION

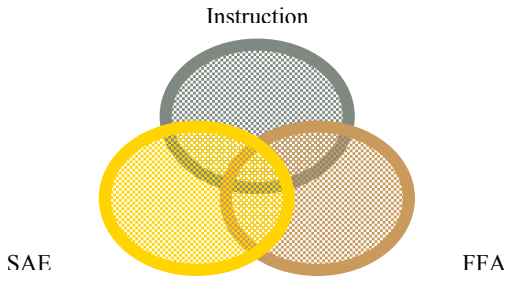
Experiential learning has been a vital component of secondary agricultural education programs throughout the country even before courses in vocational agriculture were established as part of the 1917 Smith-Hughes National Vocational Education Act. The experiential learning portion of agricultural education is currently known as the student's Supervised Agricultural Experience (SAE) program. The SAE is one of three integral components of an agricultural education program. The other two components of the program are formal instruction (classroom/laboratory) and the Future Farmers of America (FFA) Organization. These three components of agricultural education are considered intra-curricular and each is woven throughout the curriculum creating a complete program.

SAE is the "learning by doing" portion of the agricultural education program. SAE opportunities enable students to further develop skills while increasing employability and/or entrepreneurial success. Students are recognized for their SAE accomplishments through the FFA's proficiency award system and can further expand their SAE skills through Career Development Events (CDE).

Each aspect of an agricultural education program (FFA, SAE, and classroom/laboratory) builds upon the other. Therefore, a typical agricultural education program strives to blend the three segments in an effort to offer each student a complete agricultural learning experience. The typical method of visually explaining the complete agricultural education program that results from this blending is the Venn diagram (Figure 1). The outcome of a total program is a well-

rounded agricultural education experience where the three components are inter-woven in an intra-curricular fashion.

Figure 1. *Complete agricultural education program*



REVIEW OF THE LITERATURE AND RATIONALE

The Supervised Agricultural Experience (SAE) programs are supported by the curriculum theory espoused by social reconstructionists. According to McNeil (1996), "for the social reconstructionists a learning opportunity must fulfill three criteria: it must be real; it must require action; it must teach values" (p.36). SAE experiences meet and exceed these criteria in that not only are SAEs real, action oriented, and value enhanced, but they serve to transfer theory to practice and create new avenues of theory that generate enthusiasm to learn more. SAEs help develop what can be called a complete agricultural education package.

Students participating in SAEs benefit from the experience, as do the teachers, employers, agricultural education programs, communities, and agricultural industry (Barrick et al., 1992). Most of these benefits come from the fact that communication lines are opened between parents, students, agricultural educators, and employers. This approach allows students to take what is learned in the classroom, apply it in a real situation, and further develop skills toward a career.

One of the most important, yet most challenging aspects of a complete agricultural education program is the Supervised Agricultural Experience (Barrick et al., 1992). Teacher attitudes and expectations toward SAE participation is most influential (Dyer & Osborne, 1995). Teachers fully support SAE conceptually but fail to completely implement it in practice; in part, because participation is lacking by all parties (Dyer & Osborne, 1995, and Steele, 1997). SAE programs often lack definition, focus, and direction because of the changes in the curriculum from a total focus on agricultural production to more diverse aspects of agriculture (Dyer & Osborne, 1995). Consequently, Agricultural Education is in a dilemma (Steele, 1997).

The impact and success of SAE participation cannot always be quantified. A huge intangible piece is the agricultural education instructor. *The Handbook on Supervised Agricultural Experience* states that much of the potential for a successful SAE resides with the teacher (Barrick et al., 1992). One research study indicated that the strongest influence for participation is based upon teacher attitudes and expectations (Dyer & Osborne, 1995).

Camp, Clarke, and Fallon (2000) suggested that the scope of agriculture has grown and changed remarkably in the past 50 years. The broad scope of agriculture suggests that the SAE concept must be altered to meet the demands of interested students. These authors also stated that the FFA Organization and its award programs create boundaries that do not fit today's diverse student body.

It is known that, at least in theory, experiential learning and SAE are vital and major components of agricultural education. Two studies in agricultural education have indicated that SAEs can be economically beneficial. West and Iverson (1999) found the economic value of SAEs in the state of Georgia to be over $12 million per year. Using a one-time sampling of the agricultural education programs in their state, they found that 49.8% of SAEs in Georgia were entrepreneurial, while 25.8% were placement and the remaining 24.4% were improvement programs. It was estimated that the typical agricultural education program in Georgia contributed $71,344 to the local community.

Graham and Birkenholz (1999) studied SAE enrollment and its economic impact on SAEs in Missouri from 1988 to 1997. They reported a 55.8% increase in enrollment during that time. SAE participation was relatively stable increasing from 83% in 1988 to 84% in 1997. Their concern was that 16% of the agricultural education students in Missouri were not being provided the opportunity to develop skills through an individual supervised agricultural experience program.

In Missouri, the type of SAE programs students were participating in changed dramatically from 1988-1997 (Graham & Birkenholz, 1999). Ownership-related SAEs declined by 25.5% and placement increased by 130%. While this emphasis was occurring, the total annual SAE earnings increased by more than $10 million after adjusting for inflation. The SAE earnings in 1997 for Missouri were $31,801,397, representing an increase from $15,686,743 in 1988.

Although the primary purpose of the SAE is to develop skills and abilities leading toward a potential career, it should not be assumed that this means all students develop an income-generating SAE program. Some students become involved in exploratory programs with no source of income (Barrick et al., 1992). Some students volunteer in an effort to gain experience and skill development without any financial compensation. In those situations, students record their hours for record-keeping and award purposes. These hours are known and recorded as unpaid hours. All students involved in SAEs also document the skills and experiences they have developed through their programs.

Graham and Birkenholz (1999) identified several reasons for non-participation in SAEs. First, there was an increase in nontraditional student enrollment in agricultural education programs in Missouri. Secondly, and partly because of the first reason, there was a lack of home-based facilities, resources, and support available to students. Finally, there were also instructor issues that were not being addressed. Graham and Birkenholz (1999) argued that there was a lack of appropriate training, background, and educational materials available to assist the instructor in working with nontraditional students.

Until 1999, with the publishing of papers by West and Iverson (1999) and Graham and Birkenholz (1999), little economic or enrollment research had been published. Many researchers have shown concern for this problem. Dyer and Osborne (1995) reported that, at least through the time of their research, there had been no experimental research or empirical data on the benefits of SAE. The lack of such hard data prevents the profession from accurately promoting SAE or identifying the necessary areas for change. This situation is only compounded when research on supervising SAEs has been "noncumulative, making the theoretical base for supervising SAE somewhat fragile" (Dyer & Williams, 1997).

PURPOSE AND OBJECTIVES

The purpose of this study was to identify the economic impact of supervised agricultural experience programs in Iowa from 1991-2001. To accomplish this purpose, four objectives were identified:

1) To determine the income growth for both student net income and unpaid hours,
2) To determine the growth in SAE program hours,
3) To determine the average SAE income per student and per program, and
4) To develop a return on investment ratio using tax dollars invested per student derived income.

METHODS AND PROCEDURES

This study is part of a larger study which focuses on the participation trends of Iowa agricultural education programs using longitudinal data collected from several sources. One facet of the larger study was to determine the economic growth and impact of SAE in Iowa. Therefore, the focus of this paper is on the economic portion of the study.

The Iowa Governor's Council on Agricultural Education (2001) in conjunction with the Iowa Department of Education has collected data on SAE annually since the 1990-91 school year (Bureau of Technical and Vocational Education). These data include the unduplicated number of students enrolled in agricultural education, the number of students with SAE programs, as well as the number of unpaid and paid SAE hours, and the actual net earned income through SAE (Table 1).

Table 1.

SAE information from Iowa agricultural education programs

Year	Agricultural Education Enrollment (Unduplicated)	SAE Programs (# of Students)	SAE Unpaid Hours (# of hours)	SAE Paid Hours (# of hours)	SAE Net Income (Actual Earned $)	Programs Reporting	Total Claims
1991	9,000	6,969	128,306	981,896	$9,177,611	318	$6,970,178
1992	9,040	8,410	222,320	1,187,040	$10,779,230	311	$7,286,436
1993	10,994	9,758	364,899	1,364,318	$9,528,208	290	$7,370,501
1994	11,663	11,108	447,680	1,469,054	$9,364,513	282	$7,647,856
1995	12,784	10,235	507,572	1,797,227	$10,603,307	272	$7,371,685
1996	13,440	11,327	884,612	1,964,136	$12,240,619	268	$7,637,927
1997	14,373	11,760	573,148	2,293,558	$13,529,236	367	$8,106,234
1998	15,140	11,878	593,298	2,029,544	$12,970,891	267	$8,649,668
1999	14,990	11,654	587,510	3,342,020	$13,025,517	275	$9,072,997
2000	15,543	11,712	836,956	2,708,253	$15,985,424	251	$9,255,217
2001	15,871	11,120	798,480	2,482,915	$14,123,895	248	$9,592,738

Additional data for this study were provided by the Bureau of Financial and Information Service within the Iowa Department of Education (Iowa Department of Education, 2002). These data include programs reporting and total claims. The programs reporting are those school districts that claim state and federal reimbursement for agricultural education travel and salary expenses. The total claims data were collected annually as part of the requirements for local school districts to receive state and federal reimbursement for their agricultural education programs and represents the money spent on salary and travel.

In order to determine a net SAE income for all SAE programs including those with unpaid hours, a value has to be placed on unpaid hours. The literature review provided no procedure for handling this issue. As a result, the authors chose to calculate an average hourly wage. The advantage of using the average wage is that it better reflects what the actual income would have been had they received income. The disadvantage is that the average is fluid and changes each year and may or may not truly represent the actual value of those unpaid hours.

All dollars were adjusted for inflation and are reported in 2001 dollars. The Consumer Price Index (CPI) was used to adjust for inflation (Bureau of Labor Statistics, 2002). The real dollars, using 2001 as the base year, are the dollars that are reported throughout the study.

Growth rates were also calculated as a means to identify the economic growth of income. The growth rates used in this study are annualized rates and represent the rate of growth between 1991 and 2001.

The average income per student with a SAE program was calculated. Total value of SAE income was divided by the number of SAE programs (number of students) reporting to determine SAE income per participant. The average income per program was calculated using the total value of SAE income and programs reporting. The average income per program was calculated by dividing the total value of income by the number of programs.

Based on Christiansen's (1999) suggestions for improvement to previous SAE economic research, a return on investment was calculated. Student income and school district claimed expenses for agricultural programs were used to calculate a return on investment made in agricultural education programs. A return on investment was calculated for each year by dividing the total claim amounts by the total value of SAE income. The purpose of the return on investment calculation was to illustrate the financial opportunities students have as part of an agricultural education program. Although the entire SAE dollar amount cannot be directly and solely attributed to the agricultural education program, it does provide some insight into the economic impact of such programs and student experiences.

RESULTS/FINDINGS

The first objective of this study was to determine the income growth for both student and net income and unpaid hours. Earned income is still the primary source of total SAE income representing $14.1 million of the total $18.6 million earned through SAE income in 2001 (Table 2). Over the eleven years of the study, earned income grew moderately at an annual rate of 4.41% while the value of unpaid hours grew at a relatively high rate (14.24%). Total SAE income grew at an annual rate of 6.05%.

Table 2

Growth rates of net income and unpaid hours

Year	Earned Income	Value of Unpaid	Total Value of SAE
1991	$9,177,611	$1,199,254	$10,376,864
1992	$10,779,230	$2,018,835	$12,798,065
1993	$9,528,208	$2,548,404	$12,076,612
1994	$9,364,513	$2,853,745	$12,218,257
1995	$10,603,307	$2,994,581	$13,597,888
1996	$12,240,619	$5,512,958	$17,753,577
1997	$13,529,236	$3,380,884	$16,910,121
1998	$12,970,891	$3,791,790	$16,762,680
1999	$13,025,517	$2,289,819	$15,315,336
2000	$15,985,424	$4,940,121	$20,925,545
2001	$14,123,895	$4,542,100	$18,665,995
Growth Rate	4.41%	14.24%	6.05%
11 Yr. Ave.	$10,663,334	$2,954,869	$13,618,203

The second objective of the study was to determine the growth of SAE program hours. The growth of SAE hours can be seen in Table 3. The number of unpaid hours grew by 20.06% and paid hours grew by 9.72%. The eleven-year average for unpaid hours was 540,435 hours and the eleven-year average for paid hours was 1,965,451 hours.

Table 3.

Growth of SAE program hours

Year	Unpaid hours	Paid Hours
1991	128,306	981,896
1992	222,320	1,187,040
1993	364,899	1,364,318
1994	447,680	1,469,054
1995	507,572	1,797,227
1996	884,612	1,964,136
1997	573,148	2,293,558
1998	593,298	2,029,544
1999	587,510	3,342,020
2000	836,956	2,708,253
2001	798,480	2,482,915
Growth Rate	20.06%	9.72%
11 Year Ave	540,435	1,965,451

The third objective of the study was to determine the average SAE income per student and per program. Each student on average earned $1,443 over the eleven years (Table 4). The lowest income per participant was in 1994 with $1100. Income per participant peaked in 2000 with an income of $1787 and then dropped in 2001 to $1679. The annual growth rate of average annual income per student was 1.21%.

The average income per program increased substantially from 1991 to 2001 (Table 4). The grand mean income per program was $55,948. With the exception of one year (1999), the average income per program increased each year of the study. In 1991, students were earning $32,632 per program and, by 2001, students were earning $75,266 per program. The annual growth rate was 8.72% for the average income per program.

Table 4.

Growth per student and per program

Year	Per Student w/ SAE	Per Program
1991	$1,489	$32,632
1992	$1,522	$41,151
1993	$1,238	$41,643
1994	$1,100	$43,327
1995	$1,329	$49,992
1996	$1,567	$66,245
1997	$1,438	$63,334
1998	$1,411	$62,782
1999	$1,314	$55,692
2000	$1,787	$83,369
2001	$1,679	$75,266
Growth Rate	1.21%	8.72%
11 Yr. Ave.	$1,443	$55,948

The fourth objective of this study was to develop a return on investment ratio using tax dollars invested per student derived income through SAE. A positive return on investment was realized for each year of the study (Table 5). In two instances (1996 and 2000), the return through SAE was more than double the cost of the program. After peaking in 2000 at $2.20, students with a SAE still earned $1.95 in 2001 for every dollar the district invested in the program. The lowest return was realized in the first year of the study with a return of $1.14. The highest return was $2.20 in 2000. The annual growth of the return on tax dollars was 5.47% and the grand mean was $1.66.

Table 5.

Dollars returned through SAE per dollar invested

Year	At Ave $
1991	$1.14
1992	$1.39
1993	$1.34
1994	$1.34
1995	$1.59
1996	$2.06
1997	$1.89
1998	$1.78
1999	$1.59
2000	$2.20
2001	$1.95
Growth Rate	5.47%
11 Yr. Ave.	$1.66

CONCLUSIONS/RECOMMENDATIONS/IMPLICATIONS

The purpose of the study was to identify the economic impact of SAE in Iowa. The results of this study show that there is a substantial economic impact related to SAE. This impact has more than just maintained itself over the entire eleven years of the study; it has consistently grown. The study has shown that SAE does have an economic impact in Iowa just as research in other states has shown.

The economic impact of this study supports the role SAE has as a component of a complete agricultural education program. Not only does SAE serve as an experiential means to further students' education and career development, but it also serves as a source of income to further establish SAE programs or finance educational experiences beyond high school. The results of this study support similar results which were reported from studies conducted in Missouri and Georgia (Graham & Birkenholz, 1999; West & Iverson, 1999)

Several conclusions can be made from the results of this study. Earned income still is the primary source of SAE income. However, substantial growth was realized in unpaid hours during the timeframe of the study. The growth of unpaid hours may signal a change in the type of SAE programs students are demanding. If this is the case, programmatic and instructional changes may need to be considered to meet these changing needs. Perhaps this is an area for further research.

Using only SAE net income generated, school districts get a solid return on their agricultural education investment. Students earn more money through SAE programs than school districts invest in salaries and travel for agricultural education programs. This return on investment does not even reflect the additional intangible benefits that are normally attributed to

SAE programs. If an economic value were placed upon the intangible benefits, the return would be higher.

There are also some less obvious conclusions that can be made. Unpaid SAEs have gained in popularity based upon the growth in unpaid hours. There could be numerous reasons for such a change, but any provided in this paper would only be speculative. A second conclusion is that the number of students per program is increasing. This conclusion is based upon the fact that income per student has remained relatively unchanged during the study while the income per program has increased substantially. All of this has occurred while the number of programs in the state has declined.

Based upon this study, three recommendations are suggested for further study. First, since there has been a large increase in unpaid hours, research should be considered which focuses on the reason for such growth. Second, the state-wide data collection process could be improved to include more detailed information. Additional detailed data would be beneficial in order to do a more in-depth analysis. Also, the state data collection tool and the collection methods should be reviewed to ensure reliability.

Finally, all states are challenged to collect agricultural education data from local programs including SAE data. In this era of accountability, information like that provided in this study will provide valuable documentation of the impact that a complete agricultural education program can have on students. Such aggregate state data would not only go a long way in identifying trends and programmatic issues, it could be used for informative purposes in promoting agricultural education and proving its usefulness. If all states were collecting data from their local agricultural education programs, these data could be collected and utilized to serve similar purposes nationally as those on the state level.

There are several implications that can be drawn from this study. The summary of the economic data provides a profile of the economic impact of SAE. It represents eleven years of data collected systematically from all agricultural education programs in the state of Iowa. Such a complete and longitudinal data source on agricultural education adds reliability and accountability. The data can be used to answer questions related to the economic impact of SAE. But, even more importantly, these data are also useful in identifying other appropriate questions which we, in agricultural education, should be asking and preparing to answer.

The following are perhaps a few questions we should be asking ourselves and attempting to answer using appropriate data collected from our agricultural education instructors who are, on a daily basis, in the trenches working with and attempting to make an impact on students:

- In what ways have the needs of agricultural education students changed?
- In what ways have the demographics of students in agricultural education changed?
- If change in student needs or demographics is occurring, what does this mean to curriculum development and other related programmatic offerings?
- What types of students prefer placement experiences over ownership experiences and vice versa?
- What resources are needed to further expand agriscience opportunities to students?

- What can be done to better prepare pre-service teachers for developing, planning, and supervising SAE programs locally?
- How can SAE be improved or modified to make it a better learning experience for the student?
- Are there trends in the data which would lead to certain conclusions or raise questions?

Another primary implication of the study is the fact that student SAE programs do have an economic impact in Iowa and, based solely on SAE student income, agricultural education in Iowa is a sound investment. All levels of agricultural education can use this type of information to further promote the benefits and impacts of SAE.

The implication to teacher education programs is that new teachers might be positively influenced by the impact SAEs have on student motivation. SAE serves as the tool to motivate student learning. Additionally, the economic impact of SAEs might have public relations value to support local programs and activities. The ripple effect of positive SAE experiences goes far beyond the economic impact. The economic impact causes or potentially could cause other positive impacts. For example, these impacts could be in the areas of image, quality, and resource development.

The experiential learning component of agricultural education (supervised agricultural experience programs) is vital and has a positive economic impact on participants. These findings coincide with previous economic research conducted in other states (Graham & Birkenholz, 1999; West & Iverson, 1999). The findings also support the role experiential learning plays in secondary agricultural education programs. SAE fulfills McNeil's (1996) three criteria of a learning opportunity. Participants do benefit from SAE just as Barrick, et al. (1992) espoused in the handbook on supervised agricultural experience.

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Session: IIIA Discussant: Tracy S. Hoover

A Longitudinal Study of the Economic Impact of Supervised Agricultural Experience in Iowa.

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This study used longitudinal data (1991-2001) to determine the economic impact of Supervised Agricultural Experience (SAE) programs in Iowa. Results indicated a substantial economic impact related to SAE that was consistent over the eleven year time frame of the study. This study supports previous research in two other states (Missouri and Georgia).

The authors provide a sound theoretical framework and literature review to support the purpose and objectives of the study, which is to focus on the economic impact of SAE programs in the state. The study is part of a larger study related to the impact of and participation in agricultural education programs in the state of Iowa. The authors provide evidence and explanation on how data were analyzed and economic indicators were defined.

Results show that SAE's over an eleven-year period provided a substantial and increased economic impact. This is good news for agricultural education programs and reinforces the value of SAE's. Hopefully, Iowa can use the results of this study to show how agricultural education supports student achievement! Earned income was reported as the primary source of SAE income; however, the authors note a trend in the amount of unpaid hours reported by students. Was there a specific time that the authors could see an increase in unpaid hours? Is there a correlation to this period of time and revisions to requirements for FFA degrees and/or awards?

The authors raise several questions that can guide further research and/or discussions on SAE's, such as, how can teachers effectively and efficiently integrate SAE's into an agricultural education program in the face of changing student demographics and needs? Another interesting question raised are there additional resources needed to expand agriscience SAE opportunities to students?

What's the Value of Service-Learning to Agricultural Education?

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Abstract

Curricular-based service learning exploded upon the education scene in the 1980s and 1990s and continues to gather force and momentum as we move into the new millennium. Books, journals, articles, papers, web sties, list serves, conferences, retreats, workshops, organizations, and planning sessions continue to proliferate and advance service learning across the country. Service learning has gained a following of administrators, teachers, staff members, and students from kindergarten through graduate school and from citizens from all strata of society. With this growing interest in service learning developed a need to examine existing service learning research for the purpose of providing a basis to direct service learning programming and research in agricultural education and related disciplines. The purpose of this study was to review service-learning research for a 10-year period (1993 – 2002). Findings from this study indicate that while service-learning research has increased in response to queries from the field, these research efforts have not been, for the most part, easily accessible or widely disseminated. Moreover, little research in agricultural education or related disciplines has been conducted, thus additional research looking at service learning is needed in order to support programmatic initiatives and the impact of these efforts in agricultural education and related disciplines.

Introduction and Theoretical Framework

For the past two decades, political leaders and education policymakers in the United States have sought to identify and create the conditions for world-class learning in America's primary, secondary and higher education. High academic standards have been articulated and supported with assessment and accountability measures, yet according to Lave and Wenger (1991), such steps are futile unless students are motivated and energized to meet these standards.

Reports show that a large number of young Americans are not engaged – intellectually or otherwise – in the teaching and learning enterprise (NASULGC, 1998; US Department of Education, 1995). According to the National Commission on Civil Renew (1998) disengagement also extends to activities that are basic to our democratic society. Young people today tend to shun many of the more traditional activities, such as voting and keeping up with current events that are central to the functioning of our democratic society (National Commission on Civil Renew). Indeed, according to Wolfe (1998) "too many of us have become passive and disengaged. Too many of us lack confidence in our capacity to make basic moral and civic judgments, to join with our neighbors to do the work of community, to make a difference. Never have we had so many opportunities for participation, yet rarely have we felt so powerless. In a time that cries out for civic action, we are in danger of becoming a nation of spectators" (p. 313).

The good news is that academic personnel in this country have been finding that their students are feeling a new, positive feeling about school and their communities through service-learning (SL) activities that have been initiated in their classrooms (Eyler & Giles, 1999; Corn & Trexler, 2000; Hess, 2001; Sitton et al., 2001). Teachers have found that SL projects have

provided a means for young people to share their knowledge and skills to help other people in their school, in their community and in the world at large (Corn & Trexler, 2000; Grudens-Schuck, 2001; Hess, 2001; Sitton et al., 2001; Trexler, 2001). In the past decade alone, two U.S. presidents—from opposing political parties—have lauded the value of SL in their speeches and even followed through with financial support for the initiative in their budgets. Both President George W. Bush and former President Bill Clinton have touted SL as a chance for students to apply the content of their studies and character to real problems in their communities.

The National Commission on Service-Learning in its recently issued report entitled *Learning in Deed: The Power of Service-Learning for American Schools*, offers a definition of service-learning that incorporated the most essential features common to service-learning across the country. According to the Commission, service-learning is different from volunteerism in that it is "a teaching and learning approach that integrates community service with academic study to enrich learning, teach civic responsibility, and strengthen communities (National Commission on Service-Learning, 2002).

Because of its connection to content acquisition and student development, service-learning is often linked to high school and college courses, and inspires these educational organizations to build strong partnerships with community-based organizations. As noted by Woods (2001) the application of SL is not a new idea in agricultural education. The principles of community service or SL have long been advocated as a method for advancing civic awareness and citizen responsibility in both agricultural education and the FFA (Scott, 1952; Edman, 1953; Smith, Martin, McMahon, 1954; Sperlich, 1975). In some cases, like the 'Building our American Community' (BOAC) program, service had been institutionalized in agricultural education and FFA. According to Hess (2001) "service learning is the complimentary piece of the puzzle that helps tie together several aspects of the triad model of agricultural education, as well as the FFA's push for student's personal development" (p. 10). Moreover, according to Price (2003) increasingly, colleges and universities are using a SL paradigm to structure learning experiences for their students to reinforce and enhance the understanding of course material.

While faculty, both in secondary and higher education are convinced of the merit of SL, they are increasingly seeking means to assess academic development or attitude change in students that participate in SL activities. The increased acceptance and support for SL has brought a reciprocal call for research, usually to document expected outcomes. Trexler (2001) noted "[s]ervice learning is a new term for many in our profession and one that needs to be examined in detail" (p. 5). Prior to addressing Trexler's call for addressing SL within the discipline, the profession needs to take stock of the research that has examined the impact of SL both within literature from agricultural education and the education discipline at large.

Indicating the importance of such a compilation Mannebach, McKenna, and Pfau (1984) declared, "if research and development are to lead the way, we must continually review and evaluate our efforts" (p. 15). Williams (1991), in his "*Dimensions of Agricultural Education*" model further suggested that in order to raise the professional status of agricultural education, there is a need for a collection and codification of what is known about various educational theories that impact agricultural education research and programmatic efforts. Particularly, "we must fully understand the dimension of agricultural education before we can successfully focus our research" (p.8). Thus, "professors must identify studies and evaluate research already done in the fields of interest" (Williams, 1991, p. 19).

A number of researchers have examined various research and publishing aspects in the agricultural education profession. These include: diversity issues in agricultural education (Woods & Moore, 2002); safety issues in agricultural education laboratories (Dyer & Andreasen, 1999); benefits of supervised agricultural experience programs (Dyer & Williams, 1997); a review of subject matter topics researched in agricultural and extension education (Radhakrishna & Xu, 1997); developing a model for supervised agricultural experience program quality (Dyer & Osborne, 1996); participation in supervised agricultural experience programs (Dyer & Osborne, 1995); an empirical analysis of the literature cited in *Journal of Agricultural Education* (Radhakrishna et al., 1994); and the most prominent subjects discussed included empirical analysis of the *Journal of Agricultural Education* during the eighties (Radhakrishna & Jackson, 1992). As these studies indicate, many systematic literature reviews have been conducted to guide the disciplines research focus. However, in light of the growing interest in both programmatic development and research of SL, there still exists a need to compile and review research findings addressing the topic of service learning.

Purpose/Objectives

The purpose of this study was to conduct a thorough review of education literature, to critically examine the status of SL research and provide the agricultural education discipline with a basis from which to direct future research. Two objectives guided the study: 1) to synthesize a 10-year period of research related to service learning in education and agricultural education; and 2) to recommend future service learning research in the agricultural education discipline.

Procedures

To gather data to meet the objectives, a search was conducted of five sources: 1) Educational Resources Information Center (ERIC); 2) *Journal of Agricultural Education* (JAE); 3) *NACTA Journal;* 4) Proceedings from the National Agricultural Education Research Conference (NAERC); and 5) Journal of Extension. Studies were located through a library search at Michigan State University and consisted of articles published from January 1993 through December 2002. Keywords used by the researchers in conducting this study included community service and service learning. Assessing the content of the studies selected was approached systematically. The authors reviewed the first 20 studies in a 'pilot test' of the review criteria. The purpose of this pilot test was to test the initial review criteria and assess the degree of inter-rater reliability. Inter-rater reliability refers to the consistency of results when two reviewers use the same data assessment criteria. In comparing the results of the two independent reviews of the pilot test, the authors found that the reviews diverged approximately 15% of the time and agreed 85% of the time. The statistic Cohen's kappa was used to determine if this degree of agreement actually represents reliability in completing the review. The authors calculated the statistic and determined that the statistic fell within the 95% confidence interval representing true reliability of the review process. However, the two reviewers did discuss the disagreements revealed by this analysis and agreed to appropriate interpretations of criteria. After the pilot test was completed, the authors revised the criteria forms and reviewer instructions based on pilot test results. The criteria used in reviewing the articles consisted of examining the title, purpose, findings, and conclusions. Articles were grouped under themes found in the literature and the studies themselves, based upon a consensus by the researchers. To

identify areas of convergence, the authors of this study used the conclusions derived from the review and the coding process in concert with a second careful examination of each source. In some cases, articles with two or more themes where coded under both categories (i.e. effects on students and faculty).

Findings

A 10-year review of SL research revealed 166 articles from the five scholarly outlets (Table 1), with only five articles related to agricultural education. The 166 articles yielded five themes: 1) effects of SL on student development; 2) impact of SL on faculty; 3) impact of SL on Institutions (i.e. schools, colleges and universities); 4) impact of SL on communities; and 5) service learning in agricultural education (Table 2). A unifying theme among all articles was "What makes a SL project worthwhile?"

Table 1

*Total number of articles addressing service-learning issues**

Publication/ Year	93	94	95	96	97	98	99	00	01	02	Total
ERIC	4	14	13	19	23	24	19	20	7	17	160
JAE	-	-	-	1	-	-	-	-	-	-	1
NACTA	-	-	-	-	-	-	-	-	-	-	-
NAERC(M)	-	-	-	-	-	-	1	1	-	-	2
JOE	-	-	1	-	-	1	-	-	-	1	3
Total	4	14	14	20	23	25	19	20	7	18	166

*A complete list of articles identified can be requested from the researchers.

Table 2

Total number of articles addressing service-learning issues

Service Learning Themes	ERIC	JAE	NACTA	NAERC	JOE	Total
Effects of Service Learning on Students	118	-	-	1	-	118
Impact of Service Learning on Faculty	21	-	-	-	-	21
Impact of Service Learning on Institutions	23	-	-	1	-	23
Impact of Service Learning on Communities	14	-	-	-	-	14
Service Learning in Agriculture	-	1	-	-	3	4
Total	176	1	-	2	3	182

Effects of Service Learning on Students – Over the past decade, the effect that service activities have on students has been the most researched topic within the SL literature. Numerous studies have been conducted using experimental methods comparing students engaged in SL courses to non-SL courses. Research has shown that the service participants have a slightly higher grade point average (Gray et al, 1998); were more satisfied with their course (Gray et al, 1998); placed higher importance on volunteering (Markus, Howard, & King, 1993); and showed positive improvements on ability to work with diverse groups and felt self worth in social situations

(Osborne, Hammerich, & Hensley, 1998). Conversely, Kendrick (1996) found no significant difference in grades between the two groups but did indicate that SL participants expressed the importance to work toward equal opportunity.

Many studies focus on administering a pre/post test on self-esteem, moral development, and character skills to measure the outcomes and impacts of a SL project. A common test used was the Defining Issue Test (DIT). No significant differences between SL and non-SL students were found for moral development (Cram, 1998; Fenzel & Leary, 1997), increased self-esteem (Cram, 1998), or attitudes toward personal and social responsibility (Fenzel & Leary, 1997). However, Gorman (1994) found significantly higher rates of growth on moral development for students involved with SL.

Reflection is a key educational component to a SL project. It can be accomplished through writing in journals, class discussion, or any way for the student to express their emotions or thoughts throughout the service experience. Ikeda (2000) found that students enjoyed the opportunity to exchange ideas and stories and felt that written reflection "forced them to integrate course material and the service experience." Greene's (1996) analysis of reflective journals revealed that "1) students in the service-learning groups attached an ever-increasing importance to their service-learning experience; 2) there was an awareness of reciprocity between student groups and their service recipients; 3) service-learning students affirmed the educational value of their experiences; and 4) service-learning students increased their awareness of diversity and quality of life issues for service recipients." Loewen (1998) reported that reflection had a significant effect upon students' sense of empowerment and levels of empathy.

While, reasons for performing service is widespread, Siebold (1998) noted that students identified the primary area of influence from their involvement with community service was personal development; while in particular, service boosted confidence, identity development, motivation, and education (Tarallo-Falk, 1995). Results from a survey of a SL course demonstrated that students with more service experience prior to the service project were more likely to intend to volunteer in the future than the students who had less experience (Stukas, Snyder, & Clary, 1999). When asked about SL, students responded that they strongly supported it, that it should be incorporated into more classes, and made them more interested in volunteering in the future (Blackwell, 1996). Some students who had chosen to perform SL articulated concerns regarding service in the current curriculum, a sense that service should be altruistic, a frustration with the bureaucratization of SL, and their desire to maintain influence over their own learning (Tarallo-Falk, 1995).

A vast amount of studies illustrated the impact and effects of SL on students. The list of benefits SL provides is endless. Some of the benefits research has provided are: increased awareness of the world (Ikeda, 1999); motivation to serve others (Keen & Keen, 1998); apply things learned in class to real problems (Virginia Commonwealth University, 1997); confront their stereotypes (Rauner, 1995); recognizing a need to improve certain skills (McMahon, 1998); leadership effectiveness (Keen & Keen, 1998); and sense of efficacy (Ikeda, 1999). Rauner (1995) reported that [s]tudents gained self-confidence by meeting time demands, facing complex situations, and increasing their organizational and communication skills.

<u>Impact of Service-Learning on Faculty Outcomes</u> – Service-learning is a teaching method that faculty and instructors are still learning. A study in 1999 with 3,700 institutions indicated that the median number of faculty members integrating service with academics was sixteen (Campus

Compact, 2000). Berman (1999) found two factors that were challenges to successful implementation of SL; poor faculty training in SL theory and lack of faculty incentives to engage in SL. A survey of Michigan colleges and universities found that the strongest motivators for faculty to use SL were related to the curriculum, such as encouraged self-directed learning or enhancement of course relevance (Hammond, 1994). Hammond goes on to report that faculty reported concerns about the difficulties of coordinating people and many tasks; the difficulty of adjusting; and the increased time service requires.

Stanton (1994) indicated that faculty are likely to successfully develop, design and teach a SL course if they had, a) intrinsic motivation to become acquainted with or deepen knowledge related to SL; b) participated in an intensive seminar/workshop; c) specific goals related to SL curriculum; and d) "the perception that their institution placed value on teaching and buffered them from budgetary, promotional and other such pressures" (p. 13). Cushman (2002), stated that professors teaching SL courses can better sustain these initiatives when they view the community site as a place where their teaching, research and service contribute to a community's needs and students' learning. Ikeda (2000) found that faculty believe SL to be a powerful learning experience and reflection was critical to connect the service experience to the academic course. Berson and Younkin (1998) concluded that faculty using SL reported that class discussions were more stimulating, included more student involvement and were more challenging academically.

Impact of Service Learning on Colleges and Universities – Service-learning can contribute much to the college and university. Berman (1999) found that common factors to successful SL programs were a clear articulated mission, long-term goals and plans, and an open communications system. Bringle and Hatcher (2000) reported that the institutionalization of SL was contributed to an established central office that was funded with university funds.

Robinson and Barnett (1996) indicated that while 71 percent of the community colleges surveyed reported that service was a part of the institutional mission only half had an office or group that placed students in community service opportunities. The American Association of State Colleges and Universities (AASCU) and the National Association of State Universities and Land Grant Colleges (NASULGC) reported that nearly 87 percent indicated that their institution had offices or centers that directed community service (NASULGC, 1995). These offices are important to a university because they help faculty coordinate SL curriculum and projects.

Service-learning curriculum is available in almost all disciplines. A study of 682 courses from 30 institutions revealed that the academic department that offered the greatest percentage of SL courses was Education at 34.4 percent, while the Social and Behavioral Sciences had 15.4 percent of its courses linked with services (Mandell, 1995). Campus Compact (2000) reported that in 1999, the median number of disciplines that offered SL was eight, offered most frequently by departments of education, sociology, and psychology. Service-learning is a successful teaching method, but there are barriers to its institutionalization. Siscoe (1997) revealed that lack of administrative support, faculty resistance, and lack of funding (Ward, 1996) were barriers to effective implementation of SL.

Impact of Service Learning on Communities – Very little research has been conducted on the impact on communities compared to the impact to students. Strides have been made to evaluate what impact SL has on the community. Clarke (2000) identified that community leaders felt that the project worked well and it helped community residents become active in and feel a sense of control over the community. He further reported that the community/university bond was

strengthened and they gained access to new resources. "Results suggest that community service learning motivated, engaged, and gratified community leaders, tapping into local community associations" (Boyle-Baise et al, 2001, p. 348). Another important aspect of the community is how the student interacts in the community. From a study of 30 supervisors at community based organizations who worked with students on a SL project stated that as a whole they where impressed with the students' sensitivity, compassion, and actions (Ferrari & Worrall, 2000).

Service-Learning in Agriculture – Over the past 10 years, a limited number of research studies have addressed SL. Those studies that have addressed SL have been primarily philosophical in nature. Morris, Pomery and Murray (2002) outlined the concept of designing and teaching SL courses as an activity that can allow Extension educators to become a more integral part of a "truly engaged institution" (p. 1). Likewise, Simpson (1998) called for Extension to "begin to recognize the potential that SL may hold for Extension and how Extension can better extend itself toward strengthening SL initiatives" (p. 3). Israel and Ilvento (1995) concluded that "linking community SL with community development can effectively meet the needs of some rural communities." Isreal and Hoover (1996) presented a strategy for integrating community SL with community development and concluded that "the successful implementation of the community needs assessment project illustrates that student can make significant contributions to the development of their community and at the same time gain valuable experience" (p. 5). Wyble and Kotrlik's (1999) study investigating the status of community SL in Louisiana 4-H programs concluded that "4-H agents perceived the value of community SL to the participants to be substantial…indicating a strong belief that these activities contribute to an increased involvement and understanding of their community by the 4-H members and that community SL is a valuable tool for 4-H" (p. 117). Corn and Trexler's (2000) study describing the involvement of a SL project's influence on the development of a community of practice concluded "[s]ervice learning projects must be large enough to seem almost insurmountable to the learners, but manageable enough to be completed" (p 64).

Conclusions

There has been an abundance of SL research to date and most studies have focused on the impact of SL programs on students. Regrettably, this research is weakest in both concept and methodology precisely in the areas where researchers need the most guidance if educators are to design powerful academic programs utilizing SL in agricultural education and related disciplines. Research shows that service has something important to contribute to personal and social development; there is less reason to be confident that uniting it with academic work improves learning. Intellectual outcomes — knowledge, cognitive development, problem-solving skills, and transfer of learning — are at the heart of the school and college mission and yet little is known about how they are affected by SL. Thus, while the researchers touched on the many student outcomes documented in the literature, the primary focus of our recommendations for future research will address gaps in our understanding of the academic learning goals of SL and the instructional processes needed to achieve these goals within agricultural education and related disciplines.

As findings of this review summarized, just in the past 10 years there have been several national studies that address the impact of SL on students and dozens of smaller scale studies. Most of these have explored the impact of SL on such personal qualities as efficacy,

interpersonal skills, reduced stereotyping, and on social responsibility or sense of commitment to future service. This body of research consistently shows a small but positive effect of SL on these outcomes. Studies, which have examined the impact of quality differences in SL, have found that programs with more opportunity for reflection, substantive links between coursework and service, and ethnic and cultural diversity have a stronger impact. While research lacks longitudinal studies that show a link between academic SL and later civic involvement, there is evidence in the youth development literature, as well as the work of Astin, Sax and Avalos (1999) in higher education, that volunteer service leads to subsequent community involvement.

The mediating factor appears to be the development of civic identity, (i.e. the personal efficacy and social responsibility that are the outcomes of both community service and SL). The effect of SL on cognitive outcomes has been less well studied and relatively little attention has been given to defining learning outcomes that would be expected to be enhanced by service participation. Most of the reports of learning are based on student self reports or faculty testimony. Where attempts have been made to use grades as measures of learning, the evidence is mixed. In some cases where positive results are reported the method of calculating grades has differed for treatment and comparison students so that results can be attributed to different standards or 'extra credit' for service rather than increased learning.

In other studies, it is hard to disentangle the effects of selectivity on reports of better grades; do better students choose to become engaged in service or does service or SL lead to better grades? While few studies have attempted to articulate learning outcomes that might be particularly affected by the integration of service and learning, a handful of small studies have pointed the way and have used measures that allow students to demonstrate learning. They have provided evidence that SL has an impact on complexity of problem analysis, identification of locus of problem or solution, use of information to support arguments, creation of practical strategies for community action, cognitive moral development, and critical thinking.

While these studies are encouraging, their small scale, lack of finely differentiated treatment conditions, and lack of replication limits their usefulness. There is also limited evidence to guide selection of SL strategies to enhance learning within agricultural education and related disciplines. Most studies of student outcomes have simply used SL as the predictor variable and SL covers dramatically different experiences ranging from a single visit to a local nursing home, to a few hours a week of 'extra credit' for tutoring, to an intensive semester focused on working with a community partner on a social problem. It is hard to argue that experiences so varied should be linked to improved learning, except insofar as doing worthwhile service may lead to increased interest or engagement in study. Because outcomes have not been well specified, studies often link service experiences with outcomes that bear no logical relationship to them. Planting flowers on a local street corner is not likely to have an impact on public speaking; tutoring kids in science may have no impact on a multiple choice test in animal science 101; clearing a trash-filled city park is obviously not connected to improved critical thinking capacity.

A few studies have explored the impact of program characteristics. For example, twenty years ago Conrad and Hedin (1980) found that opportunity for frequent reflection was the best predictor of outcomes. Subsequent research has examined the impact of program characteristics such as amount of reflection, placement quality, application, feedback, ethnic and cultural diversity, and program duration, but these are fairly gross measures of pedagogy. There have been no systematic attempts to test alternative, theoretically-anchored models of instruction,

reflection or project planning. Research shows that reflection is a good thing — yet, the same research also showcased that faculty do not know how to structure reflection and integrate it with service to maximize learning — or what that learning might look like.

Implications and Recommendations

The studies of the past decade have provided a portrait of SL and its impact on students, but it is analogous to an abstract drawing that only a few can understand or find relevance. Detailed research and information that will help design programs that enhance cognitive outcomes is still missing. An important charge for agricultural education researchers to take forth is to provide this information by designing research programs that clearly articulate intellectual outcomes of SL within the discipline and provide information on the best way to structure the instructional process to advance the long-standing commitment to service within agricultural education and related disciplines. An important way to move SL research forward within agricultural education and related disciplines is to engage scholars in related fields in the process of designing and implementing the next wave of research.

A number of groups have expressed interest in identifying 'next steps' in SL practice and research within agricultural education and related disciplines. Service learning within agricultural education has become a topic of symposia at professional meetings and within professional magazines and journals. These efforts have tended to bog down, covering the same ground and surfacing perennial conflicts over process and ideology. A process needs to be created to engage the expertise of people who have developed methodologies for studying field-based instruction and to bring them together with experienced SL practitioners to design and implement a coordinated research program within agricultural education that will produce practical results for the field. Such a project would involve three major phases, a) the design of a research program; b) its implementation; and c) the dissemination of the results in ways that facilitate use.

First an interdisciplinary task force that teams experts on learning, problem solving and transfer of learning with SL practitioners is an important first step in developing a concrete research program focused on SL within agricultural education and related disciplines. Second, once the task force has crafted the research design, participants would implement it in their local SL activities. The research program would be coordinated across sites, with centrally-provided resources, such as managing the scoring of complex assessment tools and the data analysis. Additional support would be needed at each research site to manage the application of the treatment pedagogy to the specific SL program, the implementation of the experiments and the data collection. Data from early waves of the research would help shape the later studies; each site would participate in several studies as treatments and measures are refined. Third, this type of research process should yield approaches to measurement that would help practitioners build convincing assessment into their courses. In addition, the testing of alternative methods of program organization, instruction and reflection should also provide a basis for specific suggestions for design and implementation of SL within agricultural education and related disciplines. Practitioner materials would be created based on the research results and disseminated through in-service training, professional conferences and scholarly outlets.

Potential Research Questions

Over the past decade a lot of evidence about the impact of SL on student development has been accumulated, but this research has relied on surveys and other simple measures, which do not capture the most important intellectual outcomes of this experience. Moreover, it is known that SL has a small but consistent impact on attitudes and perceptions of self, although less evidence for its impact on learning and cognitive development and no evidence of its effect on lifelong learning, critical thinking and problem solving in the community has been established. Few studies about different approaches to SL that would provide guidance to practitioners on how best to optimize the impact of their SL activities on students have been conducted. This suggests a number of conceptual and empirical questions for future research. These include:

- Can SL produce greater interest in agricultural education and related disciplines?
- Can SL contribute to a deeper understanding of subject matter?
- Can SL lead to increased ability to solve new problems and critical thinking?
- How can teachers design measures of understanding and problem solving that allow students to demonstrate their competence rather than simply testify to it?
- How can teachers embed authentic assessment measures into the SL experience itself?
- What measures are appropriate for assessing long term community use for problem solving, community action and learning skills as well as knowledge acquired through SL?
- What kinds of preparatory activities increase the learning impact of SL?
- What kinds of scaffolding or support do students and faculty need to integrate a community experience and the subject matter objectives of the course?
- How do teachers increase students' engagement in personal reflection and self-monitoring of their learning?
- What strategies are needed as part of teacher prep and in-service training to advance SL in secondary agricultural education programs?
- What challenges face the integration of SL in colleges of agriculture?

Questions like these need to be answered to enable secondary and higher education agricultural instructors to design experiences that will help students attain the cognitive objectives of SL activities. In order to create a theory-based and empirically-tested body of knowledge about design and implementation of effective SL, teams of agricultural education researchers and practitioners need to conduct experimental studies that allow them to isolate particular instructional techniques and test their effectiveness. Combining the expertise of agricultural education researchers already exploring problem-based learning and critical thinking with SL scholars and practitioners can create this body of knowledge. As this study has outlined, the past decade has established a firm empirical base for SL; research shows that SL has a small but consistent impact on a number of important outcomes for students. In light of findings from this study, there needs to be a push to empirically answer questions about improving the academic effectiveness of SL within agricultural education and related disciplines.

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Session: IIIA Discussant: Tracy S. Hoover

What's the Value of Service-Learning to Agricultural Education?

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The authors looked at curricular-based service learning research for a ten year period (1993-2002). They reviewed five sources to meet the objectives of the study. Results yielded 166 articles with only five articles related to agricultural education. Five themes emerged as the result of this study: 1) effects of SL on student development; 2) impact of SL on faculty; 3) impact of SL on institutions; 4) impact of SL on communities; and 5) service learning in agricultural education. The authors proceed to discuss the SL research under each theme. Based on how SL is looked at on our campus lead this discussant to ask the following on the key words used to search the literature. Several institutions are using the terms "public scholarship and civic engagement" interchangeably with service learning. Do the authors have any insight on these terms and how if might have affected their search for literature? Also what does NAREC(M) stand for in Table 1.

This study provides a wealth of information and evidence of SL research along with several recommendations for additional SL study and research. One recommendation is the development of an interdisciplinary task force to guide and recommend research in agricultural education and related disciplines.

Identification of Mentors for First Year Agricultural Education Teachers

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Abstract

The purpose of this study was to identify mentors of agricultural education teachers during their first year of teaching. Specifically, this study sought to describe the personal characteristics of first year agricultural education teachers, identify mentors used by first year agricultural education teachers, and determine areas where mentors are most needed and valued.

The data collection instrument was a researcher-designed electronic survey. It had two parts with questions to gain demographic information, identify mentors of first year agricultural teachers, and determine areas where mentors were needed and valued. The population consisted of twenty-one first year agricultural education teachers in Oklahoma during the 1999-2000 and 2000-2001 academic years.

Nineteen respondents (90.5%) were male. All respondents had a bachelor's degree, were certified to teach agricultural education, and had taught agricultural education for two or three years.

Results indicated that fellow agricultural education teachers provided mentorship to new agriculture teachers. Teacher educators and program specialists also played a vital role in the mentoring and professional development of beginning teachers. However, first year agricultural education teachers experienced many of the problems during their first year without assistance from a mentor.

It was recommended that experienced agricultural education teachers continue providing informal mentorship experiences with first year teachers. The relationship between the new teacher and his/her teacher educator and program specialist is important to the professional development of new teachers. This mentorship must continue if the profession is to maintain and increase the number of quality teachers. Additionally, first year teachers must be more proactive in asking for assistance when needed.

Introduction

"Given comparisons to fields such as medicine and law, which recognize the needs of new professionals more fully, some observers have dubbed education the profession that eats its young" (Halford, 1998). The process of becoming socialized into teaching is one of the most difficult stages in the professional development of teachers. Indeed, experiences during the first year are often pivotal in the eventual success or failure of the beginning teacher. Beginning teachers are usually expected to assume all responsibilities of teaching as if they were veteran teachers (Wildman, Magliaro, Niles & Niles, 1992). Additionally, unlike most other professions, where the job becomes more challenging over time, in teaching the most challenging situations are given to the new teacher (Glickman, 1990). It is no wonder "beginning teachers frequently report stress, anxiety, and feelings of inadequacy" (Joyce & Clift, 1984, p. 6).

Aspy (1969) found survival was more important than competence for the beginning teacher. Ryan (1974) discovered a "curve of disenchantment" that followed the change from first year teachers' initial warm and positive attitudes toward their students to a sharp decline after two months of classroom experience, followed by a slow and gradual rise in positive attitudes again. Rogers described this change process as "culture shock," and identified stages a person encounters through the process. The stages include elation, anxiety, rejection, regression, reentry, acceptance, and affection. Varah, Thune, and Parker (1986) referred to teacher survival as "sink or swim." Recently, others reinforced this concept of survival for new teachers and offered assistance in this area (DePaul, 2000; Nichols & Mudnt, 1996; Stedman & Stroot, 1998).

It is not enough to simply look at the immediate school environment to predict if a teacher will remain in the profession. According to Chapman (1984), the strongest predictors of the retention of the new teacher were the teacher's initial commitment to the teaching profession and early work experiences in the profession. Yee (1990) found teachers with positive early first year experiences, reasonable assignments in terms of course loads and subjects, and adequate feedback and personal support from colleagues and supervisors are more likely to become competent and skillful teachers who remain in the profession.

Several factors contribute to a teacher's sense of self-efficacy, enhanced motivation, and commitment. Some include a supportive school climate, the presence of collegial values, shared decision-making, and a school culture that provides a sense of purpose, and a shared vision (Sergiovanni & Starratt, 1998). Schools must become learning communities for teachers to feel safe and to experiment with various strategies and talk about teaching and learning.

Agricultural education teachers are not only responsible for the activities of a normal subject teacher, but also they are responsible for an entire agricultural education program. First year agricultural education teachers especially need a positive induction process as these teachers have additional responsibilities such as preparing for numerous classes, supervising students' Supervised Agricultural Experience (SAE) programs, and advising the FFA. They also are expected to know how to complete state reports, proficiency award and degree applications, and grant proposals for external funding. Debertin and Priebe (1984) and Grady (1985) found experienced agriculture teachers have higher levels of morale or job satisfaction when compared with beginning agricultural education teachers. Specifically, when compared to national morale

norms for junior and senior high faculties, beginning agricultural education teachers rank consistently below the 50th percentile (Flowers & Pepple, 1988).

Researchers have identified areas of responsibility and needs of first year agricultural education teachers. Hillison (1977) noted these responsibilities include: completing state department reports, planning lessons, and ordering materials. Birkenholz and Harbstreit (1987) identified additional needs such as developing skills in specialty courses, training agriculture/FFA contest teams, and assisting students with SAE records. Most recently, Washburn, King, Garton, and Harbstreit (2001) reported areas of professional development needed by beginning teachers of agriculture in Kansas. Areas included writing grant proposals for external funding, preparing award and degree applications, recruiting and retaining quality students, designing and modifying curriculum and course offerings, meeting changes in technology, developing SAE opportunities for students, building the image of agriculture programs, developing computer applications, and constructing agricultural mechanics projects.

The first three to five years of teaching are a period of transition from novice to established experienced teachers. Referred to as an induction period, it is a broad process of socializing beginning teachers into the profession. Camp and Heath (1988) identified the induction process as a transitional period when beginning teachers move from the role of students to experienced teachers. Through assistance, beginning teachers develop competence in knowledge, skills, and values. This assistance ranges from informal friendships to very formal and structured programs.

Various forms of induction programs exist in education today. Many states have formalized induction programs for the development of beginning teachers. One aspect of the induction process is the development of formal or informal mentoring relationships. Kram (1985) stated when a relationship provides both career and psychosocial functions "it best approximates the prototype of a mentor relationship" (p. 42).

Mentoring programs can be organized in three distinct ways: (1) formal, organization chooses mentor; (2) formal, mentee chooses mentor; or (3) informal. The first option involves the organization implementing a mentorship program and pairing mentors with mentees. The organization sponsors a mentorship program in the second approach, while allowing the mentee to choose a mentor to work with. Finally, the informal mentorship program involves the mentee choosing to work with a mentor without any input from the organization.

Purpose and Objectives

The primary purpose of this study was to identify mentors of first year agricultural education teachers. The specific objectives were:

1. Describe the personal characteristics of first year agricultural education teachers.

2. Identify mentors used by first year agricultural education teachers.

3. Determine areas where mentors are most needed or valued.

Procedures

The population (N=37) for this study consisted of first year agricultural education teachers in Oklahoma during the 1999-2000 and 2000-2001 academic school years. A state-mandated program for first year agricultural education teachers, which is enforced by the Oklahoma state department of education, was used as the population frame. Data were collected from a census of the population.

An instrument was developed by the researchers to address the stated research objectives. A review of the literature was done to obtain information regarding problems all teachers have during their first year of teaching. When examining problems specific to agricultural education teachers, areas and topics were identified for inclusion in the instrument. The instrument consisted of five areas: classroom instruction, program management, Supervised Agricultural Experience (SAE), and FFA advisement. Within each area, problems identified through the literature were presented and the agricultural education teacher was asked to provide the name and position of a mentor who provided assistance for specific problems they experienced during their first year of teaching agriculture.

Part I of the instrument was comprised of open-ended questions seeking demographic information. Part II of the instrument focused on the five areas of agricultural education. Respondents were asked to write the name and position title of each mentor next to the problem identified for each area.

As suggested by Tuckman (1978), a panel of experts reviewed the instrument for content and face validity. The selection of the panel of experts was based on their knowledge of agriculture, agricultural education, and research methods. A pilot test was conducted to establish reliability. The instrument was pilot tested by surveying agricultural education teachers who began their teaching career during the 1998-1999 academic school year. Members of the pilot group completed the questionnaire, answered questions related to the clarity of the instrument, and made other suggestions. No major changes were made to the instrument as a result of this process.

Data were collected for this study using an electronic method as outlined by the Dillman Tailored Design Method (2000). Initially, all agricultural education teachers in the population were contacted by telephone. The researcher explained the purpose of the study and described the process of completing the instrument. The participants were given an option of completing an e-mail or FAX version of the instrument. Precautions were taken to ensure that each first year agricultural education teacher completed the instrument only once.

After the initial contact was made, the researcher either sent a FAX or e-mailed the instrument to the participant. Three rounds of follow-ups were conducted for those subjects who had not responded. Those who had not replied were sent a second e-mail or FAX message. A

second phone call was placed to remind non-respondents to complete the questionnaire. A final follow-up phone call was placed to non-respondents four weeks after the initial phone call.

A total of 51.6% (n=21) of the population completed the questionnaire. All responses were usable for data analysis. FAX and e-mail responses were compared to control for error in data collection between the two instrument formats. No differences were found between the responses comparing the two data collection formats. Non-respondents were contacted a final time. Non-response error was examined by comparing selected items between respondents and non-respondents. No differences were detected.

For data analysis and interpretation purposes, results generated for mentors of first year agricultural education teachers were identified and totaled. This descriptive analysis used frequencies and percentages to identify mentors for each problem area developed through the literature.

Findings

Characteristics of Respondents

Of the 21 first year agricultural education teachers who responded to the questionnaire, 19 (90.5%) were male. All respondents (100%) had an educational level of a bachelor's degree and no respondents had advanced degrees. All 21 (100%) teachers were certified to teach agricultural education and had taught agricultural education in public schools for two or three years.

Mentors Identified, Needed and Valued

Four sections of responsibility for agricultural education teachers were studied. These sections were: classroom instruction, Supervised Agricultural Experience, program management, and FFA advisement. Specific problem areas or challenges within each section were listed. Respondents were asked to identify mentors they sought assistance from for each problem area/challenge related to each section of the agricultural education program.

Classroom Instruction.

Specific problems addressed for classroom instruction were: using classroom discipline, creating student motivation, dealing with students' individual differences, assessing students' work, interacting with parents, organizing work, obtaining instructional materials, preparing for classes and activities, dealing with course loads, and getting along with colleagues.

Table 1 displays the data associated with first year agricultural education teachers who identified their mentors in the area of classroom instruction. Other agricultural education teachers were identified most often in the areas of parental interaction, student assessment, and preparation time. The high school principal also mentored first year agricultural education teachers in areas of enforcing classroom discipline, working with colleagues, and student

assessment. However, agricultural education teachers indicated no one provided mentorship in the areas of student motivation, student differences, obtaining instructional materials, dealing with a heavy course load, and organizing work. In these areas the respondents said they learned it on their own.

Table 1
Mentors of First Year Agricultural Education Teachers in the Area of Classroom Instruction

AREAS	N	%	AREAS	n	%
Classroom			Obtaining		
Discipline			Materials		
1. HS Principal	6	28.6	*1. No one*	*6*	*28.6*
2. No one	4	19.1	*2. Mentor Teacher-Ag*	*3*	*14.3*
3. Mentor Teacher-Ag	3	14.3	*3. Ag Ed Teachers*	*3*	*14.3*
Student Motivation			Students' Problems		
1. No one	5	23.8	*1. HS Counselor*	*5*	*23.8*
2. Ag Ed Teachers	4	19.1	*2. No one*	*5*	*23.8*
3. Mentor Teacher-Ag	3	14.3	*3. Mentor Teacher-Ag*	*2*	*9.5*
Student Differences			Preparation Time		
1. *No one*	5	23.8	*1. Ag Ed Teachers*	*5*	*23.8*
2. Special Ed Teacher	4	19.1	*2. No one*	*5*	*23.8*
3. Teachers in District	3	14.3	*3. Mentor Teacher-Ag*	*3*	*14.3*
Student Assessment			Heavy Course Load		
1. Ag Ed Teachers	6	28.6	*1. No one*	*7*	*33.3*
2. Principal	4	19.1	*2. Ag Ed Teachers*	*4*	*19.1*
3. Mentor Teacher-Ag	3	14.3	*3. Mentor Teacher-Ag*	*3*	*14.3*
Parental Interaction			Colleagues		
1. Ag Ed Teachers	6	28.6	*1. HS Principal*	*5*	*23.8*
2. Mentor Teacher-Ag	4	19.1	*2. No one*	*3*	*14.3*
3. Cooperating Teacher	2	9.5	*3. Teachers in District*	*3*	*14.3*
Organization of work					
1. No one	7	33.3			
2. Mentor Teacher-Ag	3	14.3			
3. Ag Ed Teachers	3	14.3			

Supervised Experience Program.

Specific problem areas/challenges addressed in the SAE section were: selecting projects, developing SAE opportunities for students, supervising projects, and completing livestock show procedures. As can be seen in Table 2, those persons who mentored first year agricultural

education teachers in the area of SAE's were other agricultural education teachers in the profession. Overwhelmingly, teachers identified other agricultural education teachers in each area. However, the second most frequent response in all categories was that no one assisted the first year teacher with problems they encountered within the SAE component.

Table 2

Mentors of First Year Agricultural Education Teachers in the Area of Supervised Agricultural Experience Programs

AREAS	N	%
Developing SAE Opportunities for Students		
1. Ag Education Teachers	8	38.1
2. No one	6	28.6
3. Teacher Educators	2	9.5
Selection of Projects		
1. Ag Education Teachers	6	28.6
2. No one	5	23.8
3. Parents of students	4	19.1
Supervision of Projects		
1. Ag Education Teachers	9	42.87
2. No one	5	23.8
3. Mentor Teacher-Ag Education	2	9.5
Livestock Show Procedures		
1. Ag Education Teachers	10	47.6
2. No one	4	19.1
3. Mentor Teacher-Ag Education	2	9.5

FFA.

Specific problems/challenges related to responsibilities associated with the FFA organization were examined. Areas studied included: preparing proficiency awards and degree applications, planning activities of the local chapter, officer elections, fundraising issues, and planning trips and conferences.

Table 3 displays data related to mentorship of first year teachers in the area of leadership and the responsibilities with advisement of the FFA. More than one-third of the teachers identified a neighboring agricultural education teacher as a mentor in regard to completing state degrees and applications (43%), planning chapter program of activities (38%), developing fundraisers (38%), and planning trips and conferences (38%). The second most frequent response given by first year agricultural education teachers was that no one provided mentorship for that area. Program Specialists from the agricultural division of the state department were mentors for new teachers in their preparation of awards and degrees (23.8%) and planning trips and conferences (10%). Those agricultural education teachers who also were teaching partners

in the same program were helpful in mentoring first year agricultural education teachers with planning chapter activities (10%) and fundraisers (10%).

Table 3

Mentors of First Year Agricultural Education Teachers in the Area of FFA

AREAS	N	%
Preparing Proficiency Awards and Degree Applications		
1. Ag Education Teachers	9	42.8
2. No one	5	23.8
2. Program Specialists	5	23.8
Planning Chapter Activities		
1. Ag Education Teachers	8	38.1
2. No one	5	23.8
3. Mentor Teacher-Ag Education	2	9.5
Fundraisers		
1. Ag Education Teachers	8	38.1
2. No one	5	23.8
3. Mentor Teacher-Ag Education	2	9.5
Trips and Conferences		
1. Ag Education Teachers	10	38.1
2. No one	4	23.8
3. Program Specialist	2	9.5

Program Management.

Areas investigated relating to program management included: recruiting and retaining quality students, offering a variety of courses to attract students, modifying curriculum to meet changes in technology, building the image of an agriculture program and courses, using computer applications in agriculture, and constructing agricultural mechanics projects.

First year agricultural education teachers stated that no one provided assistance in more than half of the areas related to program management as shown in Table 4. Problems included recruiting and retaining quality students (38%), offering a variety of courses (33%), building the image of agriculture programs and courses (19%), and modifying the curriculum to meet the changes in technology (29%).

In the other two areas, no mentor was identified as the second most frequent response. Other agricultural education teachers in the profession were identified as the greatest mentor in the areas of building the image of agriculture programs and courses (19%) and constructing agricultural mechanics project (53%). Program specialists were identified as the mentor providing assistance in the area of computer applications (29%). First year agricultural education teachers also identified program specialists as a mentor in the areas of recruiting and retaining quality students, building the program, and modifying curriculum.

Table 4
Mentors of First Year Agricultural Education Teachers in the Area of Program Management

AREAS	**N**	**%**
Recruiting and Retaining Quality Students		
1. No one	8	38.1
2. Agricultural Education Teachers	4	19.1
3. Program Specialists	3	14.3
Offering a Variety of Courses to Attract Students		
1. No one	7	33.3
2. Agricultural Education Teachers	5	23.8
3. High School Principal	3	14.3
Modifying the Curriculum to Meet Changes in Technology		
1. No one	7	33.3
2. Program Specialists	5	23.8
3. Agricultural Education Teachers	3	14.3
Building the Image of Agriculture Programs and Courses		
1. Agricultural Education Teachers	4	19.1
2. No one	4	19.1
3. Program Specialists	3	14.3
Computer Applications		
1. Program Specialists	6	28.6
2. No one	5	23.8
3. Agricultural Education Teachers	3	14.3
Agricultural Mechanics Project Construction		
1. Agricultural Education Teachers	11	53.4
2. No one	6	28.6
3. Mentor Teacher-Agricultural Education	2	9.5

Conclusions

The following conclusions were formulated based on the results of this study.

1. First year agricultural education teachers in Oklahoma are male, hold a bachelor's degree, and possess certification in agricultural education.

2. Fellow agricultural education teachers provide the most frequent mentorship to new teachers in agriculture.

3. First year agricultural education teachers experience many problems their first year and receive no assistance from a mentor.

4. Teacher educators and program specialists play a vital role in the mentoring and professional development of beginning teachers.

5. Other school personnel such as the high school principal, guidance counselor, and the special education teacher provide mentorship to the first year agricultural education teacher in specialty areas such as dealing with classroom discipline, student's personal problems, and student's differences.

6. Mentor teachers in multiple agricultural education departments provide mentorship to the first year agricultural education teacher.

Recommendations

Collaboration between the State Department of Education and university teacher education programs should be encouraged to develop a more comprehensive mentoring program specific to beginning agricultural education teachers. These programs should focus on issues related to agricultural education and foster the development of mentor/protégé relationships with experienced agricultural education teachers. Specific issues of this program could include building an agricultural education program, recruiting and retaining members, developing award applications, and maybe the most important aspect … surviving the first year as an agricultural education teacher.

Experienced agricultural education teachers should be alerted to the hiring of inexperienced teachers in their area and should be prepared to provide informal mentorship for those new teachers. In addition, they should be encouraged to visit and/or call new agricultural education teachers, introduce them at events, and welcome new agricultural educators to the profession.

Teachers who were employed in a school district with multiple agricultural education teachers identified their teaching partners as providing mentorship with the many problems they encountered. Therefore, experienced agricultural education teachers should be paired with first year teachers in agricultural education to formalize the mentorship experience. Factors such as the location of the school district, age, gender, and interests of the agricultural education teachers should be taken into account when assigning a mentor with a beginning teacher.

Many first year agricultural education teachers experience problems their first year and receive no assistance from a mentor. Therefore, first year teachers must be more proactive in asking for assistance when needed. These teachers should seek experienced agricultural education teachers and develop a relationship with them.

Future research should be conducted to further assess the mentorship experiences of first year agricultural education teachers. Those teachers who attained certification through alternative processes should be examined and compared to the mentoring experiences of traditionally certified teachers. Also, reasons why first year agricultural teachers do not ask for assistance or do not have specific mentors should be examined in more depth. Experienced agricultural education teachers who were identified as mentors could provide valuable information regarding the mentoring of first year teachers in agricultural education.

Discussion/Implications

The shortage of teachers is not a new phenomenon. Indeed, it is prevalent within numerous states across the nation. The agricultural education profession is no exception. Quality teachers are needed to replace the large turnover caused by retirements and agricultural education teachers leaving the profession early in their career. Indeed, the first three to five years of teaching are crucial in the development of competent and dedicated teachers. Many new teachers never recover from the initial experience of teaching agriculture, consequently they leave the profession.

Many states provide an induction program for new teachers. Is this program meeting the critical needs of first year agricultural education teachers? Should more be done to assist those new teachers, particularly those in agricultural education? What is the cause for first year agricultural education teachers not to seek additional help or mentorship? Providing valuable mentorship experiences to the beginning agricultural education teacher fosters learning through others and thus creates professional development opportunities on an individual basis and within the profession as a whole.

As classroom teachers become more accountable for student learning, teacher educators, program specialists in state departments of education, administrators, and other teachers within the agricultural education profession and each school district must become more accountable. Through mentorship, new agricultural education teachers will become more prepared to meet the challenges in the classroom and the demand for accountability with student learning.

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Identification of Mentors for First Year Agricultural Education Teachers

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There is merit for the profession to know which individuals provide for the support and assistance needs of beginning teachers as they struggle to successfully transition into the profession. The authors are applauded for their efforts to determine who is providing mentoring (support and assistance) to beginning teachers in Oklahoma.

In addition to the comments provided for the other paper, I have additional thoughts, questions, and comments about this paper that I hope can lead to many useful outcomes. First, be sure you are using findings of contemporary studies to create your conceptual framework. There have been a large number of published articles about the needs of beginning teachers in recent years. Secondly, is your study is based upon the fact that beginning teachers need support and assistance with every topic presented to them on your questionnaire? Did you allow for them to clearly state they did not need mentoring for some topics? Third, provide greater preciseness to the statements in your findings. For example in the first section, were your respondents still first year teachers when they completed the questionnaire, or had they completed two to three years of teaching? With regard to the information presented in Table 1, explain why a maximum of only 14 respondents ever responded to any one category. Fourth, use your conclusions to inform the research conducted to date. It is important to show how your research supports, refutes, and/or extends the literature already reported about your topic. And finally, carefully use the objectives of your study to confine your recommendations and discussions. Refrain from making statements that are beyond the findings of your study.

Reflect upon a couple of the following questions related to mentors and mentoring.

> Should all experienced teachers be mentors of beginning teachers?
>
> What dictates if mentoring has been conducted in an effective manner?
>
> Given what you have learned from this study, propose a corresponding recommendation for principals that serve as mentors of beginning agricultural education teachers.

I encourage to continue your interest and research activity in this topic!

Providing Psychosocial Assistance For Beginning Agriculture Teachers: The Perceptions Of Formal Mentors And Novice Teachers

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Abstract

The purpose of the study was to describe the extent to which a formal mentoring relationship met the psychosocial needs of beginning agriculture teachers, and to describe the extent of satisfaction with the dyad relationship. The accessible sample consisted of Missouri agriculture teachers (n = 40) in their first year of teaching during the 2001-2002 school year, and their formal mentors (n = 40) provided by school districts. The researchers developed a data collection instrument consisting of a beginning teacher version and mentor version of the Mentoring Relationship Questionnaire (MRQ). An overall survey response rate of 88% was achieved for the study.

From the findings of the study it was concluded that formal mentors provide psychosocial assistance to beginning agriculture teachers. Psychosocial assistance was intended to enhance a sense of competence, identity, and effectiveness in beginning teachers, and consisted of support encompassing the functions of acceptance, counseling, friendship, role modeling, and social. It was found that beginning agriculture teachers and formal mentors who perceive they are similar to their dyad partner are more likely to have a satisfying mentoring experience. Dyad members who recognize that they have similar values, attitudes, working styles, and teaching philosophies are more likely to have a positive mentoring experience, successful relationship, and satisfactory interaction.

Introduction and Theoretical Framework

It is predicted that over two million new teachers will be employed in America's schools during this decade, due to increased student enrollments and to replace a large cohort of retiring teachers (Gerald & Hussar, 1998). Developing ways to attract and retain the next generation of teachers presents the educational community with a formidable task. This large population of new teachers will be challenged to educate diverse learners in an increasingly complex society, and they will need to be the best-prepared teachers our nation has ever known (National Center for Education Statistics, 1997a).

While many universities, states, and school districts have recently intensified teacher recruitment efforts, anecdotal evidence suggests that the retention of teachers holds promise as a long-term strategy for alleviating the teacher shortage. The capacity to retain first-year teachers has profound implications for student achievement and for the possibilities of sustained educational reform. Research over the last decade has led to an understanding that quality teaching is critical to student success and "what teachers know and can do is the most important influence on what students learn" (National Commission on Teaching and America's Future,

1996, p. iv). The Commission's Report (1996) called for a number of strategies for supporting beginning teachers, including effective induction through teacher mentoring.

Unfortunately, first-year teachers are frequently inducted through a sink or swim approach with little support from colleagues and few opportunities for professional development (Darling-Hammond & Sclan, 1996). According to the National Commission on Teaching and America's Future (1996), haphazard induction experiences contribute to high attrition rates and to lower levels of teacher effectiveness. Nationwide, more than half of all teachers leave the profession before the end of their sixth year of teaching (Marso & Pigge, 1997). Even more disconcerting, Darling-Hammond (1997) reported that approximately 15% of new teachers left the profession during each of the first two years of teaching. This was more than twice the annual national teacher attrition rate of 6.6%.

Induction programs have proliferated in the last 10 years as a strategy to help neophyte teachers survive reality shock in a profession that "eats its young" (Halford, 1998). Beginning teacher induction programs and mentoring efforts have been developed to serve as a connecting link between the teacher preparation phase and the induction phase of first-year teachers. Galvez-Hjornevik (1985) found that a mentor reduced beginning teacher stress by providing the novice with knowledge of school and curriculum. Odell and Ferraro (1992) concluded that mentors helped to promote professional development of new teachers, thus reducing the number of teachers who left the profession. Several studies confirmed that induction programs and mentorship are effective at retaining qualified teachers (Archer, 1999; Fideler & Haselkorn, 1999; Gold, 1996).

Even though the interest in mentoring programs has remained strong, a certain degree of concern has emerged (Gold, 1996). In fact, some educators have criticized mentoring programs by saying that they have been implemented with too little conceptual understanding of the process, with unrealistic expectations, and with poorly thought-out implementation strategies (Little, 1990). Researchers concluded that simply offering formal mentoring programs did not necessarily improve the commitment of beginning teachers, and that the quality of assistance provided new teachers in adjusting to the profession was a key to an effective mentoring program (Huling-Austin & Murphy, 1987; Ingersoll, 1999). The National Center for Education Statistics (1997b) recommended that further research be conducted on what distinguishes effective from ineffective induction and assistance programs.

Effective support of beginning teachers is multidimensional, addressing the variety of developmental needs of teachers in this phase of their careers. In general however, support is categorized into two major types (Gold, 1996; Stansbury & Zimmerman, 2000): (a) Instructional-related support that includes assisting the new teacher with the knowledge and skills necessary to be successful in the classroom and school, and (b) psychological support for which the purpose is to build the beginning teacher's self-concept by promoting confidence, developing self-reliance, and encouraging feelings of effectiveness and positive self-esteem.

From a review of literature, it was determined that research on mentorship in agricultural education primarily pertained to instructional-related support and challenges associated with the first-year of teaching. Issues of classroom management and time management surfaced as

common concerns of beginning teachers (Joerger & Boettcher, 2000; Mundt, 1991; Mundt & Connors, 1999; Simon, 1989; Simon & Wardlow, 1989; Talbert, Camp, & Camp, 1994). Several studies concluded that mentors assisted beginning agricultural education teachers to overcome common first-year problems (Barrera & Finley, 1992; Greiman, Walker, & Birkenholz, 2002; Simon, 1989; Simon & Wardlow 1989).

Barrera and Finley (1992) reported that beginning teachers received guidance from a mentor committee composed of a classroom teacher, an administrator, and a teacher educator. Upon completion of the first year of teaching, the committee determined whether or not the beginning teacher would be recommended for an Oklahoma Teaching Certificate. By contrast, Simon (1989) recommended that mentors should never be required to formally evaluate the performance of beginning teachers because it could negatively affect the mentoring relationship.

Simon (1989) focused on the induction process from the perspective of the mentor. Mentors perceived their role to be one of personal assistance and psychological support. Benefits of being a mentor consisted of increased dedication toward teaching, and professional growth. Mentors suggested that beginning teachers should be allowed to select their own mentor(s). Simon recommended that mentor-induction programs not become over-formalized, as mentoring is an informal and naturally occurring process. Greiman et al. (2002) reported that most first-year agriculture teachers had access to formal and informal mentors. It was implied that first-year teachers were utilizing several mentors to assist them during the induction process. Although formal mentors were assigned to provide professional development assistance for first-year teachers, it appeared that informal mentors were more helpful. The majority of the respondents in the study indicated that a teacher within the school district and an agriculture teacher located outside the local school district were more helpful in providing professional development assistance than the formal mentor.

In addition, research from business and management indicated that informal mentor relationships were more effective than formal relationships (Ragins & Cotton, 1999). Other evidence suggested that gender, race, length of relationship, and perceived similarity of dyad participants may influence mentoring relationships (Dreher & Cox, 1996; Ragins & Cotton, 1999; Turban, Dougherty, & Lee, 2002), and as such, raises legitimate concerns about the success of formal mentoring relationships when there is a perceived lack of similarity between assigned participants.

The theoretical model for this study is based on Kram's mentor role theory (1985). Her seminal work consisted of conducting in-depth interviews with pairs of young managers (protégés) and senior managers (mentors). She concluded that mentoring is a type of developmental relationship in which mentors provided career and psychosocial functions. Career functions operate primarily at the organizational level to assist in advancement of the junior colleague, while psychosocial functions affect each individual on the interpersonal level, both inside and outside the organization. Career functions "are those aspects of a relationship that enhance learning the ropes and preparing for advancement in an organization" (p. 22). These functions increased the likelihood of the protégé becoming successful, and included sponsorship, exposure and visibility, coaching, protection, and challenging assignments. Psychosocial functions enhanced an individual's "sense of competence, identity, and

effectiveness in a professional role" (p. 23). Psychosocial functions included acceptance, counseling, friendship, and role modeling. Social, a fifth psychosocial function, was incorporated into the theory by Raggins and McFarlin (1990). Kram suggested that the greater the number of functions provided by the mentor, the more beneficial the relationship will be to the protégé.

Like many other states, Missouri's induction program to assist beginning teachers was a result of policy decisions made by state legislators. The 1985 Excellence in Education Act passed by the state legislature required school districts to provide professional development for all teachers, and assign a formal mentor to beginning teachers by September 1988 (Midwestern state Department of Elementary and Secondary Education, 1988). However, since its inception, there has been limited research conducted on the outcomes of the induction and mentorship of beginning teachers (Heimsoth, 1993; Greiman, et al., 2002; Wilkinson, 1997). Further, Wilkinson (1997) reported that one-fourth of new teachers in Missouri were struggling alone without a mentor and a professional development plan during the 1994-1995 school year. The results of this study will help to measure the impact of formal mentoring, and will assist stakeholders in making informed decisions regarding the continuation and/or modification of the formal mentorship component.

Numerous research studies have examined beginning teachers' perspectives on their induction into the profession, but limited research has focused upon the unique role of the mentor. Few studies have compared the perceptions of beginning teachers and their mentors regarding the dyad relationship (Vonk, 1996), and little research has been conducted on the psychosocial needs of beginning teachers. Therefore, the central problem addressed in this study was to examine the perceived satisfaction with the mentorship component of Missouri's Excellence in Education Act for one group of beginning agriculture teachers and their formal mentors.

Purpose and Objectives

The purpose of the study was to describe the extent to which a formal mentoring relationship met the psychosocial needs of beginning agriculture teachers. An additional focus of the study was to describe the extent to which beginning agriculture teachers and their formal mentors were satisfied with the dyad relationship. The following research questions were addressed in the study:

1. What are the demographic characteristics of beginning agriculture teachers, their formal mentors, and the schools where they taught?
2. To what extent do formal mentors provide assistance to beginning agriculture teachers in meeting their psychosocial needs?
3. What is the relationship between the perceived satisfaction of formal mentoring and the perceived similarity of the dyad relationship?

For the purpose of statistical analysis, the following null hypotheses were addressed in the study:

Ho_1 There is no significant difference between the mean scores of psychosocial mentoring functions for beginning agriculture teachers and their formal mentors.

Ho_2 There is no significant relationship between the mean scores of perceived satisfaction with formal mentoring and the mean scores of perceived similarity of the dyad relationship for beginning agriculture teachers and formal mentors.

Procedures

The target population for the study was beginning agriculture teachers in Missouri and their formal mentors. The accessible sample consisted of Missouri agriculture teachers (n = 40) in their first year of teaching during the 2001-2002 school year, and their formal mentors (n = 40) provided by school districts. There was one additional beginning agriculture teacher, but the school district had not assigned a formal mentor to provide assistance during the induction year of teaching. The names of the beginning agriculture teachers were obtained from the Missouri Department of Elementary and Secondary Education (DESE). The high school or area vocational technical school (AVTS) building administrators provided the names of formal mentors assigned to the beginning agriculture teachers.

Two data collection instruments were utilized to gather information from respondents. The researchers developed a beginning teacher version and mentor version of the Mentoring Relationship Questionnaire (MRQ) after reviewing the literature and identifying highly reliable data collection instruments utilized in previous research studies involving mentoring (Kram, 1985; Mundt & Connors, 1999; Ragins & McFarlin, 1990; Turban et al., 2002; Veenman, 1984). One part of the beginning teacher version of the Mentoring Relationship Questionnaire (MRQ) asked respondents to identify to what extent their formal mentor had provided psychosocial support. There were 15 questions in this part, with each of the five psychosocial functions of acceptance, counseling, friendship, role modeling, and social represented by three questions. Beginning teachers utilized a 7-point Likert-type scale to provide responses to the questions. Another part of the MRQ required beginning teachers to react to 10 statements regarding the relationship with their formal mentor. Five items were designed to measure the perceived similarity of the dyad relationship, while five other items were intended to gain a measure of the perceived satisfaction with formal mentoring. Respondents provided their perceptions using a 7-point Likert-type scale. The last part of the questionnaire asked beginning agriculture teachers to supply demographic information regarding their school and themselves. A second data collection instrument mirrored the beginning teacher version, and was developed to collect information from formal mentors of the dyad relationship.

A panel of experts was asked to review the questionnaires for content and face validity. Members of the panel were selected because they had an identifiable research focus involving mentoring and/or the induction of beginning teachers. A letter was mailed to each member of the panel, and the contents explained the motivation for the study and the expectations for their role as an expert. Appropriate changes to the questionnaires were made based on the recommendations of expert panel members. Both data collection instruments were pilot tested with a group of second and third year agriculture teachers who were not participating in the

study. The teachers were instructed to complete the questionnaire, identify any questions or parts that lacked clarity, and offer suggestions to improve the survey instrument. As a result of the input, several questions in the beginning teacher version of the Mentoring Relationship Questionnaire (MRQ) were eliminated.

Reliability in this study was addressed several ways. First, the researchers developed the data collection instruments after reviewing the reliability coefficients of questionnaires utilized in previously conducted mentoring studies. This resulted in both versions of the Mentoring Relationship Questionnaire (MRQ) being comprised of reliable content, based on previously reported Cronbach's coefficient alpha (α). Secondly, the reliability coefficients of three constructs found in the MRQ were calculated post-hoc. For the beginning teacher version, the reliability coefficients (r) were as follows: psychosocial mentoring functions (.97), perceived similarity of the dyad (.98), and perceived satisfaction with the mentoring experience (.99). With regard to the mentor version of the MRQ, the reliability coefficients (r) were as follows: psychosocial mentoring functions (.93), perceived similarity of the dyad (.96), and perceived satisfaction with the mentoring experience (.98).

A hand-written prenotice letter was sent to beginning agriculture teachers and their formal mentors about five days prior to mailing the questionnaire. A cover letter, questionnaire, and self-addressed, stamped envelope were mailed to the respondents in May 2002. Approximately 12 days after the first mailing, nonrespondents were sent a cover letter, questionnaire, and a self-addressed, stamped envelope as a reminder to participate in the study. The final contact with nonrespondents was approximately 25 days after the first mailing, and consisted of a telephone call that encouraged the return of the questionnaire. A total of 39 beginning agriculture teachers completed the questionnaire, resulting in a novice teacher response rate of 98%. The response rate for the formal mentors was 78%, with 31 instruments completed and returned. An overall response rate of 88% (n = 70) was achieved, and all instruments were usable for data analysis.

Research has shown that late respondents are often similar to nonrespondents (Miller & Smith, 1983). Therefore, the researchers utilized analysis of variance (ANOVA) procedures to compare on-time respondents to late respondents of both beginning teachers and formal mentors to ensure that nonresponse was not a threat to external validity. No significant difference was found between on-time respondents and late respondents with regard to their responses to scaled sections in the questionnaire: psychosocial functions of mentoring, perceived similarity of the dyad, and perceived satisfaction with the mentoring experience. As a result of finding no significant difference between on-time respondents and late respondents, generalizability of the results can be increased.

Findings

The first research question sought to describe the demographic characteristics of beginning agriculture teachers, their formal mentors, and the schools where they taught. The average age of the beginning agriculture teachers was 26 (SD = 6.3), with a range of 22 to 50. Formal mentors were an average of 42 years in age (SD = 8.5), with a range of 25 to 56. This resulted in an average age difference of 16 years between beginning agriculture teachers and

their formal mentors. There were almost an equal number of male (n = 20, 51%) beginning agriculture teachers as there were female (n = 19, 49%). In contrast, 87% of mentors were male and 13% (n = 4) were female. The majority of beginning agriculture teachers (n = 31, 82%) were certified to teach at a secondary school, while seven (18%) had a temporary teaching certificate.

Formal mentors had taught an average of 15 years (SD = 8.7), with a range of 2 to 31 years of teaching experience. Agriculture was the subject area most commonly taught by formal mentors (n = 15, 50%), while half (50%) of formal mentors were certified to teach agriculture. Regarding school information, most (n = 35, 90%) of the beginning agriculture teachers taught in a comprehensive high school rather than an area vocational technical school (AVTS) or career center. The majority (n = 22, 56%) of beginning agriculture teachers taught in single-teacher programs, while 44% were located in multiple-teacher departments. There was an average of 80 students enrolled in the agriculture programs of beginning teachers, with a range of 20 to 300 (four-teacher program).

The second research question sought to determine the extent to which formal mentors provide assistance to beginning agriculture teachers in meeting their psychosocial needs. As revealed in Table 1, both respondent groups perceived that the psychosocial needs of beginning agriculture teachers involving the functions of acceptance (beginning teacher M = 5.25, mentor M = 5.80), counseling (beginning teacher M = 5.26, mentor M = 5.77), friendship (beginning teacher M = 5.08, mentor M = 5.73), and role modeling (beginning teacher M = 4.76, mentor M = 5.05) were being met to a *large extent*. Both groups perceived that the psychosocial needs of beginning agriculture teachers involving the social function (beginning teacher M = 3.95, mentor M = 3.88) were being met to *some extent*.

Table 1
Extent to Which Mentors Met the Psychosocial Needs of Beginning Teachers as Perceived by Beginning Agriculture Teachers and Formal Mentors

	Beginning Teachers (n = 28)		Formal Mentors (n = 28)			
Psychosocial Function	M[a]	SD	M[a]	SD	F	p
Acceptance	5.25	1.39	5.80	1.16	2.55	.12
Counseling	5.26	1.51	5.77	1.02	2.20	.14
Friendship	5.08	1.85	5.73	1.01	2.62	.11
Role Modeling	4.76	1.76	5.05	1.20	0.50	.48
Social	3.95	2.08	3.88	1.79	0.02	.89

[a]7-point scale (1 = not at all, 3 = some extent, 5 = large extent, 7 = very large extent)

Null hypothesis one was tested by performing Hotelling's Trace multiple analysis of variance (MANOVA) for the five psychosocial functions of mentoring. As shown in Table 1, a significant difference was not found between beginning agriculture teachers and formal mentors ($F_{5, 50}$ = 1.13, $p_{.05}$ = .36). As a result, null hypothesis one was not rejected. There was no

significant difference between the mean scores of psychosocial mentoring functions for beginning agriculture teachers and their formal mentors.

The third research question sought to determine the relationship between the perceived satisfaction of formal mentoring and the perceived similarity of the dyad relationship. As revealed in Table 2, beginning agriculture teachers (M = 5.14) and formal mentors (M = 5.71) *agreed* that overall they were satisfied with formal mentoring (i.e., the relationship had been a positive experience, they were glad to have had the opportunity to interact, the relationship had been successful, they would want the same dyad partner if having to do it over again, and they were satisfied with the interaction). Respondents (beginning teacher M = 4.51, mentor M = 4.97) *agreed* that the dyad relationship had similarities (i.e., partner had similar values and attitudes, were alike in a number of areas, had similar working styles, see things much the same way, and have similar teaching philosophies). Further, it was found that formal mentors (M = 5.71, SD = 1.63) were more satisfied with mentoring interactions than were beginning agriculture teachers (M = 5.14, SD = 1.97). In addition, formal mentors (M = 4.97, SD = 1.46) perceived the dyad relationship to be more similar than did beginning agriculture teachers (M = 4.51, SD = 1.78).

Table 2
Satisfaction with Formal Mentoring and Similarity of Dyad Relationship

	Beginning Teachers (n = 36)		Formal Mentors (n = 30)	
Construct	M	SD	M	SD
Satisfaction with Formal Mentoring	5.14	1.97	5.71	1.63
Similarity of Dyad Relationship	4.51	1.78	4.97	1.46

Note. 7-point scale (1 = strongly disagree, 3 = disagree, 5 = agree, 7 = strongly agree)

The perceived satisfaction of formal mentoring was found to have a *very strong* positive correlation (Davis, 1971) with the perceived similarity of the dyad relationship for both the beginning agriculture teachers (r = .93) and the formal mentors (r = .85). It was determined that the Pearson product-moment correlations were significant at the .01 alpha level, and therefore null hypothesis two was rejected. There was a significant relationship between the perceived satisfaction of formal mentoring and the perceived similarity of the dyad relationship as reported by beginning agriculture teachers and their formal mentors.

Conclusions, Implications, and Recommendations

From the findings of this study it can be concluded that formal mentors provide psychosocial assistance to beginning agriculture teachers, thus confirming research conducted by Kram (1985). Beginning agriculture teachers indicate satisfaction with knowing that someone in the school is there to help, and that they can go to their mentor with problems, concerns, and questions. Further, beginning teachers trust and confide in formal mentors, receive support and encouragement from them, and present ideas to their formal mentors for input. Formal mentors share valuable personable experiences with beginning agriculture teachers and serve as a role model. Relative to the five psychosocial functions, both respondent groups indicate that formal

mentors provide a greater amount of support with regard to the functions of acceptance, counseling, friendship, and role modeling, and a lesser amount of support involving the social function. Additionally, formal mentors do not perceive providing psychosocial assistance to a significantly greater extend than do beginning agriculture teachers.

Beginning agriculture teachers can anticipate formal mentors providing psychosocial support during the induction year of teaching. Knowing this support is available may help to build the self-confidence of beginning teachers as they begin their induction into the profession, and help to reduce the feelings of insignificance and isolation that beginning teachers often experience (Odell & Ferraro, 1992). Furthermore, these findings imply that the job seeking process may be more high stakes for beginning agriculture teachers than they realize. Not only will they be accepting a teaching position but novice teachers will also be gaining a year-long mentor to assist with their professional development. When beginning teachers consider possible agriculture teaching positions, they should be aware that accepting a job at a school with a multiple-teacher program has ramifications beyond teaching agriculture courses. Because one of the agriculture teachers in the department could very likely be the assigned formal mentor for the beginning teacher, it is implied that questions regarding mentor style, compatibility, similarity, and interest should be addressed while interviewing.

It can be concluded from this study that beginning agriculture teachers and formal mentors who perceive they are similar to their dyad partner are more likely to have a satisfying mentoring experience. This conclusion agrees with previous research suggesting that perceived similarity influences dyad relationships (Dreher & Cox, 1996;Turban et al., 2002). Dyad members who find that they have similar values, attitudes, working styles, and teaching philosophies are more likely to have a positive mentoring experience, successful relationship, and satisfactory interaction. This finding implies the importance of similarity when selecting dyad partners, and presents administrators and mentoring program coordinators with the challenge of making a dyad assignment before the two participants have met and established a rating of similarity.

Recommendations

The first recommendation is directed towards teacher educators as they teach and advise preservice students. The findings of this study should be shared and discussed with preservice teachers during appropriate courses, especially during a senior seminar. Teacher educators should strive to expose preservice teachers to a collaborative structure that focuses on mentoring (i.e., peer mentoring) so that they are familiar and comfortable with this relationship before participating in a dyad relationship as a novice teacher. The concept of being an isolated first-year teacher should be dispelled with preservice teachers, especially during student teaching.

As a result of this study, it is recommended that administrators and mentoring program coordinators develop and share best practices of dyad matching with the educational community. There is potential to develop a common set of successful criteria that can be effective in the dyad matching process. Further research should be conducted on the matching process that is utilized in developing formal mentoring programs.

The 1985 Missouri Excellence in Education Act (Missouri Department of Elementary and Secondary Education, 1988) requires a district assigned formal mentor during the induction year of beginning teachers. As a result, this study described the dyad relationship during beginning agriculture teachers' first year of teaching. It is recommended that research regarding the dyad relationship be extended into the second year of teaching. Further, longitudinal studies should be conducted to expand our knowledge pertaining to the professional development of teachers. It is also recommended that additional research should employ qualitative methods to develop a more in-depth understanding of the induction and mentoring of beginning agriculture teachers.

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Providing Psychosocial Assistance for Beginning Agriculture Teachers: The Perceptions of Formal Mentors and Novice Teachers

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This study adds to our understanding about the elements that are necessary for a quality and effective mentor-protégé relationship between dyads of novice and experienced agricultural education teachers. While replicated studies within our field will continue, practitioners may carefully consider integrating the findings of this study in the design, implementation, and evaluation of contemporary induction programs that feature mentoring activities.

The authors provided strong conceptual and theoretical frameworks for the study. An extensive literature base was used to frame the question and inform the design of the study. The procedures section was complete and written in sufficient and full detail. The findings corresponded to the objectives. The conclusions, implications and recommendations were written in a clear and succinct manner and supported by results of the investigation. Recommendations for enhanced practice and additional inquiry were highly applicable and supported by the evidence. This is a well-conceptualized and written paper!

Topics for further consideration:

What elements must be present in a mentoring program to engage and retain highly effective and quality mentors?

What do mentors need to receive from program leaders and/or protégé to keep them satisfied with their investment of time and concern?

What are the characteristics we should look for when selecting mentors for our novice teachers?

I encourage you to continue this line of inquiry and work with others within and outside of Agricultural Education to optimize our understanding of mentor-protégé relationships and activities!

Teacher Efficacy of Novice Teachers in Agricultural Education at the End of the School Year

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Abstract

The purpose of this survey research with a relational component was to describe teacher efficacy at the end of the school year in novice teachers (first- through third-year teachers) in Ohio in agricultural education related to stage of development (years of teaching), summer activities, classroom variables, and their future plans in teaching. A questionnaire was mailed at the end of the school year. Seventy-four percent (N = 73) of the teachers participated in the study.

Novice teachers were similarly efficacious to each other at the end of the school year. Forty-two teacher characteristic variables were correlated with the summed efficacy score. Six were found to have significance. Of those six variables, two – the teachers' agreement with the statement that their student teaching experience was excellent, and the number of class preparations for which the teacher is responsible – explained 34% of the teaching efficacy score.

Novice teachers in agricultural education were efficacious at the end of the school year. It was also found that teachers in the study who had mentors felt that their mentors were competent and supportive, that teachers had generally chosen teaching as a long-term career goal, that their job matched their personal and family needs, and felt confident about teaching in agricultural education.

Introduction

Nationally, a 75% reduction rate from the beginning of undergraduate teacher education through the third year of teaching (National Commission on Teaching and America's Future, 1996) and 17% of new public school teachers leave the professional within the first three years of teaching (National Center for Educational Statistics, 1997). Because of a traditional "sink or swim" mentality, many new teachers leave the profession or have a lower self-efficacy level (National Commission on Teaching and America's Future, 1996). Turnover rates are high in part due to new teachers being assigned the most difficult-to-teach students, given the greatest number of preparations and extracurricular duties, and given the most challenging teaching assignments (National Commission on Teaching and American's Future, 1996).

Novice teachers in agriculture face similar challenges. The first year of teaching is exceptionally challenging for most beginning agriculture teachers (Talbert, Camp, & Heath-Camp, 1994). In multiple studies it was found that beginning agriculture teachers were stressed, dissatisfied (Joerger & Boettcher, 2000), quiet, reserved, and hesitant to act, had low self-esteem, low self-confidence (Mundt, 1991), and low morale (Henderson & Nieto, 1991). In a study by Wardlow, Barrick, and Warmbrod (1985), it was found that one out of every four agricultural education teachers in Ohio left the teaching profession after their first year.

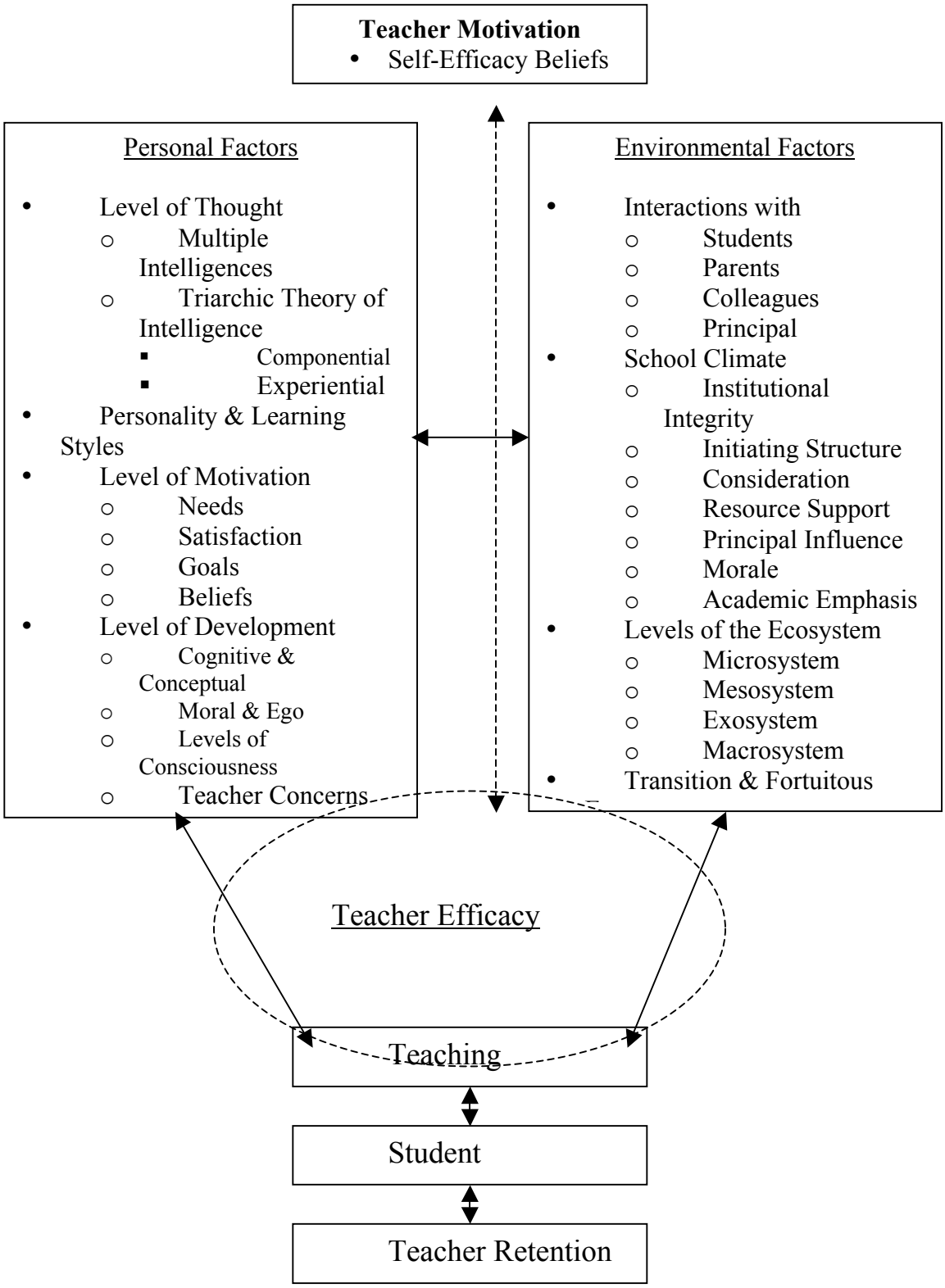

Figure 1: Conceptual Framework (Knobloch, 2002)

According to Henderson and Nieto (1991), the idea of personal achievement and feelings of satisfaction are critical in whether or not beginning teachers remain in or leave the teaching profession. Teachers have greater job satisfaction when they believe they can teach and make positive impacts (Hoy & Miskel, 2001). Evidence supports the idea that teachers who leave teaching have lower teacher efficacy scores than those who remain (Burley, Hall, Villeme, & Brockmeier, 1991; Glickman & Tamashiro, 1982).

The Conceptual Framework

The conceptual framework (Figure 1) of the study was grounded on Bandura's (1986, 1997) social cognitive and self-efficacy theories. When people self-reflect on their own beliefs about their capacity to perform certain tasks in specific situations, this is known as self-efficacy. According to Hoy (2001), self-efficacy is a type of belief that is a concept of teacher motivation.

Teacher efficacy is a type of self-efficacy and is the belief that a teacher has in his or her ability to organize and execute courses of action that are required to successfully accomplish a specific teaching task in a particular context (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). A teacher with high efficacy is a teacher who will persist when faced with setbacks and will exert more effort in order to overcome difficulties (Woolfolk, 2001). The three central components of the conceptual framework—personal factors, environmental factors, and behaviors, all interact in the beginning of the teaching career and affect teacher efficacy (Knobloch, 2001).

This study was focused on the personal factors related to stage of development (years of teaching) and environmental factors relating to interactions with students and colleagues of novice teachers in their first three years of teaching agriculture in Ohio. The development of teachers, and their performance as teachers, influences and is influenced by the interaction of personal and environmental factors of the situations in which they teach (Knobloch, 2001).

Personal Factors

This study focuses on the level of development when studying the influence of personal factors on efficacy in intact groups of first-year teachers, second-year teachers, and third-year teachers. This area relates to developmental theories of cognition, conceptualization, moral development, ego development, consciousness, and concerns (Glickman, Gordon, & Ross-Gordon, 2001).

Environmental Factors

The major area of interest for this study in environmental factors relates to teachers' interactions with different people and the varied roles they play during these interactions. For this study, these factors deal mainly with teacher interactions with students (participation at fair, attendance at camp) and colleagues (attendance at summer conferences).

Summary of Conceptual Framework

The three central components of the conceptual framework—personal factors, environmental factors, and behaviors—all interact during the initial stages of a teaching career. They all

influence each other and can be influenced by the others, but all are mediated by fundamental human capabilities, like self-reflection, through the beliefs, values, culture and experiences (Buriak, McNurlen, & Harper, 1996) of each person. For example, a teacher may have a low sense of efficacy due to transitions in their life (like moving and trying to become familiar with a new community). Facing a class of challenging students and having feelings of isolation or a lack of support could then compound this feeling. This feeling that circumstances are out of his or her control could lead to lower performance, poor student achievement, and a diminished motivation to teach (Bandura, 1997). A teacher with high efficacy, who has interactions that lead to positive outcomes, will be more likely to perform at a higher level of efficacy, have higher student achievement, and more motivation to remain in the teaching profession.

Statement of the Problem

Quality education requires that qualified and able teachers fill classrooms. Not only is it important to hire good teachers, but also to retain them. As illustrated in Figure 2, motivated teachers will have greater teacher efficacy, will be more satisfied with their career in teaching, and will teach for longer periods of time than teachers with lower efficacy (Knobloch, 2002).

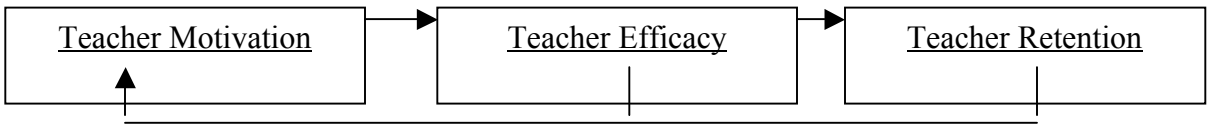

Figure 2: Relationship of teaching constructs (Knobloch, 2002)

Purpose of the Study and Objectives

The purpose of the study was to measure teacher efficacy at the end of the school year of novice teachers agriculture in Ohio related to stage of development (years of teaching experience), gender, and teacher activities. The following research objectives guided the researcher through the study.

1. Describe the difference in teacher efficacy between stages of development of first-year teachers, second-year teachers, and third-year teachers in agricultural education at the end of the school year.
2. Explain the variance in teacher efficacy at the end of the school year related to stage of development, gender, and teacher activities.

Methods and Procedures

The researcher used one independent variable: stage of development—first-year novice teacher, second-year novice teacher, and third-year novice teacher. The dependent variable of the study was teacher efficacy as measured using Tschannen-Moran and Woolfolk Hoy's (2001) Ohio State Teaching Efficacy Scale (OSTES). This instrument uses Bandura's (1997) efficacy scale based on 24 items. Each item was measured using a nine-point Likert-type scale.

The instrument was developed using existing scales that tested content, construct, criterion-related and predictive validity (Tschannen-Moran & Woolfolk Hoy, 2001). Face and content validity in agricultural education were established using a panel of experts in agricultural education. Field and pilot tests were conducted with 42 preservice teachers enrolled in agricultural education during the 2000-2001 academic year to test for internal consistency using Cronbach's (1951) alpha. The reliability of the OSTES instrument has ranged from 0.92 to 0.95 (Tschannen-Moran & Woolfolk Hoy, 2001). The reliability for this study was 0.94.

The target population was novice teachers in agricultural education in Ohio in their first three years of teaching. The Ohio Department of Education Bureau of Career, Technical, and Adult Education's Agricultural Education Service provided the frame for the accessible population. The most current frame was used, although some teachers may not have been included because some new hires were not reported. Teacher characteristics and demographic items were previously collected (Knobloch, 2002).

Data Collection Procedures

Data were collected using Dillman's (2000) tailored design method. On April 22, 2002, the teachers were sent a hand-written pre-notice message on a postcard informing them that they would receive a questionnaire within the next week. On April 29, 2002, a complete packet including the cover letter, instrument, a key chain as an incentive, and a pre-addressed, stamped envelope were mailed to the accessible population of novice teachers in agricultural education. On May 7, 2002, eight days after the first questionnaire mailing, a thank you postcard was sent to all of the participants in the study. The postcard thanked those who had returned their questionnaires and also reminded those who had not yet responded to complete and return their questionnaire. Between May 15 and May 24, non-respondents were contacted by telephone to determine if they had received the questionnaire. On May 27, 2002, a second questionnaire packet and cover letter were mailed to non-respondents.

Non-respondents were compared to the respondent list from Phase I of the study that had been conducted at the beginning of the school year. No differences were found between respondents, later respondents, and non-respondents. Therefore findings can be generalized to the population.

Data Analysis

The data were analyzed using the Statistical Package for the Social Sciences Personal Computer version (SPSS/PC+). Reverse items were recoded and subscales were aggregated into composite scores before analyzing the data. Participants whose responses were incomplete were automatically excluded by SPSS. Population means, population standard deviations, and effect sizes were rounded to the nearest $1/100^{th}$. Descriptive statistics were used to analyze the data because the study was conducted as a census. Effect sizes were calculated using Cohen's d (1988).

A full model multiple linear regression analysis was used to explain the percent variance in teacher efficacy related to teacher characteristics and activities. Relationships were described

using appropriate correlation coefficients. The alpha level was established *a priori* at 0.05. The assumptions of multiple regression were met.

Findings

Results for Objective 1. Teachers ranged from 6.65 to 6.85 on teacher efficacy at the end of the school year (Table 1). The population standard deviations (_) are reported under each population mean (μ) in parentheses. The three stages of development had mean differences of 0.02 to 0.20 (Table 2). The effect sizes on these differences were small and ranged from 0.02 to 0.15 (Cohen, 1988). At the end of the school year, second-year teachers had the highest teacher efficacy (6.85) and the first- and third-year teachers had lower efficacy (6.67 and 6.65 respectively).

Table 1: Descriptive data for teacher efficacy.

	Teacher Efficacy
First-Year Teachers	6.67
(N = 23)	(0.86)
Second-Year Teachers	6.85
(N = 22)	(0.86)
Third-Year Teachers	6.65
(N = 22)	(0.81)

Scale: 1 = Nothing, 3 = Very Little, 5 = Some Influence, 7 = Quite a Bit, 9 = A Great Deal.

Table 2: Descriptive statistics of mean differences of teacher efficacy by stages of development.

Stage of Development (I)	*Stage of Development (J)*	*Mean Difference (I-J)*	*Effect Size*	*Cohen's Index*
First-year teacher	Second-year	.18	.14	Small
(N = 23)	Third-year (N = 22)	.02	.02	Small
Second-year teacher (N = 22)	Third-year	.20	.15	Small

Scale: 1 = Nothing, 3 = Very Little, 5 = Some Influence, 7 = Quite a Bit, 9 = A Great Deal.

Results for Objective 2. Forty-two variables related to stage of development, gender, and teacher activities were correlated to the summed teacher efficacy score for each teacher. Six variables were found to have significant effects on teacher efficacy (Table 3). The alpha level was established *a priori* at 0.05.

Table 4 contains population means, population standard deviations, and the appropriate correlation coefficients of number of students enrolled in agricultural education, number of class preparations for which the teacher is responsible, the perceived excellence of the teacher's student teaching experience, the teacher's agreement with the statement that they do not plan to teach next year, the teacher's agreement with the statement that they plan to teach for at least five years, the teacher's perceived confidence in their ability to teach agricultural education and the mean scores for teacher efficacy.

Table 3: Correlation (_) of variables.

Variable	_
Plan to Teach for at Least Five Years (N = 65)	.435
Excellent Student Teaching Experience (N = 60)	.393
Number of Class Preparations (N = 61)	-.363
Feel Confident about Teaching Ag Ed (N = 65)	.327
Do Not Plan to Teach Next Year (N = 65)	-.270
Number of Students Enrolled in Ag Ed (N = 64)	.269

Using Davis (1971) conventions, one relationship was found to have a very high association, one to be substantial, seven to be moderate, eight to be low, and four to be negligible. The correlation of the number of students in the program with the number of class preparations had a -.10 (r^2 = .01) relationship, which was low. The correlation of the number of students enrolled in the program with the perceived excellence of the student teaching experience had a .33 (r^2 = .11) relationship, which was moderate. The correlation of number of students enrolled with the level of agreement with the statement that the teacher does not plan to teach next year had a -.20 (r^2 = .04) relationship, which was low. The correlation of number of students enrolled in the program with agreement with the statement that they plan to teach for at least five year was .10 (r^2 = .01), which is low. When the number of students enrolled was correlated with teachers' perceived confidence about teaching, the relationship was .04 ($r^2 \leq .00$), which is negligible. When the number of students enrolled was correlated with the teacher efficacy score, the relationship was .27 ($r^2 \leq .07$), which is low.

When the number of class preparations a teacher was responsible for was correlated with the perceived excellence of the student teaching experience, the relationship was -.02 ($r^2 \leq .00$), which is negligible. When the number of class preparations was correlated with teachers' agreement with the statement that they do not plan to teach next year, the relationship was .09 (r^2 = .01), which is negligible. When the number of class preparations was correlated with teachers' agreement with the statement that they plan to teach for at least five years, the relationship was -.24 (r^2 = .06), which is low. When the number of class preparations was correlated with teachers' perceived confidence about teaching, the relationship was -.01 ($r^2 \leq .00$), which is negligible. When the number of class preparations was correlated with the teacher efficacy score, the relationship is -.36 (r^2 = .13) which is moderate.

When the perceived excellence of the student teaching experience was correlated with teachers' agreement with the statement that they do not plan to teach next year, the relationship was -.17 (r^2 = .03), which is low. When the perceived excellence of the student teaching experience was correlated with teachers' agreement with the statement that they plan to teach for at least five years, the relationship was .26 (r^2 = .07), which is low. When the perceived excellence of the

student teaching experience was correlated with teachers' perceived confidence about teaching, the relationship was .46 (r^2 =.21), which is moderate. When the perceived excellence of the student teaching experience was correlated with teacher efficacy score, the relationship was .39 (r^2 = .15) which is moderate.

When the level of agreement with the statement that they do not plan to teach next year was correlated with teachers' agreement with the statement that they plan to teach for at least five years, the relationship was -.72 (r^2 = .52), which is very high. When the level of agreement with the statement that they do not plan to teach next year was correlated with teachers' perceived confidence about teaching, the relationship was -.39 (r^2 =.15), which is moderate. When the level of agreement with the statement that they do not plan to teach next year was correlated with teacher efficacy score, the relationship was -.27 (r^2 = .07) which is low.

When the level of agreement with the statement that they plan to teach for at least five years was correlated with teachers' perceived confidence about teaching, the relationship was .60 (r^2 =.36), which is substantial. When the level of agreement with the statement that they plan to teach for at least five years was correlated with teacher efficacy score, the relationship was .44 (r^2 = .19) which is moderate. When the perceived confidence about teaching in agricultural education was correlated with teacher efficacy score, the relationship was .33 (r^2 = .11) which is moderate.

Table 4: Summary data: Relationships of mean teacher efficacy score and teacher characteristic variables (N = 60).

Variables		*Intercorrelations*							
		X_2	X_3	X_4	X_5	X_6	Y_7	μ	_
(X_1)	Number of Students Enrolled	-.10	.33	-.20	.10	.04	.27	84.70	51.67
(X_2)	Number of Class Preparations		-.02	.09	-.24	-.01	-.36	3.37	1.41
(X_3)	Student Teaching Experience[A]			-.17	.26	.46	.39	5.22	1.25
(X_4)	Do Not Plan to Teach Next Year[A]				-.72	-.39	-.27	1.22	1.22
(X_5)	Plans to Teach for Five Years[A]					.60	.44	5.20	1.20
(X_6)	Confidence about Teaching[A]						.33	5.01	1.16
(Y_7)	Teacher Efficacy[B]							6.71	1.00

Note. [A]Scale: 1 = Strongly Disagree, 2 = Moderately Disagree, 3 = Slightly Disagree, 4 = Slightly Agree, 5 = Moderately Agree, 6 = Strongly Agree;
[B]Scale: 1 = Nothing, 3 = Very Little, 5 = Some Influence, 7 = Quite A Bit, 9 = A Great Deal

The six variables (number of students enrolled in agricultural education, number of class preparations, excellent student teaching experience, plans to teach next year, plans to teach for at least five years, and perceived confidence in teaching agricultural education) were entered into a

linear regression model (Table 5). Two variables were found to have significant effects on the teacher efficacy score. For each additional class preparation for which a teacher was responsible, the summed teacher efficacy score was lowered by 4.16 points. For each unit increase of agreement with the statement that the teacher had an excellent student teaching experience, the summed teaching efficacy score was raised by 4.81 points. The full model explained 41.0% of the variance in teacher efficacy (no adjustment for shrinkage in a census study).

Table 5: Regression of Teacher Efficacy Score on Teacher Characteristic Factors.

Variables	Unstandardized		*Full Model Standardized Beta*	*t*	*p*
	b	*SE*			
Number of Students Enrolled in Ag Ed	.048	.049	.119	.976	.334
Number of Class Preparations	-4.16	1.74	-.280	-2.40	.021
Excellent Student Teaching Experience	4.81	2.28	.291	2.11	.040
Do Not Plan to Teach Next Year	2.40	3.22	.141	.743	.461
Plan to Teach for at Least Five Years	6.32	3.55	.382	1.78	.081
Feel Confident about Teaching Ag Ed	.843	2.738	.049	.308	.759
(Constant)	103.72				

Note. Full Model: $R = .643$; $R^2 = .414$; $R^2_{adj} = .340$; $F = 5.642$; $SE = 16.91$; $p \leq .001$

Conclusions, Discussions, and Implications

First-year teachers, second-year teachers, and third-year teachers are similarly efficacious to each other at the end of the school year. This evidence supports Knobloch's (2002) findings that stage of development did not have a significant impact on teacher efficacy. It is not necessarily experience that effects teacher efficacy, but a variety of factors.

The greatest influences on teacher efficacy were the number of class preparations the teacher was responsible for and the perceived excellence of the student teaching experience. The two factors found to have significant impact on teacher efficacy were the number of class preparations the teacher was responsible for and the perceived excellence of the student teaching experience. While the number of class preparations taught is easily quantified, excellence in student teaching

is not. The definition of an excellent student teaching experience should be studied in more depth.

Novice teachers in agricultural education were efficacious at the end of the school year. This conclusion supported Knobloch's (2002) conclusion, and Rodriquez's (1997) findings that novice teachers in agricultural education were mildly-to-moderately efficacious. This finding did not support Mundt's (1991) finding that beginning agriculture teachers lacked confidence.

For Further Study

Student teaching experiences and teacher efficacy should be studied across fields of study (agricultural education, general education, and special education). The design of these experiences, their length, how cooperating teachers are chosen, and the responsibilities of student teachers should all be investigated. Also, those 40 variables not found to have significant effects should be researched, because each variable was only one item on the questionnaire and many are hard to quantify. For instance, 61% of teachers stated that they had a mentor, but no item was asked as to how much they interacted with their mentor.

This study should be replicated and the longitudinal study should continue with this novice teacher group. Also, the study should be expanded to other novice teacher groups and should be replicated outside of agricultural education.

A comparative study of the novice teacher efficacy scores from this novice group of teachers to those teachers under the new licensure program, thus new undergraduate curriculum, would add to the body of knowledge.

Summary

Overall, this study found that novice teachers in agricultural education in a Midwestern state were generally efficacious at the end of the school year and that there was no difference between efficacy levels of first-, second-, or third-year novice teachers. The number of class preparations a teacher is responsible for significantly lowered the teacher efficacy score, and the perceived excellence of the student teaching experience raised the efficacy score.

More studies should be conducted so that the generalizability of this data can be improved. Also, the variables that effect teacher efficacy should be further investigated. Specifically, the perceived excellence of the student teaching experience, must be further explained.

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Teacher Efficacy of Novice Teachers in Agricultural Education at the End of the School Year

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Whittington, McConnell and Knobloch are commended for conducting on-going research that is expanding the body of literature relating to the factors that affect the self-efficacy of secondary and/or middle school teachers of Agricultural Education. The findings and conclusions of this and earlier studies may be important for teacher educators when revising preservice curricula, instructional activities and practices for preservice teachers. Findings of this study may also suggest cooperating teachers, students, university supervisors, and others associated with the student teaching experience must consider the impact of all events, activities, and performances that result in quality student teaching experiences. Administrators and others responsible for assigning teaching loads to novice teachers may be able to use this data to justify reduced teaching loads the initial year while the beginning teachers become acclimated to their teaching roles. In addition, individuals who are responsible for the continuing and professional development efforts of novice, professional, and expert educators must consider the influence of variables investigated in this study upon teacher self-efficacy, satisfaction, and retention.

While not disclosed in much detail, the authors suggest the study focused on the level of development of self-efficacy when studying personal and environmental factors, all which were assessed using the OSTES. Disclosure of the items from the conceptual framework that were used and then entered into each currently untitled subscale (discussed in data analysis section) would provide greater clarity to the reader and strength to the findings. Likewise, reliability coefficients for each subscale are warranted for this instrument of 42 items.

The findings and conclusions are clear for objective one though no mention is made of the implications or recommendations for practice. The authors suggested they desired to find and reveal the influence of gender in addition to the stage of development and teacher activities upon teacher self-efficacy in the second objective. Disclose your findings in all cases. Likewise, provide the information not only for the 42 variables, but also for the subscales discussed in the data analysis section. I believe it is also advisable to include your implications and/or recommendations for practice and additional inquiry for the two variables which were found to have significant effects on the teacher self-efficacy score.

Again, thank you for sharing your work and causing us to think about a topic that is becoming a more common topic of discussion in our profession! A final thought to consider given the methods, strategies, and findings from this and earlier studies. Please talk about the factors of the conceptual framework that you know or hypothesize to contribute to the self-efficacy, achievement levels, career satisfaction, and attrition rates of fully inducted teachers. What are the implications for teacher education? Other than years of teaching experience, what could be ways of differentiating stages of development?

A State Mandated Induction Program: Mentorship Experiences for First Year Agricultural Education Teachers

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Abstract

The primary purpose of this study was to determine perceptions of mentoring within a state-mandated first year teaching program of first year agricultural education teachers and their assigned resident committee members. The following objectives were formulated to accomplish this purpose: 1) Describe the personal characteristics of first year teachers and committee members appointed within the program; 2) Determine the perceptions of residency committee members concerning mentoring the first year agricultural education teacher; 3) Describe the mentor relationships that exist between the first year agricultural education teacher and his/her committee members; 4) Compare perceptions among committee members of the program; and, 5) Determine if the participants in the program favor its continuance.

The data collection instrument was a researcher-designed survey composed of two parts. The first part provided demographic information regarding the participants of the resident teacher program. The second part of the instrument was designed to identify perceptions of mentoring within the resident teacher program of first year agricultural teachers and their committee members.

The results indicated that the residency committee members believed they did provide mentoring to the first year teachers in agricultural education. First year agricultural education teachers perceived the mentor teacher to be the committee member who provided the most assistance during their first year of teaching. To the contrary, mentor teachers believed they did not assist these teachers with agricultural education issues or technical agriculture areas. Committee members and the first year teachers felt the first year teacher asked for assistance from each committee member 1-5 times during the new teacher's first year. Mentor teachers, administrators, higher education representatives, and first year agricultural education teachers favored the continuance of the state-mandated program; however, some improvements could be made to strengthen the mentoring component of the program.

It was recommended that efforts be made to better involve teacher educators as higher education representatives, and expand the residency committee to include an agricultural education mentor teacher and program specialist with the department of education. Members serving on committees should make a special effort to develop rapport with these first year teachers beyond the mandatory meetings and scheduled observations. Informal mentoring by all professionals must continue to meet the needs of first year teachers of agriculture.

Introduction

The process of becoming socialized into teaching is one of the most difficult stages in the professional development of teachers. Indeed, experiences during the first year are often pivotal in the eventual success or failure of the beginning teacher. Beginning teachers are usually expected to assume all responsibilities of teaching as if they were veteran teachers (Wildman, Magliaro, Niles & Niles, 1992). Unlike most other professions, where the job becomes more challenging over time, in teaching the most challenging situations are given to the new teacher (Glickman, 1990). The transition from student to first year teacher is traumatic for many. It is no wonder that "beginning teachers frequently report stress, anxiety, and feelings of inadequacy" (Joyce & Clift, 1984, p. 6). Fifteen percent of all new teachers never recover from this initial experience and leave the profession after the first year (Hulling-Austin, 1992). More than 50 percent of all beginning teachers leave the profession within the first five years (Olson & Rodman, 1988).

According to Wildman & Niles (1987), it has been long recognized that beginning teachers need support to help them through the first year. Recently, other researchers reinforced this concept of survival for new teachers and offered assistance in this area (DePaul, 2000; Nichols & Mudnt, 1996; Stedman & Stroot, 1998). Induction is the broad process by which beginning teachers are socialized into the profession. Camp and Heath (1988) identified the induction process as a transitional period when beginning teachers move from the role of students to experienced teachers. This assistance ranges from informal friendships to very formal and structured programs. It is during this time through assistance, beginning teachers develop competence in knowledge, skills, and values. This assistance ranges from informal friendships to very formal and structured programs. Yee (1990) found teachers with positive early first year experiences, reasonable assignments in terms of course loads and subjects, and adequate feedback and personal support from colleagues and supervisors are more likely to become competent and skillful teachers who remain in the profession.

First year agricultural education teachers especially need a positive induction process as these teachers have additional responsibilities. Agricultural education teachers are not only responsible for the activities of a normal subject teacher, but also they are responsible for an entire agricultural education program. Debertin and Priebe (1984) and Grady (1985) found experienced agriculture teachers have higher levels of morale or job satisfaction when compared with beginning agricultural education teachers. Specifically, when compared to national morale norms for junior and senior high faculties, beginning agricultural education teachers rank consistently below the 50th percentile (Flowers & Pepple, 1988).

In the early 1980s, programs were developed to serve as a vehicle for connecting theory and practice for beginning teachers. Since inception, resident teacher programs have created "new ways for colleges and school systems to work together around instructional reform, creating greater common ground, and leveraging improvements in both settings" (National Commission on Teaching and America's Future, 1996, p. 80). One aspect of the induction process is the development of formal or informal mentoring relationships. In fact, one of the recommendations in <u>What matters most: Teaching for America's future</u> (1996) was to "create and fund mentoring programs for beginning teachers" (p. vii). Kram (1985) stated that when a

relationship provides both career and psychosocial functions "it best approximates the prototype of a mentor relationship" (p. 42).

In 1980, a state mandated induction program was implemented for all first year teachers in Oklahoma. The stated intent of the legislation that created the program was "to establish qualifications of teachers in the common schools of this state through licensing and certification requirements" (HB 1706, Section 4). Few changes have occurred with this induction program during its history.

In almost every state in America, induction programs are established to provide mentoring to beginning agricultural education teachers. Is this state mandated program, the Oklahoma Resident Teacher Program, providing a mentorship experience for the professional development of agricultural education teachers?

Purpose and Objectives

The primary purpose of this study was to determine perceptions of mentoring within a state mandated first year teaching induction program of first year agricultural education teachers and their assigned resident committee members. The following objectives were formulated to accomplish this purpose:

1. Describe the personal characteristics of first year agricultural education teachers and their committee members assigned to the residency committee.

2. Determine the perceptions of residency committee members concerning mentoring the first year agricultural education teacher.

3. Describe the mentor relationships that exist between the first year teacher and his/her committee members.

4. Compare perceptions among committee members of the residency program.

5. Determine if the participants in the residency program favor its continuance.

Procedures

The population for this study consisted of residency committees for first year agricultural education teachers in Oklahoma during the 1999-2000 and 2000-2001 academic school years (N=37 committees). This state-mandated program for first year agricultural education teachers, and enforced by the Oklahoma state department of education, was used as the population frame. Descriptive in design, data were collected from a census of the population.

A telephone questionnaire was used as the data collection instrument. The instrument was modified from studies by Barbee (1985) and Barrera (1991) and contained two parts. Part I

was designed to gather selected demographic data of first year agricultural education teachers and their committee members. Part II was designed to gather respondents' perceptions of mentoring between the first year teacher and the committee members. Items used throughout the instrument were closed-ended questions, with participants ranking those items from greatest to least. One open-ended question was in place to gather respondent's description of mentoring within the residency committee and current program.

As suggested by Tuckman (1978), to ensure validity and reliability of the instrument, a panel of experts was used. The selection of the panel of experts was based on knowledge of agriculture, agricultural education, and research methods. The instrument was pilot tested with agricultural education teachers who went through the induction year program during the 1998-1999 academic year along with the persons who served on their residency committees. Members of the pilot group completed the telephone questionnaire, answered questions related to the clarity of the instrument, and made other suggestions. No major changes were made to the instrument as a result of this process.

The researcher administered the instruments to all participants. First year teachers and committee members were contacted by telephone to explain the purpose of the study and describe the process of completing the instrument in addition to scheduling an interview appointment. This preliminary call allowed participants time to gather their thoughts regarding their mentoring experience in the resident teacher program and to ensure a more accurate response.

A total of 97.3% (N=144) of the population completed the questionnaire. All responses were usable for data analysis. Data were analyzed using SPSS for Windows and Microsoft Excel. Descriptive statistics were used for all variables. Chi-square was also computed for comparative data between the studies. No analysis for non-respondents could be made, as four administrators could not be located. Therefore, as non-respondents they also could not be located.

Findings

Personal Characteristics of Respondents

Nearly 90% of the first year agricultural education teachers, administrators, and higher education representatives were male. As shown in Table 1, most committee members serving as mentors had more than 15 years of experience in education. Few administrators and mentor teachers had an agricultural education background; however, 37.8% of the mentor teachers possessed a vocational certification. Most administrators serving on the residency committees were high school principals (84.8%) and almost 88% held certification in an academic subject matter.

Table 1
Participant Profile of the Residency Program

	Resident Teacher (n=37)	Mentor Teacher (n=33)	Administrator (n=37)	Higher Education Representative (n=37)
Gender	Male (89.2%)	Male (70.3%)	Male (89.2%)	Male (89.2%)
Educational Level	Bachelors (97.3%)	Bachelors (67.6%)	Masters + 15 (54.5%)	Doctorate (89.2%)
Certification Area	Agricultural Education (100%)	Secondary Vocational (37.8%)	Secondary Academic (87.9%)	Agricultural Education (94.6%)
Total Years in Education	0-5 (100%)	Over 15 (73.0%)	Over 15 (87.9%)	Over 15 (87.9%)
Total Years Teaching	0-5 (100%)	Over15 (73.0%)	Over 15 (42.4%)	0-5 (87.9%)
Years in Higher Education	--	--	--	11-15 (43.2%)
Years in Administration	--	--	6-10 (33.3%)	--
Type of Administrative Experience	--	--	High School Principal (84.8%)	--

Committee Members' Perceptions of Mentoring

Committee members and first year agricultural education teachers perceived mentoring did occur through the state mandated residency program. As illustrated in Figure 1, first year agricultural education teachers perceived the greatest assistance came from their mentor teacher (49.0%). However, mentor teachers perceived they did not provide technical or agricultural education assistance to the first year teacher.

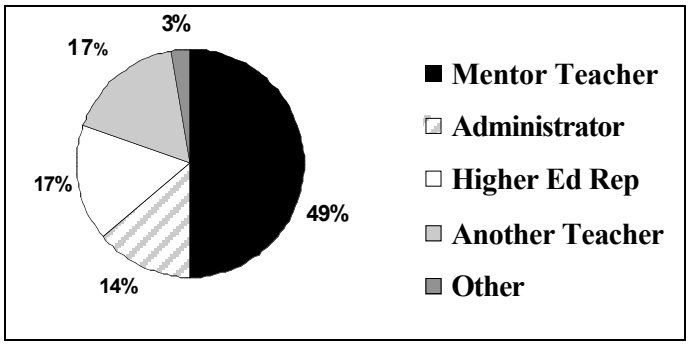

Figure 1. Comparison of individuals providing mentoring as perceived by first year agricultural education teachers.

Both first year agricultural teachers and the committee members perceived the first year teacher asked for assistance 1-5 times throughout the academic school year. Figure 2 shows that first year teachers (78.4%) believed the mentor teachers spent the required amount of time serving as their mentors.

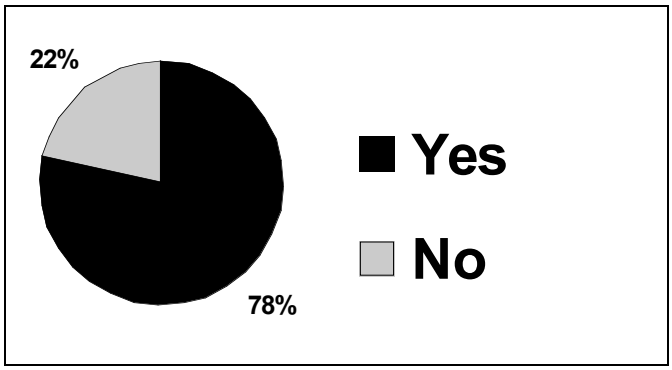

Figure 2. An analysis of required time spent by the mentor teacher as perceived by first year agricultural education teachers.

Mentor Relationships Described

Information was solicited about the relationship of committee members to the first year agricultural education teachers through open-ended questions. As displayed in Figure 3, both positive and negative themes were identified. In many instances the higher education representative and the mentor teacher were identified as having provided great assistance and mentoring, especially when the higher education representative was an active part of the pre-service teacher education program. In this instance, the teacher educator serving as a higher education representative had a feel for the program's mission, goals and community needs. However, each group also identified areas where the mentoring offered through the higher education representative committee member could have been improved.

Mentor teachers identified that the success of mentoring within each committee was dependent on the committee members. The administrators added that the personality of the first year agricultural education teacher was also important for effective mentoring to occur. For example, the first year teachers' ability to listen to feedback and take constructive criticism and adopt and implement changes in their teaching style and program is vital. If a first year teacher's personality is one that he or she will not listen to the mentor assigned, the program will not be effective.

First Year Agricultural Education Teacher Comments

Positive Comments	Areas for Improvement
Mentor teacher provided assistance	Mentor teacher – no assistance
Higher Ed Rep was of assistance	No understanding of ag education program
Administrator provided assistance	Program is Evaluation instead of Mentoring
	Just a process to go through-no meaning

Mentor Teacher Comments

Positive Comments	Areas for Improvement
Success depends on people in committee	Higher Ed Rep – no tie to community
Program is needed for new teachers	No technical ag or ag education assistance
Teaching areas are similar - "vocational"	Time to provide assistance was difficult

Administrator Comments

Positive Comments	Areas for Improvement
Program effectiveness relies on personality	Mentor teacher is not aware of technical ag
Other committee members did a good job	More involvement with Mentor Teachers

Higher Education Representative Comments

Positive Comments	Areas for Improvement
Higher Education Rep. provides support	Often a rush to get process finished
	Uneven assistance given - Higher Ed Rep.
	Improvements need to be made in system

Figure 3. Themes from open-ended questions describing the relationships formed through residency committee.

Respondents' View of Continuing the Residency Program

Fifty-eight percent of the respondents stated they would strongly favor the continuance of the residency program. In fact, the most frequent response for each type of committee member was "strongly favor." However, 20 (13.8%) of the respondents were either uncertain or opposed to continuing the program. First year agricultural education teachers were unsure of the effectiveness of the mentoring component within the program, as eight (21.6%) were either uncertain or opposed to its continuance. Twenty (50%) of the committee members having a negative view were higher education representatives, with 8.1% of the higher education representatives strongly opposed to the continuance of the program.

Conclusions

The following conclusions were formulated based on the results of this study.

1. Committee members in the residency program typically have 15 or more years of experience in the educational system.

2. Few administrators and mentor teachers assigned to the residency committee have a technical agriculture or agricultural education background.

3. First year agricultural education teachers perceive they receive mentoring from their residency committee.

4. First year agricultural education teachers rarely ask their committee members for assistance in their first year of teaching.

5. The mentor teacher provides the greatest assistance to the first year agricultural education teacher, however mentor teachers believe they do <u>not</u> assist first year agricultural education teachers in technical or agricultural education areas.

6. First year agricultural education teachers and their mentors appointed through the induction program believe the function of the residency program is related more to evaluation than mentoring.

7. Most higher education representatives are familiar with the first year teacher, agricultural education, and the agricultural education programs in this state; however within some committees this did not occur.

8. The residency program helps to create a feeling of security for the first year agricultural education teacher.

9. The residency program in this state should continue because some mentoring of the first year teacher does occur by his/her committee members.

Recommendations

1. Because few members of residency committees have experience in technical agriculture, committees for first year agricultural education teachers should be expanded to include a mentor agricultural education teacher and an agricultural education program specialist from the state department of career and technical education.

2. Collaboration between the state department of education and the university teacher education program should occur to improve the current resident teacher program or develop a new mentoring program specific to first year agricultural education teachers.

3. One of the main functions higher education representatives bring to the induction year teacher committee is their familiarity to the resident teacher and the teacher preparation program where the teacher recently graduated. Thus, higher education representatives appointed should be only those teacher educators who play an active role in the pre-service program.

4. Very few first year agricultural education teachers seek assistance from their committee members, therefore committee members should make a special effort to develop rapport with these first year teachers beyond the mandatory meetings and scheduled observations.

5. Induction year committee members come from diverse backgrounds and great experience as educators. However, results of this study indicate that first year agricultural education teachers rarely seek assistance from them. These new teachers must ask their committee members for assistance when needed, beyond the scheduled committee meetings.

6. Program specialists, teacher educators, and other experienced agricultural education teachers should continue to informally mentor first year agricultural education teachers.

Recommendations for Further Research

1. The mentorship experience of beginning agricultural education teachers must be further assessed. This could include analysis of teachers in their first 5 years.

2. A longitudinal study should be conducted to measure these participants' perceptions of the residency program throughout their career.

3. Further investigation should be placed on experienced agricultural education teachers regarding their views of serving as mentors for beginning agricultural education teachers.

4. Further research needs to be conducted to learn why first year agricultural education teachers do not seek mentoring assistance from their assigned mentors.

Discussion/Implications

Induction programs, such as the one in Oklahoma, are not a new phenomenon. The concept of induction in regard to teachers is decades old, while popularization of the term is fairly new. More formalized induction programs were established in the early 1980's and still are in place. However, today numerous first year agricultural education teachers still encounter many of the same issues. Still, the profession still battles the attrition issue. It is our responsibility as agricultural educators to continually re-evaluate what is current practice and make adjustments to the hopes to improve the quality of the first year teachers' experience and the education of those students in their classrooms.

As classroom teachers become more accountable for student learning, teacher educators, program specialists in state departments of education, administrators, and other teachers within the agricultural education profession must also become more accountable. Through mentorship within and outside of established induction programs, new agricultural education teachers will become more prepared to meet the challenges in the classroom and the demand for accountability with student learning.

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A State Mandated Induction Program: Mentorship Experiences for First Year Agricultural Education Teachers

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What is mentoring? Why be mentored or mentor another educator? Does mentoring happen just because people are assigned to mentors? Is it really needed? Can people successfully navigate throughout their first years as they become fully or partially socialized to the teaching profession within an institution? These are important questions that have been partially answered by investigators and theoreticians from and outside of agricultural education. Findings of earlier investigations and this study are important for individuals responsible for creating, implementing and evaluating effective programs.

The authors are commended for identifying a need for investigation that may have implications for a number of stakeholders including state department of education staff, beginning teachers, teacher educators, and legislators. The profession futher commends you for furthering efforts to develop research skills that are necessary for developing professionals who produce quality scholarship for the profession.

Ideas for enhancing your final paper are provided for your thoughtful consideration. Recall that a strong theoretical and conceptual framework based upon recent references and seminal works provide the foundation for a substantive purpose and related objectives. More will be stated about that later in the comments. Informed by clear objectives, the corresponding methods of conducting the research result in fully-developed descriptions that allow a complete understanding of how the investigation was completed. It is critical to disclose the details relating to each measure or set of measures. Inform the reader of the processes used to create a valid and reliable instrument.

As noted, this paper can be further strengthened by having a well-developed conceptual framework that is supported by related theory and research. *There is an extensive body of literature about mentoring* outside of agricultural education that is very useful for framing the questions of interest to the authors. Expand in greater detail upon the theories and literature relating to each objective of the study. In addition, disclosure of the requirements of the original legislative documents that mandated the Oklahoma Resident Teacher Program (ORTP) would be useful. Pattern the report after exemplars identified in earlier NAERC proceedings and/or issues of the Journal of Agricultural Education, Journal of Vocational Education Research, and/or the Journal of Career and Technical Education.

Use your conclusions for each objective to support or refute the outcomes of other studies. Likewise, propose recommendations for practice and research that do not extend beyond the objectives of the study. Given what you learned from this study, discuss what additional questions come to mind about mentoring and the ORTP? Upon what basis would you argue for is continuance? Discontinuance?

Transfer of Training by Texas State 4-H Council Members

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Abstract

This study examined the demonstration of leadership life skills by former Texas State 4-H Council members. The researchers used a purposive sampling technique to identify former members of the State 4-H Council with a snowball sampling technique to identify the remainder of the sample. There were fifteen individuals interviewed. The qualitative research methods used in this study included interviews, participant observation, and document analysis. The researchers used documented methods of dependability, transferability, confirmability, and credibility to establish trustworthiness. The major finding of the study was that Texas State 4-H Council members demonstrated a command of the seven leadership life skill categories. Recommendations include conducting a needs assessment of all incoming Texas State 4-H Council members, developing a training method that is more experiential in nature, implementing extensive training in personality types and how to positively work with different types, employing new ways of improving communication between members, members and advisors, and members and their external environment, and continuing to reward council members for using the skills they gain while on council.

Introduction/Theoretical Framework

The Texas State 4-H Council is a body of young people elected to fill the highest positions young people can attain in the 4-H organization in the state. Approximately 34 members sit on the State Council. Being a State 4-H Council member is often seen as the pinnacle of a young person's 4-H career. Council members plan retreats, conferences, and camps for the 4-H members that they represent. They are the most visible of all 4-H members, being responsible for industry contacts and public appearances representing the state organization. Young people covet Texas State 4-H Council positions. Individuals that fill State 4-H Council positions receive opportunities that are not available to other 4-H members, such as travel, networking and training.

Many experiences are included in the preparation for and the year of travel, speeches, workshops, and conferences that make up a Texas State 4-H Council position. These young people take a journey as they prepare for and take on their council year. Cooperative Extension states that the 4-H program develops leadership and life skills among its members (National 4-H Council, 2003). Seevers and Dormody (1995) found that "holding an office" is one of the capstone leadership development experiences.

According to Donovan, Hannigan, and Crowe (2001), if a training program is to be successful, a trainer must implement three steps. First, the identification of needs is necessary so that trainers are aware of what training is required. Second, an analysis of the organization's ability to identify the issues at the heart of the training as well as issues that will affect the ability of the organization to exploit new skills learned in the training is needed to trouble shoot problems before they arise. Third is an evaluation of the training. This evaluation ensures that trainers apply sufficient resources to implement and to integrate the training program.

Axtell, Maitlis, and Yearta (1997) discuss essential elements in the evaluation of training in terms of trainee transfer. These elements can be classified into the following categories: relevance or usefulness of the training to the students' job or task, the principles of learning used, characteristics of the learner (self-efficacy, motivation, job involvement, ability), and managerial support (control or autonomy available on the job, climate).

Training can obviously provide a variety of benefits for both the organization and for the participants. The parent organization providing the training benefits through improved employee performance and increased productivity. Trainees benefit through both extrinsic and intrinsic rewards associated with new skill development and improved performance. Elangovan and Karakowsky (1999) defined transfer of training as the generalization of the skills acquired during the training phase to the work environment and the maintenance of these acquired skills over time. Further, they defined the positive transfer of training as the extent to which trainees apply the knowledge, skills, and attitudes gained in the training context to the job. They also identified key trainee and environmental factors that influence the effectiveness of the transfer of training.

Elangovan and Karakowsky's (1999) model divides trainee factors that affect the transfer of skills into two categories: motivation and ability. Noe (1986) defined motivation to transfer skills as the trainees' desire to use the knowledge and skills mastered in the training and development program on the job. This is further divided into five critical elements:

- *Perceived relevance of training* - Does the trainee believe that the training is relevant or important? The more important the training is perceived, the greater the chance that skills will be transferred.
- *Choice in attending training* - Do the trainees have the choice to attend the training? Those offered the choice to attend programs may develop greater appreciation for the information, thus motivation to learn would increase, thereby improving the chances that the trainees transfer the training.
- *Outcome expectancies* - Do the trainees believe that if they learn and use the new skills that it will produce the expected outcomes (better performances, etc.)? The clearer that this link between training and outcomes seems to the trainee, the greater the motivation they will have to transfer the training.
- *Self-efficacy* - Does the trainee believe that they can accomplish the goals of the training? Numerous studies have shown that by enhancing a trainee's self-efficacy, the trainer also increases the odds for a positive transfer of the training.
- *Job involvement* - The degree to which a trainee is involved in their job will affect the transfer of the training.

Noe's (1986) other category of motivation factors, ability related factors, affect the ability of the trainee to transfer training. Those factors can be broken into two main elements:

- *Knowledge acquisition* - Employees who learn and retain the skills and knowledge offered by the training program are better prepared and able to transfer the training than those whose knowledge is low.

- *Situation identification* - The generalizability and application of the training to an actual job is a major player in the transfer; therefore, requiring that a trainee identify or recognize situations where the new skills are relevant and useful.

Environmental factors refer to various aspects in the employees' work environment, which either facilitates or impedes effective transfer of training. Elangovan and Karakowsky (1999) advocate two categories of environmental factors to transference of skills: job related and organization related factors.

Job related factors are those that pertain to a specific job and its setting. Those vary from situation to situation; however, major elements are as follows:

- *Job requirements* - The job demands or requirements play a major role in determining the effectiveness of the transfer of training. Someone who has undergone training will transfer skills only if the opportunity arises where it is appropriate to do so, and the trainee then recognizes that situation.
- *Norms and group pressure* - Conformance to standards and pressure will affect the transfer of skills. Even a trainee who has acquired the skills necessary from training may not transfer the training if pressure from his or her group does not allow it.

Organizational factors in contrast to the more specific job related factors, apply to the whole organization, and are broken down into two elements:

- *Reward systems*- If the application of newly acquired skills is noticed and recognized, the trainees will be more inclined to transfer knowledge than if the transfer of skills is overlooked.
- *Organizational cult*ure- An organizational culture that fosters employee development, favors improvement/progress, and encourages employee initiatives will have a positive impact on the transfer of new skills. However, if the organizational culture is such that development, progress, and initiative are not norms, that will reduce the possibility of transfer of skills.

Purpose/Objectives

Research tells us that youth learn leadership life skills as members of the 4-H program. However, little is known about what happens to those skills once youth leave the 4-H program and begin the next stages of their lives. The purpose of this study was to investigate, using the factors advocated by Elangovan and Karakowsky (1999) and Noe (1986), whether the environment of the Texas State 4-H Council fosters the transfer of training and skills members learned while on council and to describe how members of the State 4-H Council transferred the skills that they learned to experiences once their terms were complete.

Methods/Procedures

Qualitative research is as much a point of view as it is a set of methods. Knowledge is socially constructed and builds the foundation for qualitative research. The qualitative framework also embraces the notion that participants, both interviewer and interviewee, influence and are influenced by data collection and analysis. Credible qualitative inquiry depends on creating categories of meaning firmly based in the social realities of study participants.

Purposive sampling is central to naturalistic inquiry. Erlandson, Harris, Skipper, and Allen (1993) say that random or representative sampling is not preferred when doing naturalistic inquiry because the researcher's major concern is not to generalize the findings of the study to a broad population or universe, but to maximize discovery of the heterogeneous patterns and

problems that occur in the particular context under study. Purposive sampling increases the range of data exposed and maximizes the researcher's ability to identify emerging themes that take adequate account of contextual conditions and cultural norms. The researcher used purposive sampling, a technique that intentionally seeks out participants/data sources because of certain qualities, to find participants who were willing to discuss their experiences as Texas State 4-H Council members. The names of participants for this study were from personal knowledge; those students in the classes taught by the researcher who identified themselves as former council members. A snowball sampling method was then used whereby the knowledge of the first group was used to find the second group (Babbie, 2001).

Within naturalistic inquiry, there is no concrete rule for sample size. The key is to look more for quality than quantity, more for information richness than information volume (Erlandson, et al., 1993). Patton (1990) says that sampling size adequacy is subject to peer review, validation and judgment. The sampling procedures and decisions need to be described, explained and justified such that they can be reviewed and judged appropriately. This study focused on 15 individuals who had participated in the Texas State 4-H Council program from 1988-89 through 2001-2002.

The researcher used several qualitative methods to gather data. Those methods included interviews, participant observation, and document analysis. Dexter (1970) describes interviews as conversations with a purpose. Lincoln and Guba (1985) say that interviews allow researchers and respondents to move back and forth in time; to reconstruct the past, interpret the present, and predict the future. Interviews also help the researcher to understand and put into a larger context the interpersonal, social, and cultural aspects of the environment (Erlandson, et al., 1993). Semi-structured and unstructured interviews were scheduled and conducted. Participation in these interviews was voluntary. All interviews were coded to retain confidentiality. The codes for this project include the type of data collection method used (I for interview), gender of interviewee (F or M), and the type of geographic area in which they were raised (R for rural, >50K for town over 50,000 people, and <50K for town under 50,000 people).

Participant observation offers a researcher the rare opportunity to observe the participants in their element, on their "turf." It gives any researcher the opportunity to see, first hand, the reality of what their subjects experience everyday. In this study, the researchers observed the participants throughout the interview process. According to Lincoln and Guba (1985), documents also provide a stability of information, contextual relevance, richness of information, natural language of the setting, and are non reactive. The researchers also used handbooks, training manuals, and other similar materials for informational purposes, and to grasp the time and place within which the officers work.

Data analysis followed the traditional methods described by Lincoln and Guba in *Naturalistic Inquiry* (1985). These methods allowed the researchers the opportunity to analyze data throughout the entire research process, not just at the conclusion. More importantly, using these methods brought the researchers nearer to an understanding of the subjects involved in the research and of the research itself. This method allowed for constant improvement and validation. Lincoln and Guba (1985) adopted the Glaser and Strauss (1967) constant comparative method for use in naturalistic inquiry. Lincoln and Guba believe that by using this method, the researcher is able to develop a construct of the reality in which they are studying. The researchers' use of this method followed that adaptation and is outlined below:

- Unitization of Data - Interview transcripts were "unitized" and printed onto 4" x 6" index cards. The researcher coded all index cards to correspond with the appropriate interview code for audit purposes.

- Categorization of Units - During this stage, the researcher sorted the data cards into categories or themes using the Glaser and Strauss (1967) constant comparative method. Eventually, categories or themes emerged from constant contact with the data.

- Merging Categories - Here, the researcher reduced the remaining categories into the salient themes that became the final construct. Some of the categories were discarded completely or dissolved into other remaining categories during this phase.

- Journaling - This process occurred throughout the research as the researcher kept a methodological journal, chronicling the decisions and situations with the research process itself. The researcher kept a second, reflexive journal as well.

Lincoln and Guba (1985) propose that a significant study report should include "thick description" of the context and process observed, discussions of saliencies identified at the site, outcomes or lessons learned, and a thorough description of the final, research methods as they unfolded. This description includes a discussion of the validity or trustworthiness criteria (credibility, transferability, dependability, and confirmability). In this study, the researchers established credibility through persistent observation, triangulation, peer debriefing, member checking, and reflexive journaling. The researchers used thick description in the reporting of respondent's thoughts and ideas relative to the research questions and purposive sampling to establish transferability. In this study, the researchers used a dependability audit and journaling to establish dependability. Methods to establish confirmability included the confirmability audit and reflexive journal. Establishing trustworthiness enables the researchers to claim methodological soundness.

Results/Findings

Using the training transfer elements of Elangovan and Karakowsky and Noe, these researchers were able to identify areas where transfer of training is strong and where improvement is necessary to ensure greater transfer of training for the members of the State 4-H Council.

What happens to the leadership skills that youth attain during their term as an officer, after that term is over? Do Texas State 4-H Council members transfer those skills to other areas?

Transfer of training is the generalization of the skills acquired during the training phase to the work environment and the maintenance of those skills over time. Further, it is the extent to which trainees apply the knowledge, skills, and attitudes gained in the training to the context of the job (Elangovan & Karakowsky, 1999). For transfer of training and skills to occur, several elements must be present. One can classify these elements into categories of the relevance and usefulness of training to the job or task, the principles of learning used, characteristics of the learner (i.e. motivation and ability), and managerial support (Elangovan & Karakowsky, 1999).

Perceived relevance of training occurs if the trainee believes that the training is relevant or important to them. The more important the trainees perceive the training to be, the greater the chance that they will transfer the skills. The council members interviewed had differing perceptions of the relevance of their training. Some of the council members perceived that the training they received as state officers was very relevant (I1, I2, I5, I9, I11, I13, I14). "I definitely saw the relevance in the training. I saw how she {a former state president} acted, and then I experienced the training and I saw how it all fit together" (I2.F.R.2). "Everything about council was so new to me. I really didn't realize what was ahead of me. I think that it {training} was all relevant. I probably just didn't realize it. And like I said it wasn't in depth training, it was more the crash course" (I11.F.R.1). "Everything they told us, you could tell we'd use it at some point. There was nothing that didn't come in handy at some point" (I13.M.R.2). Others did not

see the relevance in their training, and instead felt time would have been better spent on other activities (I3, I4, I6, I7, I10, I15). “Looking back I think we need less of the kind of stuff that they gave us- like public speaking and that kind of stuff and more just together times. We didn’t ever really get the chance to know each other” (I3.F.R.2). “I just don’t think that having us prepare the memento ‘schpeel’ was enough and that certainly isn’t public speaking” (I4.F.>50K.3). “Honestly, I felt like I’d been trained off my ass. You’ve been put through the ringer by that point. And so we don’t really have training” (I7.M.<50K.2).

Choice in attending the training is a second element in a trainee deciding to transfer the skills. In the case of the State 4-H Council, there is a consensus that there is only one major training session, the training at the State 4-H Council workshop in {training location}. There is a unanimous sentiment among the individuals interviewed that the training sessions at {training location} are mandatory events. In fact, if an individual cannot attend this training in its entirety, it is the belief that the individual will have to forfeit their spot on the council (I1-I15).

Outcome expectancies, or the trainees’ belief that if they learn and use the new skills, it will produce the expected or intended outcome, is the third element of positive transfer of training. Several council members talked about their ability to see how the training materials and skills taught would be useful in their “real life settings” as they went out to do their jobs (I1, I2, I5, I9, I11, I13, I14). “I definitely felt like I would use it {the training materials}. I mean you’re always going to have to know the stuff that we learned there” (I1.F.R.2). Other council members talked about the applicability of their training to the activities they participated in throughout their council years. One council member discussed using the materials in workshops and camps that they helped put on in their home county and neighboring counties (I5).

Self-efficacy, or an individual’s belief that they can accomplish the goals of the training, is the next element of training transfer. Even though some of the council members did not see the relevance in their training, they still unanimously believed that they had the skills necessary to do their job as council officers. They also unanimously believed that they could use those skills with success (I1- I15). “At the same time though, it’s like we’ve been trained our whole lives for this. We came to {training location} ready to take on those roles” (I3.F.R.1). “I don’t know that I learned or improved on anything during that time, honestly. I felt like I knew and had the skills that I needed to do the job” (I6.F.<50K.1).

Job involvement and job demands are two elements of transfer of training that are similar enough that the researchers can discuss them together. Job involvement describes an individual’s level of involvement in his or her job. Job demands play a major role in transfer because someone will only transfer skills if the opportunity arises for them to do so. The perception of job involvement and job demands varies a great deal within this group of council members. One interviewee discussed participating in up to 25 activities per month, during their year on the State 4-H Council. This individual believed, because of the information given to them in training, that every time the phone rang and they were invited to another event, the individual should consider the event mandatory (I2). “Everything I went to was mandatory. At least that is how I felt you know? You get called and people want you to be there and come to things, even if it is just to look pretty. So, everything I got called for was mandatory for me. I guess I just felt like anytime that I got to go and wear the jacket and share my message was a mandatory event” (I2.F.R.4). Other interviewees felt like only the events that were state sponsored events where council members play prominent roles were mandatory. In that case, the training events held for the council and state conferences, approximately four events throughout the year, were mandatory and participation in other invited events was by choice (I1, I3, I4, I5, I8, I9, I10, I11, I13, I14). “The last two events were mandatory, the training in {training location} and again in January. Other than that, it was all voluntary. I mean if you were called you could kind of pick and choose if you said yes or not” (I3.F.R.5). Other interviewees felt like only the first training was mandatory, as that was the only event that all of the council attended (I6, I7, I15). “The way that

I saw it was that the only thing that was 100% mandatory was {training location}. Nothing seemed 100% mandatory after that. People backed out of things all the time and lots of times, being a state officer took the backseat to other things like sports or whatever" (I6.F.<50K.3).

Knowledge acquisition is an important element in the transfer of training because students who learn and retain skills are more equipped to transfer those skills to other areas. All of the council members interviewed acknowledged that during their year on council they acquired new knowledge (about themselves) or skills (communication, relationships) (I1-I15).

Situation identification, or the generalizability and application of the training to an actual job or situation, is the next element in the transfer of training. In other words, those individuals who can see where skills from the training are applicable to other areas are more likely to transfer those skills to the new situation. In this research, all interviewees discussed being able to identify situations where their training might be applicable (I1-I15). "I mean you're always going to use etiquette. Eventually you're going to be looking for jobs or doing whatever in classes and so knowing how to present yourself is always going to be something you have to know (I1.F.R.2). Norms and group pressure is the next transfer of training element. Norms surround the conformance to standards and pressures that will affect the transfer of skills. Even if someone has learned and retained skills, transfer will not happen if pressures from his or her group do not allow the transfer. While on the State 4-H Council, members were encouraged to take things away from the training environment for use in other areas. More than one-half of the individuals interviewed talked about peers and advisors encouraging them to seek opportunities to use their skills outside of the state officer arena (I1, I2, I4, I7, I9, I11, I12, I14).

If people outside of the council notice and reward the students' new skills, students are more likely to want to transfer the skills to other areas. This idea of a reward system for learning and using new skills is the next transfer of training element. While there were both extrinsically and intrinsically motivated individuals in this group of interviewees, they discussed only two rewards for using their training. Three quarters of the Council members mentioned that the honor of wearing the green jacket was reward enough (I1, I2, I3, I4, I5, I8, I9, I10, I12, I13, I14, I15). Others mentioned the watches and briefcases given to those individuals who did things "the most" such as those who wrote the most thank you notes (I4, I6, I9, I10, I11).

Organizational culture is the final element in the transfer of training and skills. An organizational culture that fosters employee development, favors improvement, and encourages employee initiatives will have a positive impact on the transfer of new skills. In the case of the 4-H Council, seven members talked about being stifled and their creativity discouraged by the advisors (I3, I4, I6, I7, I8, I9, I10). "I wish that they would have let us lead the state instead of calling us leaders and the only thing that we did was decide on themes. We never built our own schedules or made our own choices. We're figureheads and not leaders" (I6.F.<50K.4). Eight members of the council felt that the organizational culture was very positive (I1, I2, I5, I11, I12, I13, I14, I15). "Our advisors were great! I think that something that was real important was that they realized that we were still kids, but at the same time, we really were somebody important too. And so that is how they treated us" (I1.F.R.3).

Conclusions/Recommendations/Implications

This study explored the elements necessary for the transfer of training by members of the Texas State 4-H Council and how members positively transferred skills.

Seven of the council members felt like the training was relevant. Six of the council members did not see the relevance in their training programs. The goals of the training program were ambiguous and the material covered in the program was repetitious for some, or all of the

council members. Because the relevance was lost to some members, if skills were learned, their transfer was unlikely.

Unanimously, the council believed that the training at {training location} is mandatory. Because of this perception, there was less likelihood of transfer, according to the research. The researchers recommend that each year, the advisors and facilitators of council conduct a needs assessment with the incoming Texas State 4-H Council members. This would help them understand the needs of the council members as they decide on training activities. Advisors could then more closely align the training with the needs of the council members. Advisors should clearly articulate the goals of the training to the council members. They should repeatedly articulate the goals throughout the program. As councils change each year, council members and advisors should reassess training goals so those goals always align with the needs of the incoming council members. We further recommend that this needs assessment initiate a greater number of experiential trainings, instead of a traditional one-time training experience. Council members could select the areas where they felt they needed improvement, or where their interests lie and attend trainings in those areas. If advisors or facilitators felt that a certain number of trainings were still required, a certain number of experiences could be required, instead of the one shot, week long situation. Or, based on the needs assessment results, advisors could set up concurrent sessions during the week-long training experience, where the council members could chose to attend sessions in areas where improvement is needed or desired.

Seven council members felt like they could use the training in a “real life” setting. Approximately one-half of the council members had positive outcome expectancies for their training expectancies. Advisors and facilitators should include a needs assessment for training experiences. In this area, the needs assessment would be crucial in creating the perception that the training is relevant and useful to the members. If the council members believe that the areas of training are relevant to them, the likelihood that they will see the applicability to larger situations will be greater. This will aid the council members transferring those skills to other areas. We would encourage advisors to implement a time of reflection throughout the council experience. During this time, advisors and council members should come together and help each other to synthesize the experiences in which each member participates. This will help members make connections between training, the council experience and their “real life” contexts.

Unanimously, the council members interviewed believed that they had the ability to successfully do their jobs. Members of the Texas State 4-H Council demonstrate a high degree of self-efficacy, thus furthering their opportunity to transfer the training they receive.

One member believed that every time they were asked to represent Texas State 4-H Council at any event, attendance at that event was mandatory. Ten council members felt like only the state 4-H events were mandatory for them to attend. Three interviewees believed that only the training workshop in {training location} was mandatory. The degree of job involvement varied among council members, and advisors do not clearly communicate their expectations to everyone, even in the area of job requirements. This would discourage the transference of training. Advisors and facilitators of council members need to clearly define the expectations at the outset of the experience, and frequently reiterate those expectations throughout the year. Council advisors should also capitalize on the desires of the members to have autonomy and make decisions in this area by having State 4-H Council members help develop the job expectations.

All of the council members interviewed believed that they learned something during their council year. Members acquire new knowledge or skills as part of their experience, which aids in the transfer of training.

Unanimously, council members believed they could identify situations where they could use their skills during their council year. Council members demonstrated an ability to identify

situations where they could utilize their training furthering their transfer of training. Texas State 4-H Council advisors and facilitators should continue their efforts in supporting members in identifying situations where they can use their skills.

Only eight of the council members felt like they had encouragement to go out and seek opportunities to use their skills. Those members who felt they were encouraged by advisors were more likely to transfer the training than those who felt they lacked the encouragement. Advisors and facilitators of the council should lead by example and encourage all council members to seek out their own opportunities to use their skills. They could develop a list, with the help of former members, of service organizations and other groups where Texas State 4-H Council members could volunteer to speak, telling those individuals who might not know about the meaning and significance of the 4-H program. This would also help council members encourage each other to use their skills, creating more opportunities to transfer the training.

Three-quarters of the council members said that the green jacket that they received was reward enough for using the skills that they had. Others on the council mentioned that watches, plaques, and briefcases were used as rewards for using their skills. An extrinsic reward system is successful in getting the members to use their skills. Council advisors and facilitators should continue rewarding the council members for using their skills. Since Texas State 4-H Council members tend to be extrinsically motivated, this could also encourage members to seek opportunities to use what they have learned in other areas of their lives.

Seven council members perceived the organizational culture of the Texas State 4-H Council to be stifling. Eight council members felt that the organizational culture was positive. This group perceived that they made important decisions. The organizational culture of the State 4-H Council is operationally undefined. This will negatively affect the transfer of training by the council members. Council advisors, facilitators, and members should undertake training to encourage the development of a positive organizational culture. Positive organizational cultures include an environment that fosters individual development, favors improvement/progress, and encourages members' to take initiatives. This training should include identifying and working with different personality types, appropriate conflict management, gender and ethnic sensitivity training, and positive group decision-making skills.

Each element of training transfer plays an important role in a trainee taking what they have learned and applying it to outside situations. In the case of the State 4-H Council, five elements will further the members' transfer of training. However, five others will not, and will in fact, impede training transfer. We would recommend that advisors take note of the areas where training transfer is impeded, and develop strategies, like those suggested above, to rejuvenate those areas and improve training transfer.

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Transfer of Training by Texas State 4-H Council Members – A Critique
Leadership Life Skills Demonstrated by Texas 4-H Council Members – A Critique by

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The research regarding the Texas 4-H Council members were conducted by the same researchers, and I believe the same fifteen respondents, therefore, my remarks will be about the two studies.

One of the key areas in leadership development focuses on building coalitions and effectively communicating to a variety of audiences. This foci area includes oral communication, written communication, influencing/negotiating, partnering, having political savvy, and possessing interpersonal skills. Texas 4-H council members are key leaders in delivering programs in the state and I commend the researchers for conducting a study on certain elements of this group. The researchers did a good job in describing the theoretical framework, purpose, methods, findings, conclusions, recommendation, and implications.

There are many leadership models on the market. However, many of them seem to possess elements of the industrial model of leadership. A survey of U.S. employers by the Hay Group (2002) revealed that leadership development programs yield disappointing results, wasting billions of dollars. They also reported that seventy percent of all change initiatives failed due to people issues – inability to lead, lack of teamwork, inability to deal with change, etc. Considering the results of this study and the Hay Group findings, perhaps this is a wake-up call for those of us who are responsible for leadership development efforts in our states. I would suggest that new and innovative leadership programs should be developed in the context of best cutting-edge practices. These practices should be researched based and closely linked to social, economic, political, and ethical dimensions of leadership. Moreover, participants should be given the opportunity for an enormous amount of dialogue in order to learn more about themselves, diverse audiences, and in contested situations.

In addition to building coalitions and communicating effectively, leaders of the future will have to demonstrate extraordinary skills in: leading change; leading people; achieving results; and obtaining business acumen (financial, human resources, technology) outcomes.

These research studies suggest a closer look at what should be done with the Texas State 4-H Council members during their tenure from a professional development perspective. I trust the researchers will share their findings with key leaders in the state in order to assist in improving the role of council members while in serving, and to provide them with additional life skills.

4-H Enrollment Trends in Pennsylvania: Implications for Extension Research and Programming

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Abstract

The purpose of this study was to examine 4-H enrollment trends in Pennsylvania from 1990-91 through 2001-02. Data for the study were obtained from Pennsylvania 4-H facts maintained in the 4-H Program Management Office. Enrollment data examined included: gender, race, age, residence, program delivery methods, and 4-H programs and projects. Trend analysis was used as a framework to describe the findings. Overall, 4-H enrollment has declined slightly in the last 12 years. Change in enrollment was evident relative to age and residence. Enrollment in younger age groups (8-12) declined than older age groups (12-15 years and 16-19 years). Similarly, 4-H enrollment in cities, suburbs, and farms declined, while enrollment increased in small towns. Four-H school enrichment is the most frequently used program delivery method followed by organized 4-H clubs, and short term programs. Animal science, individual and family resources, and plant science programs/projects showed the largest enrollment. Programs/projects such as health and safety, diversity, leadership, citizenship and civic development had lower enrollments. Based on the analysis, one of the recommendations was to systematically align all the 4-H programs/projects under the new curriculum framework that contained nine broad program/project areas.

Introduction

For many Americans the word 4-H evokes the image of an organization that has, for more than 100 years helped American youth into responsible citizens and potential future leaders. The American public, in general, and educational institutions (schools, colleges and universities) in particular, have always known the value of 4-H programs. The mission of 4-H is to assist youth in acquiring knowledge, developing life skills, and forming attitudes which will enable them to become self-directing, productive, and contributing members of society (Cantrell, Heinsohn, & Doebler, 1989).

Four-H is the most highly recognized of all Cooperative Extension programs (Van Horn, Flanagan, & Thomson, 1999). The Public Perception Study of Cooperative Extension conducted in 1982 by Warner and Christenson (1984) indicated that 77% were aware of 4-H programs. When the same study was conducted in 1994, the awareness of 4-H program declined to 69%. Even with the decline, 4-H remains the most visible Extension program (Warner & Christenson, 1996).

A youth organization such as 4-H satisfies adolescent development needs and encourages leadership, community service, enthusiasm, morality, dignity of work, mature relationships, economic security, family life, health and independence from parents (Mead, Hirschl, Rodriguez, & Goggin, 2000; Collins and Associates, 1997; and Norland and Bennett, 1993). It is argued that a youth organization that is successful in reaching its goal has worth (or value) and would be attractive to young people. Youth development literature (Sarver, Johnson, & Verma, 2000) reveals three interweaving themes related to worth: 1) preparing youth to be contributing members of society, 2) providing family support, and 3) satisfying developmental needs of youth.

Four-H enrollment reporting dates back to as early as 1914 when the Smith-Lever Act was enacted. In 1914, 4-H had a total of 116, 262 members. Since then, 4-H has experienced tremendous growth in the United States. Four-H membership peaked in 1974 at 7.5 million, and in 1994, 4-H enrollment dropped to 5.6 million, a drop out of almost 2 million (Van Horn, Thomson, & Flanagan, 1999). The enrollment report is the principal way 4-H program gets credit for the work it is doing. A variety of agencies--federal, state and local--and organizations, both public and private and individuals ask for specific information. For example, enrollment data are needed to study rural vs. urban, involvement of minorities in 4-H, youth involved in community service, trends in projects, program contents relating to developing values etc. Examples of federal agencies needing 4-H enrollment information include: the Department of Interior, Environmental Protection Agency (EPA), and U.S. Forest Service are interested in 4-H environmental and natural resources. Education department is interested in School Enrichment and Community Service Learning. Similarly, the National Science Foundation and Energy Department is interested in 4-H science projects and science literacy programs. The National 4-H Council rely on 4-H enrollment data to show the scope of the proposed target audience for any given subject. As the Council seeks private sector partnerships, the use of enrollment data becomes crucial because the larger the numbers in a given area, greater are the potential cooperators, both public and private. The National Program Leaders (NPLs) use extensive enrollment data for trend information to depict national data and for comparison between large and small states. They use trend data on age, place of residence, delivery mode, racial and ethnic outreach and curriculum areas. According to United States Department of Agriculture, measure of impact in the early days of 4-H included members per agent year devoted to club work. In addition, pounds of beef and bushels of corn produced, and quarts canned were considered as measures of impact (USDA, 2000).

A number of researchers have examined 4-H enrollment trends. Ritchie and Resler (1993) reported that the number of youth enrolled in 4-H in Indiana fluctuated greatly since the 1980s. They found that major reasons for members dropping out of the 4-H program were displeasure with 4-H clubs, ranging from boring meetings to not getting enough help with projects. Other reasons included: youth too busy with sports and/or job, lack of parental support with club activities.

In a Pennsylvania study, Kiernan et al. (1994) found that 4-H coordinators in 26 counties reported sharp decline in 4-H enrollment for youth ages 11-13. Seventy-five percent of the 4-H coordinators interviewed indicated that teens in their counties have more choices in how they spend their time than younger youth. According to the coordinators, these choices are related to several changes in the lives of youth: transition to middle school where activities include homework, music and sports, part-time jobs, and developmental changes accompanied by activities that include socializing and interest in the opposite sex. A youth coordinator's comment

is worth noting in the context of the study, "We are not prepared to meet the challenges of 12 and 13 year olds. We are prepared well for 10 to 11 year olds who don't require a lot of individual attention." In a related study, Heinsohn and Lewis (1995) indicated that decline in 4-H enrollment should be viewed as developmentally appropriate and normative rather than a programming glitch. Further, they indicated that many activities attract youth away from 4-H. They suggest that youth organizations such as 4-H need to adjust their expectations for teen participation. Heinsohn and Lewis believe that youth organizations that are flexible and willing to make programmatic changes to reflect changing teen interests, will continue to attract and retain participants.

As indicated earlier, 4-H enrollment numbers declined significantly from 7.5 million in 1974 to 5.6 million in 1994. The transition from rural to urban membership is one factor responsible for this drop in enrollment (Van Horn, Flanagan, & Thomson, 1995). Van Horn et al., suggest that if 4-H wants to be a force in the future, it needs to be progressive and adaptive to new trends and ideas, reaching youth from all cultures, races, ethnic groups and income levels. In addition, they pose two important questions that guide program development and adaptations for new groups of youth. These include: 1) what are the principles underlying our programs that we want young people to learn by participating in these programs, and 2) what projects (traditional or new programs) will appeal to meet the needs of the young people we want to involve?

Recognizing the many facets and potential positive development outcomes from participating in 4-H programs, Penn State Cooperative Extension, in consultation with the extension administration, extension specialists, and Youth Advisory Committee developed a Pennsylvania 4-H curriculum framework in nine areas (Figure 1). Since the implementation of the framework, there has been limited formal statewide evaluation of 4-H programs, curriculum projects, and activities. Further, the National Research Council (2002) has emphasized the need for systematic documentation and evaluation of community programs that promote youth development.

The National Research Council (NRC) (2002) identified gaps in tracking youth programs. The Council suggested that further efforts should focus on how different populations are affected by different program components and features (age, gender, socioeconomic status, ethnicity, community environment, developmental readiness, skill levels etc.). As a first step to NRC's need for tracking youth programs, this study examined 4-H enrollment trends in Pennsylvania. Findings from this study can be useful in identifying trends in enrollment and trends in specific program areas. Such information will be of value to review current 4-H programs and provide justification for developing new programs and further research.

Purpose and Objectives

The overall purpose of the study was to examine 4-H enrollment trends over a 10-year period. Specific objectives of the study were to:

1. Determine enrollment trends in 4-H membership by gender, race, age and residence.

2. Determine enrollment trends by program delivery method.

3. Determine enrollment trends by curriculum/project areas.

Animal Sciences	Consumer and Family Sciences	Science and Technology	Environmental Education and Earth Sciences	International and Diversity	Communications and Expressive Arts	Healthy Lifestyles education	Leadership and Personal Development	Citizenship and Civic Education
Dairy	**General Family Living**	**Engineering Sciences**	**Forest/Natural Resources (Smith)**			**Leisure Education**	**Youth**	
Horse	**Foods and Nutrition**	**Computer/Web Technology**	**Plant Sciences**				**Adult**	
Livestock	**Intergenerational**		**Entomology**					
Poultry	**Consumer Economics**							
Small Animals								

Figure 1: 4-H Curriculum Framework

Methods and Procedures

The design used for the study is trend analysis which is a longitudinal study exploring time oriented associations (Borg & Gall, 1983). Trend analysis is a technique used to identify patterns of programs or projects over a period of time. In addition, trend analysis help predict future program development efforts and provide justification for future research.

The enrollment data used in this study was obtained from Pennsylvania 4-H Facts maintained in the Department of Agricultural and Extension Education at the Pennsylvania State University. Key 4-H facts documented each year are organized into three major categories: 1) 4-H involvement gathered information on 4-H membership by gender, race, residence, age, volunteer leaders, and total youth served; 2) 4-H enrollment by delivery methods--organized 4-H clubs, 4-H special interest or short term programs, 4-H overnight camping programs, 4-H school enrichment, 4-H individual study, school aged child care education programs; and 3) Scope of present program which included curriculum/projects in animal sciences, plant sciences, engineering sciences, natural sciences, health and safety, communications, economics, jobs and careers, citizenship and community development, individual and family resources, energy, and leisure education. The data used in this study can be characterized as secondary source of data. Borg and Gall (1983) defines secondary source of data as publications written by authors who were not direct observers of, or participants in, the events being described (p. 143). Secondary sources are useful because they combine knowledge from many primary sources into a single publication.

Themes and patterns for each of the three major categories of data were noted. Descriptive statistics was used to summarize the data.

Results

Objective 1: Enrollment Trends

4-H enrollment trends relative to gender, race, age and residence are shown in Table 1. As shown in Table 1, enrollment of boys and girls more or less remained constant at 47% for boys and 53% for girls. Regarding race, 81% were white, 14% African Americans, and five percent others (American Indians, Hispanics, and Asian Americans). This trend remained same throughout the 12-year period.

Regarding age groups of kids enrolled in 4-H, certain trends were observed. For example, enrollment of kids in the age group 8-12 years marginally declined (from 81.8% in 1990-91 to 77.1% in 2001-02) during this 12-year period. On the other hand, enrollment of 13-15 year olds slightly increased from 12.8% in 1990-91 to 15.6% in 2001-02. Similar trends were observed for 16-19 year olds as well (Table 1).

Table 1: 4-H Enrollment Trends by Year

	Enrollment Data	1990 1991	1991 1992	1992 1993	1993 1994	1994 1995	1995 1996	1996 1997	1997 1998	1998 1999	1999 2000	2000 2001	2001 2002
	Total Enrollment	117,976	119,854	117,197	117,159	113,801	130,145	127,266	123,495	119,373	123,220	122,568	109,816
Gender (%)	Boys	47.6%	47.5%	48.1%	48.3%	47.3%	47.3%	47.6%	48.5%	47.4%	48.3%	47.9%	47.5%
	Girls	52.4	52.5	51.9	51.7	52.7	52.7	52.4	51.5	52.6	51.7	52.1	52.5
Race (%)	White	79.2%	82.4%	81.9%	81.8%	81.7%	80.6%	81.7%	81.3%	80.8%	81.5%	80.5%	81.5%
	African American	15.9	14.0	13.2	13.3	13.8	13.5	13.6	14.3	13.9	13.8	12.9	13.1
	Other*	4.9	2.6	4.9	4.9	4.5	5.9	4.7	4.4	5.3	3.7	6.6	5.4
Age (%)	8-12 years	81.8%	81.6%	81.7%	81.6%	75.9%	81.4%	80.2%	78.9%	77.9%	77.5%	76.0%	77.1%
	13-15 years	12.8	13.7	13.2	13.2	16.6	13.2	13.6	15.0	15.7	16.1	17.3	15.6
	16-19 years	5.4	4.7	5.1	5.2	7.5	5.4	6.2	6.1	6.4	6.4	6.7	7.3
Residence (%)	Cities	28.0%	21.1%	19.4	19.3%	19.1%	21.4%	19.8%	19.5%	21.7%	6.0%	18.5%	17.0%
	Suburbs	10.0	9.2	12.8	12.8	12.5	10.8	12.1	12.3	11.2	39.0	9.6	9.3
	Towns[a]	21.0	23.2	22.6	22.5	23.6	22.8	23.3	22.7	20.5	24.7	25.5	27.3
	Towns[b]	33.0	39.0	38.5	38.4	36.4	38.5	30.3	39.2	40.2	9.3	40.4	39.8
	Farms	08.0	7.5	6.7	7.0	8.4	6.5	6.5	6.3	6.3	21.0	6.0	6.6

*Includes American Indians, Hispanic Americans and Asian Americans

[a]Towns with 10,000 to 50,000 population

[b]Towns with less than 10,000 population

Enrollment of 4-H members by residence varied across the five residence categories. Enrollment of kids from cities declined from 28.9% in 1990-91 to 17.0% in 2001-02. Similar trends were observed for kids from suburbs. However, enrollment of kids from towns with a population of 10,000 to 50,000 increased from 21% in 1990-91 to 27.3% in 2001-02. Similarly, enrollment of kids from towns with a population of 10,000 or less also increased over this 12-year period. It is surprising to note that enrollment of kids from farms has somewhat declined, with the exception in 1999-2000.

Overall, the total enrollment of 4-H kids shows a declining trend during this 12-year analysis. The total enrollment peaked to 130,000 in 1995-96. After 1996, the total enrollment showed a declining trend with a slight increase. In the last two years (2000-01 to 2000-02), total enrollment declined by about 12,752 (Table 1).

Objective 2: Enrollment by Program Delivery Methods

Figure 2 shows enrollment trends by program delivery methods. Four-H school enrichment is the most frequently used delivery method. As shown in Figure 2, enrollment in 4-H school enrichment programs remained same at 75,000 for the first three years and increased to 89,000 in 1993-94. However, enrollment declined from 1996-97 onwards with an exception in year 2000. Organized 4-H clubs is the second most frequently used delivery method. Enrollment in organized 4-H clubs remained more or less same for the first six years (1990-91 to 1995-96), increased slightly in 1996-97, and started declining from 1997-98 (Figure 2). Enrollment in 4-H special interest or short term programs stood between 10,000 and 20,000 with a peak in 1997-98 and a slump in 2000-01 (Figure 2).

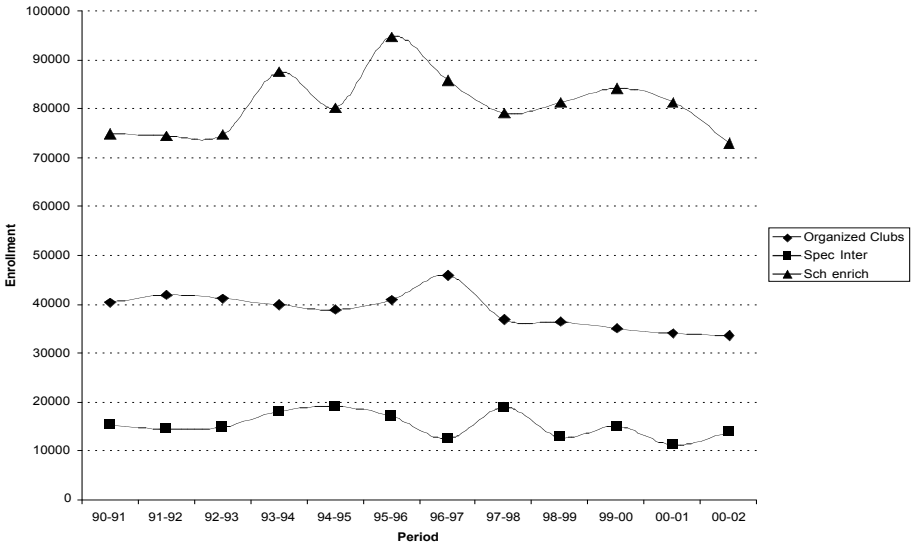

Figure 2. 4-H Enrollment by Program Delivery Methods

Objective 3: Enrollment by 4-H Curriculum Projects/Programs

A number of curriculum projects/programs are offered to 4-H members. These projects/programs can be grouped in several categories: animal science, plant science, mechanical/engineering, natural resources, health and safety, individual and family resources, citizenship and community development, economics, jobs and careers, and others (leisure education, energy, communications). In the year 2001, a new 4-H curriculum framework was developed. This new framework contained nine curriculum areas under which all 4-H programs/projects are included (Figure 1).

Of all the 4-H program/project areas, animal science had the highest enrollment during this 12-year period (Figure 3). Enrollment in animal science programs stood at a range of 70,000 to 84,000. The second largest enrollment was in individual and family resource programs/projects which ranged from low enrollment of 27,000 in 1998-99 to a high of 51,983 in 1990-91. Overall, enrollment decline is evident in individual and family resource programs over the last 12 years. The third highest enrollment was observed in plant sciences. Enrollment remained more or less same throughout the 12-year period with a peek in 2001. Enrollments in programs/projects relative to natural resources, economics, jobs and careers, and citizenship, have remained more or less constant. Enrollment is these programs were under 20,000. Programs/ projects relative to health and safety showed a declining trend throughout the 12-year period (Figure 3).

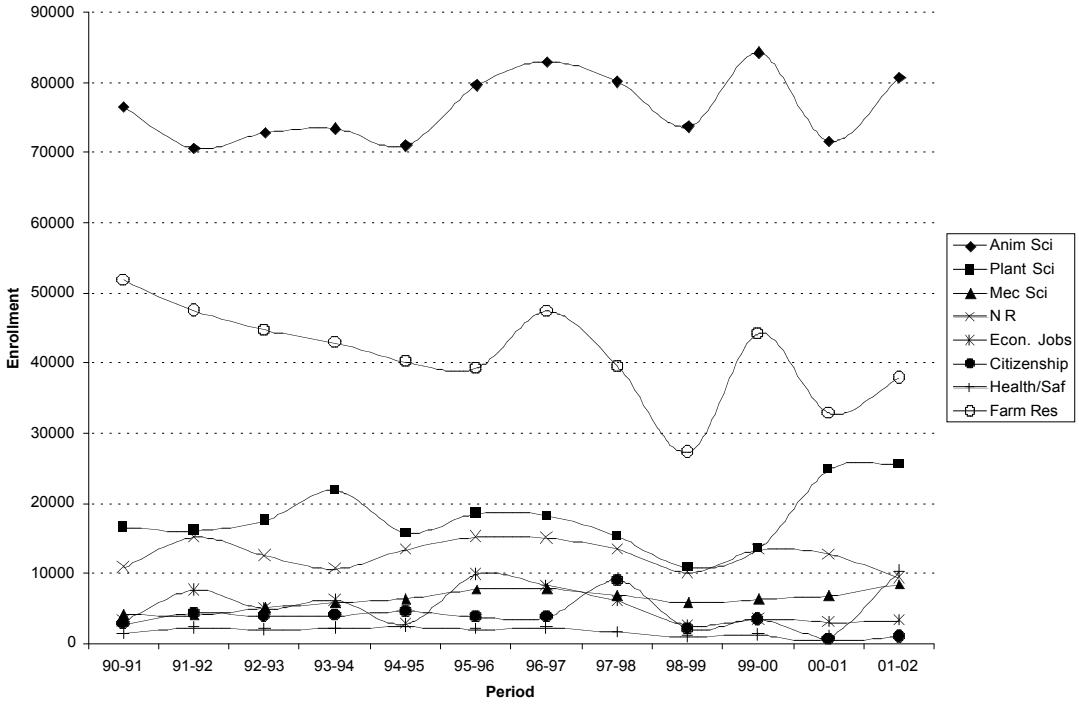

Figure 3. 4-H Enrollment in Select Curriculum Projects/Programs

Conclusions and Recommendations

Based on the findings of this study, the following conclusions and recommendations were offered. The findings of this study provide several perspectives on 4-H enrollment trends and patterns in Pennsylvania for the years 1990-91 through 2001-02.

Overall, analysis of 12 years of data reveals that Pennsylvania 4-H enrollment has slightly declined. This decline can be attributed to several factors previously indicated in the literature. These include developmental and normative (Heinsohn and Lewis, 1995), lack of age appropriate programs (Kiernan, et al., 1994), displeasure with 4-H activities (Ritchie and Resler, 1993).

When 4-H enrollment data was examined by gender, race, age, and residence, several trends were evident. More girls than boys enroll in 4-H programs/projects. The percent of girls enrolled in 4-H programs remained constant around 50-51% during the 12-year period.

Enrollment of 4-H members by race was representative of several ethnic groups in 4-H programs. According to U.S. Census Bureau (2000), 10% of the total population in Pennsylvania is comprised of African Americans, followed by 3.2% Hispanics (Therrien and Ramirez; 2000), and 1.8% Asian Indians (Barnes and Bennett, 2002), 0.1% American Indians, 84.9% white (U.S. Census Bureau, 2000). The 12-year analysis revealed that enrollment of African Americans in 4-H programs declined from 15.9% in 1990-91 to 13.1% in 2001-02. On the other hand, enrollment of Hispanics and Asian Americans slightly increased from 4.9% in 1990-91 to 6.6% in 2000-01. The enrollment figures by race reveal that 4-H programs in Pennsylvania is reaching minority groups into 4-H programs. Efforts should be made to enroll African Americans, Hispanics, and other minorities. A county-by-county 4-H enrollment assessment should be conducted to see where promotional efforts are needed. Such efforts would lead to increased enrollment of underrepresented kids/groups in 4-H programs. Similar efforts should be conducted to increase White population as well.

Enrollment of 4-H members, especially younger ages (8-12 years), has declined during this 12-year analysis, while enrollment in age groups of 13-15 years and 16-19 years has slightly increased. These findings mirror findings from previous studies (Heinsohn and Lewis, 1995; Kiernan, et al., 1995, and Ritchie and Resler (1993). Programs/projects currently offered to this group (8-12 years) should be examined and age and developmental appropriate program/projects should be developed. As indicated in the literature, 8-12 year is a critical age period, where several changes occur in the lives of 4-H members. Extension educators, including specialists, and program leaders should take note of these changes in developing future 4-H programs/projects.

Enrollment of 4-H members by residence indicated several trends. First, enrollment in cities, suburbs, and farms has declined in the last 12 years. Second, enrollment show increasing trends in towns with a population of zero to 50,000. One reason for this shift may be due to the fact that families from urban and rural areas are moving into smaller towns.

Program delivery method is crucial to the effectiveness of 4-H programs. Four-H school enrichment program is the predominant method used to deliver 4-H programs, followed by organized club activities, and 4-H special interest or short term programs. It appears that schools are a natural choice for reaching kids. However, effectiveness of 4-H programs is dependent on the delivery methods. Further research is needed to examine the appropriateness of delivery methods for 4-H programs/projects completed by 4-H members. In a time when documenting outcomes of 4-H programs are emphasized, the effectiveness of delivery method becomes important.

Four-H members in Pennsylvania are completing a number of programs/projects. Animal science, individual and family resource, and plant sciences are programs/projects with substantial enrollments. Over the years, enrollment in specific program/projects has declined. For example, individual and family resources, and health and safety programs have declined in the last 12 years. This suggests the need for examining further the programs/projects offered by age groups and by residence. Such cross examination of enrollment data will provide additional insights into developing age and developmental appropriate programs for 4-H members. In addition, results of cross examination may also help to identify low enrollment programs. Extension educators and specialists should periodically examine enrollment data to modify program/project offerings. A need exists to identify and/or develop projects that suit the needs of 4-H kids. Programs/projects in the areas of technology, civic development, leadership, service learning, and diversity should be developed in attractive packages to entice kids. In two recent studies (Fabin and Radhakrishna, 2003; and Sterner and Radhakrishna, 2003), focus group participants (current and past 4-H members) suggested several strategies to retain kids in 4-H programs. These included: 1) making project books progressively harder or challenging as the age level of 4-H members increases to maintain interest in learning new materials, 2) making 4-H a part of school curriculum like FFA, 3) develop projects involving computer applications in the agriculture and food sciences, and 4) training of club leaders and volunteers.

As indicated earlier, a new curriculum development framework with nine curriculum areas was developed (Figure 1). A need exists to align projects/programs currently offered to the new framework. Such alignment will help document enrollment facts in a systematic way. It is recommended a number scheme/code be developed to identify and align 4-H projects/programs into appropriate curriculum areas identified in the framework.

Finally, as we look to the future, we must periodically evaluate enrollment to make informed decisions about 4-H programs. Such efforts will help extension educators, program leaders, and administrators develop strategies and programming initiatives to address the needs of children, youth, families, and communities.

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4-H Enrollment Trends in Pennsylvania: Implications for Extension Research and Programming – A Critique

by
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The researchers of this study should be commended for investigating the 4-H enrollment trends in Pennsylvania for a 12-year period in light of a number of factors, including budget constraints. During difficult times, individuals in management and leadership positions are likely not to have this type of extensive research data as part of the decision-making process. The introduction, purpose, objectives, procedures, results, conclusions and recommendations were clearly described. For the profession, this is a great model for designing and conducting studies of this nature.

Many of us would agree that our youth are very precious in our society. In most cases, they are the primary reasons why we go to work each day. Permit me to connect this research with the quality of life in the U.S. for the period of time this study was conducted. In the early 1990s, the U.S. economy was basically limping along. The major international conflict was the invasion of Kuwait by Iraq. A coalition of countries was successful in getting the Iraqi troops out of Kuwait. Between 1993 – 2001, the U.S had tremendous prosperity with the stock market being at an all time high, and unemployment the lowest in 30 years. For the last three years, we have witnessed 9-11, most states struggling with budget deficits, and a war in Iraq that is costing us about $4 billion per month. All of us have been impacted by these events, particularly our youth.

Unquestionably, programs like 4-H, the FFA, boys and girl scouts play key roles in helping youth to cope with ever changing global events that impact their lives. This study revealed that enrollment in cities, suburbs, and from farms declined in the last 12 years. As a profession, should we be concerned about the slippage here? I think so! The researchers mentioned that schools are a natural choice for reaching kids. Many of us have heard about the "Leave No Child Behind Act." 4-H could very well be one of the most successful models for helping schools to implement this act. In light of budget constraints in Extension and public education, the development of more formalized initiatives between these two entities seem to be in order.

Again, I want to commend the researchers for their scholarly efforts and trust that they will present their findings to Extension personnel in Pennsylvania, particularly the key leaders in the state.

Relationships Between Selected Demographic Characteristics and the Quality of Life of Adolescents in a Rural West Texas Community

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Abstract

Agricultural educators have long had an interest in the viability of rural schools. At least part of this interest can be attributed to the large number of secondary programs located in rural school districts. In this study, the researchers examined the relationships between a composite quality of life measure, perceived control over one's quality of life, and perceived opportunities for the improvement in one's quality of life and students' gender, family socioeconomic status, and number of children and adults residing in the household. The literature indicates that quality of life is associated with various student performance indicators. Findings showed as family socioeconomic status increased, overall quality of life, control, and opportunities also increased. The additional demographic variables included in the study did not have a consistent influence upon the students' quality of life as measured by the three indicators. In formulating hypotheses, the researchers treated the three components of quality of life as a "bundle" in relation to the ethnicity, livelihood, and household composition variables of interest. If anything, the data have indicated that there is a great deal of variability in the three components based upon these measured variables.

Introduction and Background

Rural communities are becoming increasingly smaller in population and fewer in number. The 2000 U.S. Census revealed there were only 59 million Americans, or a little less than 21% of the population, living in rural communities. Previously, the 1990 U.S. Census reported 23% of the population resided in rural communities. This data illustrates a population shift to urban and suburban areas. By U.S. Census definition, rural communities are areas who have less than 2,500 residents. Additionally, rural communities have higher numbers of low-paying, low-benefit jobs compared to more urban areas (Herzog & Pittman, 1995).

Many challenges face rural school districts each day. Communities are a unique part of the fabric of rural education. Communities establish the framework for helping students succeed in school (Bauch, 2001). Schools serve as the "cultural and social center of the town" (Bauch, 2001, p. 209). Rural schools are intertwined within the community they serve (Theobold & Nachtigal, 1995). Parents in rural communities are expected to aid in the educational process by supporting their schools and ensuring their children are prepared for school requirements (Bauch, 2001). Additionally, Bauch (2001) stated that some rural families encourage their children to obtain the basic skills required in hopes of them moving out of rural areas, attending college, and living a successful life outside of the rural community. This behavior contributes to a downward spiral of human capital in rural populations and a lack of well educated community citizens (Bauch, 2001). Few, if any, attempts are made to "recruit" community members back following college graduation.

Many differences can be seen between rural and urban schools, most obviously being size. Rural schools are smaller than urban schools. According to Bauch (2001), rural students generally achieve lower levels of education when compared to urban students. High school completion rates were 7.8% lower in rural areas (Lipmann, Burns, & McArthur, 1996). However, rural students have lower student absenteeism and dropout rates, and are less likely to be living with single parents (Lipmann et al., 1996). Kearney (1994) reported that smaller schools tend to have a positive school climate, a high level of student-faculty contact, and better school-community relationships. The vast majority of rural schools are located in areas with low tax bases and property values. Herzog and Pittman (1995) concluded that rural schools are often underfunded compared to other schools. School poverty has been shown to have a negative impact on student achievement, behavior, and teacher morale (Achilles & Mitchel, 2001-2002).

Information from the U.S. Department of Education (1999) indicated that 66.5% of rural schools offered one or more vocational programs. According to the National FFA Association (2002), 27% of its membership resides in rural, farm areas. In addition, rural schools are more likely than urban schools to offer vocational programs for the occupations of agriscience technician and welder (USDE, 1998). In a study of Houston Livestock Show and Rodeo Scholarship recipients (of which at least 60% were 4-H or FFA members), more than 90% indicated a very acceptable or excellent quality of life (Smith & Briers, 2001).

The condition of rural America is evident in Floyd County, Texas. The 2000 U.S. Census revealed a decline of more than seven hundred residents between 1990 and 2000. Additionally, the 2000 Census revealed that 49.9% of the population was white, while 45.9% of the population was Hispanic. The 2000 U.S. Census indicated the median family income in Floyd County, Texas was $32,123. These conditions are representative of the norm for many rural West Texas communities.

Theoretical Framework

The Mitzel model identified four classes of variables which influence teacher effectiveness. These variables included presage, context, process, and product variables (Mitzel, 1969). Presage variables refer to teacher characteristics, including formative experience, background, and competencies of the teacher (Dunkin & Biddle, 1974). These experiences include formative or personal background experiences, teacher-education experiences, and teacher properties. Teacher properties encompass variables such as authoritarianism, attitudes toward students, and personality (Dunkin & Biddle, 1974). Context variables include student knowledge and experiences, as well as the physical classroom situation. Context variables affect student learning, but are not in the control of the teacher (Mitzel, 1969; Dunkin & Biddle, 1974). Process variables may be defined as all interactions between students and teachers (Mitzel, 1969). Process variables are seen when context and presage variables interact. All activities within classrooms are considered process variables. Interactions which are not productive to student growth are also considered process variables (Dunkin & Biddle, 1974). Finally, product variables assess the outcomes of teaching. Product variables include teacher effectiveness and student growth or changes which come about as a result of instruction (Dunkin & Biddle, 1974). Primarily, product variables are seen as positive impacts on student knowledge. However, some

classroom experiences may hinder future learning experiences. Standardized tests are the popularly used method to assess product variables.

Quality of life constructs are examples of context variables. The interaction of context variables need to be further examined to better understand how they affect learning and student achievement. Higher education, learning, and achievement have been positively correlated with quality of life, and therefore many benefits can be achieved through additional study of context variables (Mookherjee, 1992; Campbell, Converse, & Rogers, 1976; Edwards & Klemmack, 1973). Although there are numerous forces and factors which might influence quality of life, four variables are germane to this study. These variables are ethnicity, socio-economic status, number of children in the home, and number of parents in the home.

Ethnicity has been linked to quality of life scores. However, research to date has not clearly delineated the direction and strength of this link. Anglo female adolescents reported higher quality of life scores than African American female adolescents in a study conducted by Dew and Huebner (1996). Inversely, the same study revealed that African American male adolescents were found to have higher quality of life scores compared to Anglo male adolescents. Near, Rice, and Hunt (1978) found that non-Anglo adult males indicated less satisfaction with their lives and jobs than did adult Anglo males. Similarly, Mookherjee (1992) concluded that Anglos indicated a higher quality of life compared to African Americans.

Much data has been collected regarding the influence of socioeconomic status on quality of life. Most of this data indicates that family income is positively related to quality of life (Campbell, Converse, & Rodgers, 1972; Mookherjee, 1992). Edwards and Klemmack (1973) determined that there is a positive relationship between income and overall life satisfaction. Families with a higher income revealed that they had a higher quality of life than lower income families (Metzen, Bradley, & Helmick, 1986). Research conducted by Palmore and Luikart (1972) indicated that income was more strongly linked with quality of life in participants with lower incomes. Furthermore, they determined that older middle aged participants indicated that income was less related to quality of life than younger middle aged participants (Palmore & Luikart, 1972). Higher education levels have also been positively linked to perceptions of well-being (Mookherjee, 1992; Campbell et al., 1976; Edwards & Klemmack, 1973).

Family composition, including number of siblings and number of parents in the home, has become apart of many studies seeking to determine what affects achievement and learning. Student achievement has been linked to home environment. The March 2000 Current Population Survey (CPS) revealed that the composition of American families is drastically changing. This survey determined that there are an increasing number of single-parent homes as a result of increased divorce rates and out-of-wedlock childbirth (CPS, 2000). Between 1980 and 2000 the number of single-parent families increased 5% (U.S. Census Bureau, 1980; U.S. Census Bureau, 2000). Almost three out of 10 children in America live in single-parent families (Caldas & Bankston, 1999). Alarmingly, Caldas and Bankston (1999) reported that large concentrations of students from single-parent homes had decreased individual achievement, regardless of race, family income, or family composition. The results of their study indicate schools are more effective when there are fewer numbers of students from single-parent families. Lillard and Gerner (1999) reported that children who spent part of their childhood in single-parent homes are

twice as likely to drop out of school, and less likely to attend college. All ethnic groups reported to have a decrease in the number of two-parent families, with African Americans having the lowest numbers of two-parent families (U.S. Census Bureau, 2000). According to Caldas and Bankston (1999) family structure significantly impacts a child's well-being. The number of parents in the family impacts the economic well-being, amount of attention and social interaction, and the behavior of the child.

The number of children per family may also influence student learning and achievement. An increased number of children may mean less attention and interaction between parents and each child. The average number of children per family has steadily decreased over the last 20 years. In 2000, the U.S. Census Bureau reported that the average family size for Anglos was 3.0, 3.4 people for African Americans, and 3.9 per family for Hispanics. Hispanics were reported to have larger family sizes than any other ethnic group (U.S. Census Bureau, 2000).

Purpose/Research Hypotheses

The purpose of this study was to determine relationships between selected demographic and livelihood system characteristics and the perceived quality of life of rural adolescents. The following research hypotheses were developed to guide the study: (1) rural Anglo (white/non-Hispanic) students will have a greater perception of their quality of life, a greater perception of control over their quality of life, and greater perceived opportunities for the improvement of their quality of life than rural Hispanic adolescents; (2) rural adolescents coming from households in the upper-range of socioeconomic status, will have a greater perception of their quality of life, a greater perception of control over their quality of life, and greater perceived opportunities for the improvement of their quality of life than rural adolescents coming from households in the lower and middle ranges of socioeconomic status; (3) rural adolescents living in families of two children will have a greater perception of their quality of life, a greater perception of control over their quality of life, and greater perceived opportunities for the improvement of their quality of life than rural adolescents from single-child or three or more children families; (4) rural adolescents living in families where two adults reside will have a greater perception of their quality of life, a greater perception of control over their quality of life, and greater perceived opportunities for the improvement of their quality of life than rural female adolescents living in single adult families or families where three or more adults reside.

Methods/Procedures

Data for this descriptive/correlational study were collected Spring 2002. The target population for this study was adolescents residing in a rural community in Floyd County, Texas. The accessible population was students attending Floydada High School. Floydada is the largest of two school districts in Floyd County. On April 12, 2002 the researchers accompanied by undergraduates at Texas Tech University administered the Quality of Life Questionnaire and related demographic instrument to a nonrandom convenient sample of 176 students. Due to the sampling methodology, the authors would urge caution in generalizing the findings of this exploratory study beyond this sample.

In terms of instrumentation, the adolescent version of the Quality of Life profile was developed by faculty at the Center of Health Promotion at the University of Toronto (Raphael, Rukholm, Brown, Hill-Bailey, & Donato,1996), served as the primary data-gathering instrument. The first of the two-section instrument utilizes 54 Likert-scaled statements to assess both importance of each statement and satisfaction with each statement in regards to this part of their life. Both the importance and satisfaction scales were measured on five points (ranging from 1=*Not At All* to 5=*Extremely*). The 54 statements measure overall quality of life and three constructs or domains. The initial construct is the "being" domain, where physical (body and health), psychological (thoughts and feelings), and spiritual (beliefs and values) are assessed. The second construct is the "belonging" domain consisting of items that measure the physical (one's life and how time is spent), community (access to things), and social (interaction with people) components of students. The "becoming" construct measures one's life in terms of the practical (daily things), growth (how one improves and changes), and leisure (things done for enjoyment).

The second section of the instrument utilized nine Likert-scaled statements to assess both how much control students had on the particular part of their life and the student's perceived opportunity to improve the particular part of their life. The control scale was measured on five points ranging from 1=*Almost None*, to 5=*Almost Total*, and the opportunity scale was measured on five points ranging from 1=*Almost None*, to 5=*Great Many*. Although the instrument developers have established face validity, content validity, construct validity, and internal consistency of the instrument, the following post-hoc Cronbach's reliability coefficients were found on this sample: (1) Being, r=.92; (2) Belonging, r= 90; (3) Becoming, r=.93; (4) Overall Quality of Life (Cumulative Being, Belonging, and Becoming), r=.97; (5) Control, r=.81; (6) Opportunity, r=.90.

The researchers added a third demographic section to the questionnaire that solicited livelihood system information (age, gender, ethnicity, number of children under 18 in the household, number of adults over 18 residing in the household, and parental occupation). Adult occupations were assigned scores based upon an index developed by Hauser and Warren (1997). This scale is determined upon the characteristics of the workforce based upon the 1990 census and occupational prestige ratings obtained in 1989. Separate indices were used for males and females. These combined (both males and females) occupational index scores were used as a proxy for household socioeconomic status.

Data were analyzed using SPSS/v.11.0 and G*Power/v.2.0 software. SPSS was used to calculate descriptive statistics consisting of means, standard deviations, frequencies, and percentages to profile the adolescents. To test the research hypotheses, the researchers used single-factor general linear model (GLM) analysis of variance (ANOVA). GLM ANOVA was used rather than the traditional variance-ratio method to allow the researchers to break the variance accounted for in quality of life scores into predetermined component parts. Consequently, the researchers planned contrasts (as opposed to using post hoc comparisons) to test the specific research hypotheses. The use of GLM ANOVA also allowed the researchers to conduct polynomial contrasts for the purpose of analyzing trends in the data, in the case of research hypotheses four through six (which consisted of quantitative independent variables with three data points), the shape of the function relating the levels of these independent variables to

the dependent variables were of interest to the researchers. In many of the analyses, the Levene's test for homogeneity of variance between groups was statistically significant, which violated one of the assumptions for ANOVA. Consequently, the researchers utilized the Brown-Forsythe F test ($F_{BF)}$ for the omnibus ANOVA hypotheses, which is recommended in place of the F test in cases where variances between groups are not equal (SPSS/PC v.11). For data analysis purposes only, the demographic makeup of this sample was viewed by the researchers as being representative of many rural high school students in the region. Consequently, inferential statistics were used as a mechanism for decision making, with an a priori alpha level set at .05. G*Power software was used to calculate Cohen's f (f_c) statistic, a measure of effect size. This was calculated to determine the overlap between membership within a particular group, being particularly sensitive to the use of the F statistic and contrast coding. To assist in the interpretation of effect size, the convention advanced by Cohen (1988) was used: .1=small; .25=medium; and $\geq$.40=large.

Results/Findings

The adolescents in the sample could be described as a group as being 16 years of age (*M*=16.11, *SD*=1.12). There were slightly more Hispanics (51.1%) than Anglos (41.5%), and males (52.3%) than females. These adolescents had an average of two adults (*M*=2.14, *SD*=0.87) and two children (under 18 years old) (*M*=2.10, *SD*=1.20) living in their home. Collectively, mothers in the household held higher socioeconomic status jobs than fathers. Higher occupational index scores reflect greater socioeconomic status within the household. The average status by mothers was about a score of 35 (M=34.79, SD=25.12) as compared to fathers with a score of 30 (*M*=29.41, *SD*=14.59). The combined occupational index score for the household was about 64 (*M*=64.21, *SD*=32.46).

Overall Quality of Life scores and the three component constructs are products of both the importance and satisfaction scores ranging from 3.33 to –3.33. Based upon a normal curve, Smith and Briers (2001) utilized the following convention for interpreting quality of life scores: (1) *Excellent*=3.32 to 1.51; (2) *Very Acceptable*=1.50 to 0.51; (3) *Adequat*e=0.50 to -.50; (4) *Problematic*=-0.51 to -1.50; and (5) *Very Problematic*=-1.51 to -3.33. Overall, students in this sample perceived themselves as having a very acceptable quality of life (*M*=1.45, *SD*=0.95). Similarly, students scored in the very acceptable range for the constructs of Being (*M*=1.50, *SD*=1.00), Belonging (*M*=1.44, *SD*=0.98), and Becoming (*M*=1.42, *SD*=1.05).

In terms of the perceived control that adolescents had over their life and potential opportunities for adolescents to improve their lives, these two constructs were based upon a five-point scale. Control scores were rated by asking "How much control do I have over..." my physical health, my thoughts and feelings, my beliefs and values, the places where I spend my time, the people whom I spend my time with, using what my community has to offer, the everyday things I can do in my life, the things I can do for fun and enjoyment, and the things I can do to improve myself." Overall, the adolescents felt fundamentally empowered based upon perceived control (*M*=4.12, *SD*=0.60). Opportunity scores were rated by asking: "Are there opportunities for me to improve..." the same nine statements identified above in reference to Control. These adolescents were less optimistic in regards to Opportunity, with an average perception between "some" and "many" (*M*=3.48, *SD*=0.90).

Hypothesis One - For the purpose of this hypothesis, it must be pointed out that of the 176 students participating in the study, 11 did not reveal ethnic background. In addition, one student was self-identified as being American Indian or Alaskan Native and another as being African American. Due to the missing data and the small cell size that would have resulted in including the latter two students, a total of 13 cases were omitted from the following analyses. There was a statistically significant ethnic effect upon overall quality of life, F_{BF} (1,123.59)=12.05, p<.001, f_C=.27. Anglo students (M=1.78, SD=1.09) perceived themselves as having a higher overall quality of life than Hispanic students (M=1.26, SD=.75). A statistically significant ethnic effect was found on perceived control over the students' quality of life, F_{BF} (1,152.01)=6.49, p=.01, f_C=.20. Anglo students (M=4.25, SD=.56) perceived themselves as having greater control over their quality of life, compared to Hispanic students (M=4.02, SD=.60). A statistically significant difference was found between ethic background and opportunities for the adolescents to improve their quality of life, F_{BF} (1,121.4)=36.34, p<.001, f_C=.46. Interestingly enough, Hispanic students (M=3.38, SD=.67) perceived themselves as having greater opportunities to improve their quality of life than did Anglo students (M=3.01, SD=.95).

Hypothesis Two - Data related to occupational index score, a proxy for socioeconomic status, were coded into the following categories: (1) 10 to 46 = low socioeconomic status; (2) 47 to 84 = middle socioeconomic status; and (3) 85 to 126 = high socioeconomic status. This assignment resulted in the groups being roughly equal in membership. It should be noted that 38% of the students did not respond to this question, resulting in a sample size of 138 for these analyses. An overall statistically significant socioeconomic status effect was found in overall quality of life, F_{BF}(2,116.61)=18.82, p<.001, f_C=.47. In terms of the planned contrasts, there was a significant difference between adolescents coming from upper socioeconomic status families, when compared to students whose families fell within the lower and middle socioeconomic status groups, t(64.46)=19.29, p<.001. However, no statistically significant difference in overall quality of life was found between adolescents in the lower socioeconomic status group and students in the middle group, t(90.7)=.21, p=.42. In terms of trends, there was a statistically significant quadratic trend (F(1,135)=8.99, p=.003).

A statistically significant socioeconomic status effect was found on perceived control over the students' quality of life, F_{BF} (2,131.81)=8.48, p<.001, f_C=.34. Adolescents in the higher status group felt significantly greater control over their quality of life, than did adolescents in the other groups, t(94.57)=82.33, p<.001. Similarly, adolescents in the middle status group felt significantly greater control over their quality of life, than did adolescents in the lower group, t(89.61)=2.04, p=.023). There was a statistically significant linear trend (F(1,134)=16.89, p<.001) indicating as socioeconomic status increased perceived control over quality of life increased proportionally.

A statistically significant socioeconomic status effect was discovered on perceived opportunities for the adolescents to improve their quality of life, F_{BF} (2,116.45)=13.83, p<.001, f_C=.42. Adolescents in the higher status group perceived significantly greater opportunities for the improvement in their quality of life, than did adolescents in the other two groups, t(65.40)=37.34, p<.001. However, no statistically significant differences were found between students in the lower socioeconomic status group and students in the middle socioeconomic

status group, $t(85.77)=-1.37$, $p=.087$). A statistically significant linear trend ($F(1,130)=25.75$, $p<.001$) indicating as socioeconomic status increased, perceived opportunities for the adolescents to improve their quality of life decreased proportionally.

Hypothesis 3 - For the following analyses, families with one child were coded as one group, families with two children were coded as a second group, and families with three or more children were coded as a third group. When examining overall quality of life, statistically significant differences were found based upon number of children in the household, $F_{BF}(2,127.33)=9.8$, $p<.001$, $f_C=.33$. Adolescents in the families with two children felt significantly greater control over their quality of life, than did adolescents in the other groups, $t(108.83)=-3.65$, $p<.001$). However, no statistically significant differences existed in overall quality of life between adolescents in one-child homes and those in homes with three or more children, $t(65.85)=-1.50$, $p=.069$. There was a statistically significant quadratic trend ($F(1,129)=13.00$, $p<.001$) indicating a nonlinear relationship between household composition based upon number of children.

No statistically significant household composition effect was found based upon number of children and perceived control over the students' quality of life, $F(2,123)=1.73$, $p=.09$, $f_C=.17$. However, a statistically significant socioeconomic household composition effect was discovered on perceived opportunities for the adolescents to improve their quality of life, $F_{BF}(2,90.27)=15.06$, $p<.001$, $f_C=.44$. Adolescents in homes with two children perceived significantly less opportunities for the improvement in their quality of life, than did adolescents in the other two groups, $t(98.82)=5.10$, $p<.001$. However, no significant differences were found between students in homes with only one child and students in homes with three or more children, $t(40.95)=-.15$, $p=.44$). A statistically significant quadratic trend ($F(1,120)=27.36$, $p<.001$) indicating nonlinearity between household composition based upon number of children and opportunities for the adolescents to improve their quality of life.

Hypothesis 4 - For the following analyses, children from families with one adult were coded as one group, children from families with two adults were coded as a second group, and children from families with three or more adults were coded as a third group. When examining overall quality of life, statistically significant differences were found based upon number of adults in the household, $F_{BF}(2,75.65)=21.70$, $p<.001$, $f_C=.50$. Adolescents in the families with two adults had a significantly lower overall quality of life, than did adolescents in the other groups, $t(101.46)=4.14$, $p<.001$. Adolescents from one-adult households had a significantly higher overall quality of life than did adolescents from households with three or more adults, $t(51.66)=-5.26$, $p<.001$). There was a statistically significant quadratic trend ($F(1,158)=18.99$, $p<.001$) between household composition based upon number of adults and overall quality of life.

A statistically significant household composition effect based upon the number of adults in the home, was found on perceived control over the students' quality of life, $F(2,151)=8.94$, $p<.001$, $f_C=.33$. Adolescents in the families with two adults had a significantly lower perceptions of control over their quality of life, than did adolescents in the other groups, $t(151)=3.10$, $p<.001$. Similarly, adolescents from one-adult households had significantly higher perceptions of control over their quality of life, than did adolescents from households with three or more adults,

$t(151)=-3.08$, $p<.001$. There was a statistically significant quadratic trend ($F(1,151)=9.59$, $p<.001$) between household composition based upon number of adults and overall quality of life.

A statistically significant household composition effect, based upon the number of adults in the home, was found on perceived opportunities for the improvement of the adolescents' quality of life, $F(2,147)=28.14$, $p<.001$, $f_C=.53$. Adolescents in the families with two adults had significantly greater perceptions of control over their quality of life, than did adolescents in the other groups, $t(147)=-3.87$, $p<.001$. Similarly, adolescents from one-adult households had significantly lower perceptions of opportunities for the improvement of their quality of life, than did adolescents from households with three or more adults, $t(147)=6.56$, $p<.001$. There was a statistically significant quadratic trend ($F(1,147)=15.01$, $p<.001$) between household composition based upon number of adults and the adolescents' perceptions of opportunities for the improvement of their quality of life.

Conclusions/Recommendations/Implications

Due to the nonrandom sampling technique used in this study, the conclusions, recommendations, and implications will be limited only to those students participating in the study. As a group, these students were optimistic about their overall quality of life, were optimistic about perceived control over the quality of life, but were less optimistic about opportunities for the improvement of their quality of life. Intuitively, there must be a relationship among these measures of quality of life and the attitude in which these adolescents approach knowing, teaching, and learning, particularly in the affective domain. However, the breadth and depth of this relationship is certainly far from being understood. Hopefully by sharing this finding with teachers, counselors, and educational leaders in the high school, they will be able to approach these students with a deeper understanding of how their students feel about this important dimension of their life. It is recommended that future research focus upon the cognitive, affective, and behavioral components of attitudes and perceptions that these rural adolescents have towards the quality of their life.

The data did not support the first research hypothesis. Although Anglo students felt that they had a higher quality of life and exhibited more control over their quality of life, Hispanic students felt that they had significantly more opportunities for the improvement of their quality of life. In terms of practical significance, the analysis demonstrated convincingly that the differences in opportunities to improve quality of life between Hispanic and Anglo students are formidable. Subsequent research should examine the correlation between family socioeconomic status and ethnicity. If Hispanic students reside in households with lower socioeconomic status, then the gap between overall quality of life might be greater than the same gap faced by Anglo students. Consequently, the need to perceive opportunities by Hispanic students may be greater. Subsequent research should also focus upon generational differences among the Hispanic student population. Given the fact that most Hispanic students in rural West Texas communities are Mexican-Americans, intuitively there is a great deal of variability within this group of students based upon the number of generations that one's family has resided within the United States.

The second research hypothesis on socioeconomic status was supported by the data. For this group of students, the rural youth who came from the seemingly more affluent households

perceived themselves as having a higher quality of life. Once again, the effect sizes of the relationships verified this finding convincingly. Of particular interest though was the nonlinear relationship between overall quality of life and socioeconomic status. Due to the fact that there was little difference between adolescents in the lower and medium groups, the trend was quadratic in nature. There was not a consistent increase of change in quality of life based upon socioeconomic status. Clearly, there is a need for school districts to provide leadership for rural economic development. Often rural school districts are the largest employers within rural communities and are the primary source of social capital. Flagship school districts are fundamental in a community's ability to attract value-added agricultural businesses and other industries. They also have a significant influence upon the development of human capital that enters into the workforce, and can play a major role in adult education within a community.

Both research hypotheses associated with family composition were rejected. In terms of the number of children in the household, students in two-child households had a higher overall quality of life, but no difference was found between this group of students and the other groups in perceived control. Surprisingly, this same group of students felt that they had less opportunity to improve their quality of life than the other groups. There was a large practical significance in students' perceived opportunity to control their quality of life, and whether or not students resided in a two-child home. Another unexpected finding was that students residing in homes with two adults felt that they had a lower overall quality of life when compared to other family structures. This relationship was both statistically and practically significant. In fact, adolescents residing in single parent homes exhibited the highest overall quality of life.

Future research should look closer at the relationships between overall quality of life, perceived control, and opportunity for improvement. Might adolescents residing in single parent households have higher expectations for household maintenance activities than students from other households, and consequently feel that they have greater control over their quality of life? Would the amount of control directly influence perceptions of overall quality? Do students from traditional homes feel more financially and emotionally secure regarding future opportunities? Perhaps more sophisticated multivariate analyses might shed additional light on this subject. In formulating hypotheses, the researchers treated the three components of quality of life as a "bundle" in relation to the ethnicity, livelihood, and household composition variables of interest. If anything, the data have indicated that there is a great deal of variability in the three components based upon these measured variables. Future research should examine the relationship between degree and intensity of participation in school-based organizations and activities such as the FFA, FHA/HERO, band, choir, athletics and perceptions of quality of life. Additionally, organizations external to the school district such as church youth groups and 4-H participation should be examined.

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Relationships Between Selected Demographic Characteristics and the Quality of Life of Adolescents in a Rural West Texas Community – A Critique

by
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The researchers should be commended for their theoretical framework, purpose, procedures, findings, conclusions, recommendations, and implications.

I recognize that this research, the conclusions, recommendations, and implications are limited to the study population. However, permit me to place this research in the context of a number of U.S. economic factors. Even though the U.S. achieved tremendous economic prosperity between 1993 –2001, farm prices remained relatively low during this period. Unquestionably, low farm prices and other factors had negative impacts on the quality of life of many rural residents. In order to strengthen the infrastructure of rural communities, the Farm Service Agency administered $28 billion to farmers and ranchers in fiscal year 2000. The economic decline in the U.S. over the last three years is having a double and in some cases, a triple negative affect on the quality of lives of rural and urban residents.

It is worthy to note that the "students in this study were optimistic about their overall quality of life, were optimistic about perceived control over the quality of life, but were less optimistic about opportunities for the improvement of their quality of life." This finding should be a serious concern for those who are concerned about our youth. For many years, African-American urban youth have been less optimistic about opportunities for the improvement of their lives. It is good to know that in this study, Hispanic students felt they had significantly more opportunities for the improvement of their lives than Anglo students. Moreover, "adolescents residing in single parent homes exhibited the highest overall quality of life."

If we are serious about the quality of life of our youth, this study provides the profession with an excellent framework for developing a research agenda around youth and development. The researchers have already outlined a number of possible studies and perhaps the National Council for Agricultural Education or some other entity should convene a national summit on youth development in agricultural education.

I personally want to thank the researchers for the scholarly nature of their research and call upon the profession to take note of the recommendations. The challenges ahead of us will be unprecedented and the quality of life for our youth will be tested. The war in Iraq and the Middle East conflict alone could very well put the quality of life of future generations at risk. Our youth are depending upon us, the adults to leave them with a better quality of life than our generation. This is a tall order in light of where our country is today and world affairs. When I think about the nearly 500,000 agriculture students and FFA members, we have a major responsibility ahead of us. I feel confident that we will be able to meet the challenges that lie ahead.

Leadership Life Skills Demonstrated by Texas State 4-H Council Members

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Abstract

This study examined the demonstration of leadership life skills by former Texas State 4-H Council members. The researchers used a purposive sampling technique to identify former members of the Texas State 4-H Council. A snowball sampling technique was used to identify the remainder of the sample. There were fifteen individuals interviewed. Traditional qualitative research methodologies were used to collect and triangulate data. These methods included interviews, participant observation, and document analysis. The researcher used documented methods of dependability, transferability, confirmability, and credibility to establish trustworthiness. The major finding of the study was that Texas State 4-H Council members demonstrated a command of the seven leadership life skill categories. Recommendations include developing a training method to continue to expand the council members' decision-making abilities, continue current activities and expand the opportunities for the Texas State 4-H Council members to get to know each other and develop as a group, implement extensive training in personality types and how to positively work with different types and employing new ways of improving communication between members, members and advisors, and members and their external environment.

Introduction/Theoretical Framework

The Texas State 4-H Council is a body of young people elected to fill the highest positions young people can attain in the 4-H organization in the state. Approximately 34 members sit on the State Council. Being a Texas State 4-H Council member is often seen as the pinnacle of a young person's 4-H career. Council members plan retreats, conferences, and camps for the 4-H members that they represent. They are the most visible of all 4-H members, being responsible for industry contacts and public appearances representing the state organization. Young people covet Texas State 4-H Council positions. Individuals that fill Texas State 4-H Council positions receive opportunities that are not available to other 4-H members, such as travel, networking and training.

Many experiences are included in the preparation for and the year of travel, speeches, workshops, and conferences that make up a Texas State 4-H Council position. These young people take a journey as they prepare for and take on their council year. Cooperative Extension states that the 4-H program develops leadership and life skills among its members (National 4-H Council, 2003). Seevers and Dormody (1995) found that "holding an office" is one of the capstone leadership development experiences.

Kouzes and Posner (1987) note that leadership is an observable, learnable set of practices. In the contemporary context, the subject of leadership requires learners to become adept at shaping and fulfilling not only their own aims, but those of their followers as well (Kaagan, 1998). Instrumental to leadership development is a wide range of aptitudes and capabilities (personal qualities, moral commitments and management skills), all of which affect a person's interactions with co-workers, constituents or customers. When leaders and followers attempt to work together to attain common goals the most direct effects of leadership development can be experienced (Terry, 1993).

During the last few years there has been an increasing interest in leadership development and education. Cacioppe (1998) explains this in two ways. First, the rapid change in business, technology, global communications, and human values dictates the interest in leadership education. The world is changing fast. As change occurs, the world will demand leaders. Second, our society has lost confidence in the ability of science and technology to solve problems. Many times, instead of being the solution, individuals see science and technology as the cause of the problems. Finally, Cacioppe (1998) demonstrated that there is a need for leadership in organizations.

Undergraduate agricultural degree programs in land grant colleges throughout the United States identify leadership development as an important objective of their programs (Love & Yoder, 1989). Leadership development has been, and continues to be, a major goal of most youth programs (Seevers & Dormody, 1995). Obviously, educators on two levels (secondary and higher education) believe that we, as educators, can teach leadership skills. Research has shown that both sets of educators believe that the 4-H program does teach those skills. However, Cooperative Extension and 4-H take leadership development one step further by advocating that a specific skill set is learned within the larger context of leadership.

In 1992, it was estimated that 25% of our nation's youth engaged in high risk activities- heavy alcohol, tobacco, or drug use, delinquency, and poor school performance or non-attendance (Boyd, Herring, & Briers, 1992). An additional 25% were considered to be at a moderate risk level. Hoopfer (1981) believes that the number of youth exhibiting these kinds of behaviors points to a lack of skills necessary for adulthood- skills in working with others, understanding self, communicating, making decisions, and leadership. Boyd, et al. (1992) believed that these are the skills required by adults for everyday living and have been deemed leadership life skills. These skills allow youth to better cope with their environment by making responsible decisions, having a better understanding of their own values, and being able to communicate and get along with others. The development of this set of skills is the cornerstone of 4-H youth development programming.

Miller (1976) conceptualized leadership life skills developed in the 4-H program into seven categories: decision making, relationships, learning, management, understanding self, group processes, and communications. Luft (1986) organized the leadership life skills into four conceptual domains of general leadership, speaking skills, group leadership skills and work related skills. Seevers, Dormody, and Clason (1995) adopted Miller's conceptualization for purposes of their life skills assessment and expanded the definition into the development of the life skills necessary to perform leadership functions in real life. For purposes of this research, we will also use the seven categories of the life skills conceptualized by Miller and the broader definition from Seevers, Dormody, and Clason.

There exists the perception that participating in a variety of activities enables members of the 4-H program to develop positive life skills. Seevers and Dormody (1995) found that a majority of 4-H members participated in many different leadership activities. Participation in 4-H leadership life skills activities was the greatest at the club level. However, researchers also found high participation in activities at the county/district level. This suggests that more 4-H members may

be participating in a broader range of leadership development activities at a higher level of leadership. In an assessment of activities where 4-H members ranked the activities they believed allowed them the best opportunity to acquire leadership life skills, four activities tied for the number one spot. Holding an office was the first of those four activities. Cantrell, Heinsohn, and Doebler (1989) found that perceived life skill development was positively related to general participation and leadership roles at the three succeeding levels ("club," "county," "beyond county") of 4-H programming. At the "beyond county" level, 68% of 4-H members surveyed said they participated generally in activities and 17% said they were taking on leadership roles. In the same study, the authors found that leadership life skill development dramatically increased when 4-H members experienced leadership roles beyond the club level, positively affecting development in nine of the ten clusters surveyed (value development, interpersonal skills, citizenship development, communication skills, career development, agricultural skills, and home economics skills). Home economics skills were the only cluster identified as not having positive development.

It is also important to note that inter-relatedness plays an important role in defining and achieving motivation. Anderman and Midgely (1998) describe inter-relatedness as one of three pieces of the motivational pattern of self-determination. Self-determination theory describes students as needing a sense of competence, relatedness to others, and autonomy. Competence involves understanding how to, and believing one can, achieve various outcomes. Relatedness involves developing satisfactory connections to others in one's social group. Autonomy involves initiating and regulating one's own actions. For young adolescents, with their increased cognitive ability and developing sense of identity, a sense of autonomy may be important. Students at this stage say that they want to be included in decision-making processes and to have some sense of control over their activities.

Purpose/Objectives

The purpose of this study was to investigate the skills 4-H members learned once they were in office. As extension professionals, we often assume that leadership is taught, but research has failed to describe what was actually learned as a result of being an officer. For example, we know that they learn communication skills, but what *kind* of communication skills. We know that they learn relationship skills, but how does this impact their future relationships?

Methods/Procedures

Qualitative research is as much a point of view as it is a set of methods. Knowledge is socially constructed and builds the foundation for qualitative research. The qualitative framework also embraces the notion that participants, both interviewer and interviewee, influence and are influenced by data collection and analysis. Credible qualitative inquiry depends on creating categories of meaning firmly based in the social realities of study participants.

Purposive sampling is central to naturalistic inquiry. Erlandson, Harris, Skipper, and Allen (1993) say that random or representative sampling is not preferred when doing naturalistic inquiry because the researcher's major concern is not to generalize the findings of the study to a broad population or universe, but to maximize discovery of the heterogeneous patterns and problems that occur in the particular context under study. Purposive sampling increases the range of data exposed and maximizes the researcher's ability to identify emerging themes that take adequate account of contextual conditions and cultural norms. The researchers used purposive sampling, a technique that intentionally seeks out participants/data sources because of certain qualities, to find participants who were willing to discuss their experiences as Texas State 4-H Council members. The names of participants for this study were from personal knowledge; those

students in the classes taught by the researchers who identified themselves as former council members. A snowball sampling method was then used, whereby the knowledge of the first group was used to find the second group (Babbie, 2001).

Within naturalistic inquiry, there is no concrete rule for sample size. The key is to look more for quality than quantity, more for information richness than information volume (Erlandson, et al., 1993). Patton (1990) says that sampling size adequacy is subject to peer review, validation and judgment. The sampling procedures and decisions need to be described, explained and justified such that they can be reviewed and judged appropriately. This study focused on 15 individuals who had participated in the Texas State 4-H Council program from 1988-89 through 2001-2002.

The researcher used several qualitative methods to gather data. Those methods included interviews, participant observation, and document analysis. Dexter (1970) describes interviews as conversations with a purpose. Lincoln and Guba (1985) say that interviews allow researchers and respondents to move back and forth in time; to reconstruct the past, interpret the present, and predict the future. Interviews also help the researcher to understand and put into a larger context the interpersonal, social, and cultural aspects of the environment (Erlandson, et al., 1993). Semi-structured and unstructured interviews were scheduled and conducted. Participation in these interviews was voluntary. All interviews were coded to retain confidentiality. The codes for this project include the type of data collection method used (I for interview), gender of interviewee (F or M), and the type of geographic area in which they were raised (R for rural, >50K for town over 50,000 people, and <50K for town under 50,000 people).

Participant observation offers a researcher the rare opportunity to observe the participants in their element, on their "turf." It gives any researcher the opportunity to see, first hand, the reality of what their subjects experience everyday. In this study, the researchers observed the participants throughout the interview process. According to Lincoln and Guba (1985), documents also provide a stability of information, contextual relevance, richness of information, natural language of the setting, and are non reactive. The researchers also used handbooks, training manuals, and other similar materials for informational purposes, and to grasp the time and place within which the officers work.

Data analysis followed the traditional methods described by Lincoln and Guba in *Naturalistic Inquiry* (1985). These methods allowed the researcher to analyze data throughout the entire research process, not just at the conclusion. More importantly, using these methods brought the researchers nearer to an understanding of the subjects involved in the research and of the research itself. This method allowed for constant improvement and validation. Lincoln and Guba (1985) adopted the Glaser and Strauss (1967) constant comparative method for use in naturalistic inquiry. Lincoln and Guba believe that by using this method, the researcher is able to develop a construct of the reality in which they are studying. The researchers' use of this method followed that adaptation and is outlined below:

- Unitization of Data - Interview transcripts were "unitized" and printed onto 4" x 6" index cards. The researcher coded all index cards to correspond with the appropriate interview code for audit purposes.

- Categorization of Units - During this stage, the researcher sorted the data cards into categories or themes using the Glaser and Strauss (1967) constant comparative method. Eventually, categories or themes emerged from constant contact with the data.

- Merging Categories - Here, the researcher reduced the remaining categories into the salient themes that became the final construct. Some of the categories were discarded completely or dissolved into other remaining categories during this phase.

- Journaling - This process occurred throughout the research as the researcher kept a methodological journal, chronicling the decisions and situations with the research process itself. The researcher kept a second, reflexive journal as well.

Lincoln and Guba (1985) propose that a significant study report should include "thick description" of the context and process observed, discussions of saliencies identified at the site, outcomes or lessons learned, and a thorough description of the final, research methods as they unfolded. This description includes a discussion of the validity or trustworthiness criteria (credibility, transferability, dependability, and confirmability). In this study, the researchers established credibility through persistent observation, triangulation, peer debriefing, member checking, and reflexive journaling. The researchers used thick description in the reporting of respondent's thoughts and ideas relative to the research questions and purposive sampling to establish transferability. In this study, the researchers used a dependability audit and journaling to establish dependability. Methods to establish confirmability included the confirmability audit and reflexive journal. Establishing trustworthiness enables the researchers to claim methodological soundness.

Results/Findings

Using Seevers and Dormody's *Youth Leadership Life Skills Development Model*, this researcher was able to identify some of the skills that the State 4-H officers gained throughout their term. Specific operational definitions for each of the categories for purposes of this study were created using the words of the Texas State 4-H Council members. This was done in order to construct a more realistic conceptualization of the skills, as the State 4-H Council members perceived them.

The first of the seven categories of leadership life skills is decision making. Several of the council members interviewed for this study demonstrated an ability to make decisions based on situations or methods they learned while on Texas State 4-H Council. Ten council members talked about their experiences of learning to make decisions based on the time requirement of being on State 4-H Council (I1, I2, I3, I7, I8, I9, I10, I11, I13, I14). These individuals talked about learning what priorities were and making decisions based on the priorities they had chosen. "I don't think that I missed out on anything because of 4-H either. I made it a point to manage my time around 4-H and that was how I wanted it" (I7.M.<50K.4). "I had to plan my life around state council. I planned my life around state council. Everything came second to that" (I8.F.<50K.6). Nine council members expressed a desire to take on the Texas State 4-H Council role because they wanted to make decisions that would make a difference in the lives and the 4-H experiences of their peers (I1, I2, I3, I6, I7, I8, I9, I13, I14). One State 4-H Council member in particular discussed a long-standing desire to join Texas State 4-H Council to make some changes that would have far reaching effects for their district leadership (I7). Another council member talked about wanting to make decisions that would have a positive affect on the 4-H members at home in the counties within their district (I6). "I wish that they would have let us lead the state instead of calling us leaders and the only thing we did was decide on themes. We never got to build our own schedules or make our own choices. I think that they {advisors} believe that kids, if given the opportunity to lead, will screw things up, and so they don't ever let us do anything. They do everything for us, make all our decisions for us" (I6.F.<50K.4).

The second of the seven categories of leadership life skills is relationships. Eleven of the council members discussed their experiences in getting to know and working with a large group of peers, they did not know well at the outset (I1, I2, I3, I4, I5, I6, I8, I9, I10, I13, I14). "Definitely when

working with people I would {use what I learned on council}. You know that there are 28 other people on council and so you need those people skills… so you learn how to get along" (I5.M.<50K.1). Greater than their desire to work well with one another was their desire for a close-knit group of friends. "I know that I walked away with a really core group of friends. And even if they are not 'friends' it's a strong network of people" (I4.F.>50K.5). "I think the other thing was that I walked away with a lot of friendships. And maybe not just friendships in like people I talk to all the time, but connection. To know that wherever you go you might be able to find people that you have something in common with, like a common bond" (I1.F.R.6). All of the council members interviewed discussed the friendships that grew out of their council experiences with great fondness, placing it at the top of the list of things that they walked away with from the experience (I1-I15).

The third of the seven categories of leadership life skills are learning. Several council members discussed things they learned throughout their council year. Whether it was a skill or something new about themselves or the world around them, many council members walked away with something new. Five of the council members felt like the greatest lesson learned was a new skill (I1, I6, I7, I9, I11). "{I feel like I walked away with} huge leadership skills. I think that the most important thing that I learned was that a good leader is not always the one that is in charge, or they don't always have to be in charge" (I1.F.R.6).

Tied closely to the third skill category, is the fourth category of understanding of self. Having an understanding of self encompasses knowing your own individual strengths and weaknesses and knowing in what areas of your life learning has occurred. Thirteen council members recognized that their personal growth was the area where their learning occurred (I2, I3, I4, I5, I7, I8, I9, I10, I11, I12, I13, I14, I15). "I think that the greatest skill you get is confidence. You gain a greater sense of confidence in yourself" (I5.M.<50K). "I think that I am much more self confident. I know that I learned to be a lot more open with myself" (I2.F.R.5).

The fifth skill category is management. In the case of the Texas State 4-H Council, management was similar to other skill areas and learning methods. Council members demonstrated the ability to manage their own paths to reach the state council goal by learning all they could from their own experiences and the experiences of others. These young people exhibited management skills through decision-making and priorities on their time. Finally, they demonstrated the ability to manage their time as Texas State 4-H Council members successfully as they learned new skills and further developed old ones.

The sixth leadership life skill is group processes. The Texas State 4-H Council defined group process as understanding how a group works and how an individual can positively, or negatively, influence a group. Each of the individuals interviewed discussed their own experiences with the group and their understanding of the group processes of the 4-H Council. Eight members of the group perceived that their group worked successfully or had positive group processes (I1, I2, I4, I5, I9, I11, I13, I14). "We did some outstanding stuff as a group. We knew we had to work together and so we really did it and we helped each other out too" (I13.M.>50K.5). Five members of the group perceived that their group did not work well together of had ineffective group processes (I3, I6, I7, I8, I10). "There was never any team. Everyone kind of came up with their own stuff and did their own thing. We never sort of collapsed that to meld into a team" (I6.F.<50K.2). Seven of the State 4-H Council members discussed the cliquishness of the group as a whole or the lack of team unity (I3, I4, I6, I7, I8, I9, I10). "I also think that we were cliquish as a group and so that makes me wonder if they {minority delegates or delegates-at large} got the same experiences that I got" (I4.F.>50K). "Socially we got along fine I guess. It was so cliquish, and that was one of our goals- not to be cliquish, but it was. It always is. You know as soon as you walk in everybody has their game face on. People are just fake. Everyone wants to get elected" (I8.F.<50K.2). "We were cliquish. There were about four girls, then three or four

guys depending and we were a group, and then there was the rest of the group. I mean I hate saying that. But it's true, we were really cliquish" (I3.F.R.3).

The last of the leadership life skill categories is communications. On the Texas State 4-H Council, communication is key between individual members, members and advisors, and between the council and the people they meet and work with outside the 4-H program. Several council members talked about learning how to communicate differently, depending on which of the three audiences they were addressing. Eight council members talked about learning to communicate with their peer groups (I1, I2, I4, I5, I9, I11, I13, I14). "We communicated really well together. And we wanted to work hard {at communicating} and we did that together and really supported each other" (I2.F.R.3). Eleven of the council members discussed learning to communicate with their advisors (I1, I2, I3, I4, I6, I7, I8, I9, I12, I13, I14). "We would propose things and they would always get shot down, and because of that we learned that if we wanted something we would go to the advisors in a small group and more often than not, we would get what we wanted that way. Things got done faster that way. So if we wanted something done, we would send one or two or even up to four or five to go to the advisors and they would say yes" (I6.F.<50K.5). Ten talked about learning how to properly communicate with the people at their different speaking engagements (I1, I2, I3, I4, I8, I9, I10, I11, I12, I13). "I always wrote them {thank you notes}, but now I learned the best way to write them. I got a thank you letter for helping at something as a state officer, and it really meant something to me and so I thought that if getting that meant something to me, then I should write really good ones because they might mean something to someone else" (I1.F.R.3).

Conclusions/Recommendations/Implications

This study looked at the leadership life skills conceptualized by Miller and how each of the council members demonstrated those leadership life skills. Eleven council members discussed decision-making as being a part of their job as council members. Ten talked about having to learn to make decisions based on the time requirements of being a Texas State 4-H Council member. Nine council members talked about having a desire to make decisions that would have a positive effect on their peer group and younger 4-H members. We conclude that while council members made decisions in the past, when they became State 4-H Council members, they honed those skills as they made choices about how to prioritize their time.

Eleven council members described a desire to cultivate positive relationships with their peer group. All of the council members explained that the friendships that they formed, were the most important part of their council experience. From these findings, we conclude that Texas State 4-H Council is a unique bonding experience for its members. These friendships and the bonding experience of the council only serve to further the feelings of inter-relatedness that these individuals need as part of their motivational patterns (Anderman & Midgley, 1998).

Five of the council members believed they learned a new skill while serving on the council. Thirteen of the council members felt like their personal growth (becoming more confident, more self aware) was where their greatest learning occurred. Learning and understanding of self occurs while on the Texas State 4-H Council, and further that understanding of self is one of the major components of the State 4-H Council experience.

Eight council members had positive perceptions regarding the group processes of their council cohort. They felt like their group communicated well, the group had positive relationships with their advisors, and worked well as a whole. Five council members had negative perceptions of their cohort's group processes. These individuals believed that their groups did not communicate well and that their groups had poor relationships with their advisors.

Eight council members discussed learning how to communicate with their peer group during their council experience. This experience includes being vigilant in writing letters, making phone calls, and keeping the group informed of all pertinent information regarding upcoming events. Eleven council members talked about experiences that taught them how to communicate with the council advisors. This experience includes best decision-making processes and becoming aware of the importance of keeping in touch with the advisors. Ten council members discussed learning how to communicate with those outside of the council as a learned skill. This would include writing sincere thank you notes to corporate donors, judges and speakers at events and county extension personnel who would invite them to speak at county functions.

We conclude that council members learn new communication skills because of the council experience. While being a member of the Texas State 4-H Council, members also gain the leadership life skills conceptualized by Miller (1976) and further developed by Seevers, Dormody, and Clason (1995). We would also conclude that throughout their year on State 4-H Council, members have the opportunity to further develop their prowess in these areas. The findings of this research, therefore, support the findings of Seevers and Dormody (1995) that espoused holding an office is one of the four best ways to gain leadership life skills.

However, it is clear that advisors and trainers address some of the areas of leadership life skills more fully than they address others throughout the year. In those cases, our recommendations are as follows:

- Develop a training method to continue to expand the council members' decision-making abilities. While they are making decisions about their use of time, experiential training in decision-making would help them hone those skills further and could encourage them to make decisions in other areas beyond just choosing the themes of state events. Experiential training activities might include exercises in setting priorities and scheduling since Texas State 4-H Council members must schedule a number of activities within a confined time.

- Continue current activities and expand the opportunities for the Texas State 4-H Council members to get to know each other and develop as a group as suggested by Tuckman and Jenson (1977). This will strengthen the bond between members and allow them to extend those bonds to other council members. Implement greater opportunities for team building utilizing challenge activities, communication builders, delegation activities, and down times during state, as well as council only events, with scheduled team strengthening activities.

- In the areas of understanding of self and group processes, we would recommend that council facilitators and advisors implement extensive training in personality types and how to positively work with different types. This training should include all council members and all council advisors and facilitators. Implementing this type of training would vastly improve the group processes of the council. In addition, it would improve the level of the professional culture surrounding the council, internally. By improving the professional culture, advisors will set a positive professional example for the Texas State 4-H Council members.

- Employ new ways of improving communication between members, members and advisors, and members and their external environment. This should include written and oral communication, as well as professional, non-verbal queues that indicate respect, attention, and active listening.

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Transfer of Training by Texas State 4-H Council Members – A Critique
Leadership Life Skills Demonstrated by Texas 4-H Council Members – A Critique by

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The research regarding the Texas 4-H Council members were conducted by the same researchers, and I believe the same fifteen respondents, therefore, my remarks will be about the two studies.

One of the key areas in leadership development focuses on building coalitions and effectively communicating to a variety of audiences. This foci area includes oral communication, written communication, influencing/negotiating, partnering, having political savvy, and possessing interpersonal skills. Texas 4-H council members are key leaders in delivering programs in the state and I commend the researchers for conducting a study on certain elements of this group. The researchers did a good job in describing the theoretical framework, purpose, methods, findings, conclusions, recommendation, and implications.

There are many leadership models on the market. However, many of them seem to possess elements of the industrial model of leadership. A survey of U.S. employers by the Hay Group (2002) revealed that leadership development programs yield disappointing results, wasting billions of dollars. They also reported that seventy percent of all change initiatives failed due to people issues – inability to lead, lack of teamwork, inability to deal with change, etc. Considering the results of this study and the Hay Group findings, perhaps this is a wake-up call for those of us who are responsible for leadership development efforts in our states. I would suggest that new and innovative leadership programs should be developed in the context of best cutting-edge practices. These practices should be researched based and closely linked to social, economic, political, and ethical dimensions of leadership. Moreover, participants should be given the opportunity for an enormous amount of dialogue in order to learn more about themselves, diverse audiences, and in contested situations.

In addition to building coalitions and communicating effectively, leaders of the future will have to demonstrate extraordinary skills in: leading change; leading people; achieving results; and obtaining business acumen (financial, human resources, technology) outcomes.

These research studies suggest a closer look at what should be done with the Texas State 4-H Council members during their tenure from a professional development perspective. I trust the researchers will share their findings with key leaders in the state in order to assist in improving the role of council members while in serving, and to provide them with additional life skills.

Science Can Be Fun?
A Look At Student Attitudes Towards Science After Completing A Year-Long Biology Course Taught Using Agriculture As The Context

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Abstract

The purpose of this study was to determine the attitudes of biology students who had completed a yearlong, introductory biology course that was taught utilizing animal agriculture as the context. The population for the study consisted of all students who enrolled in the biology course over a six year time period. Specific research questions sought to determine student attitudes towards science and the relationship of science with agriculture as a result of taking the biology course described.

Students were positive towards the relationship between science and agriculture when asked for their perceptions, however they had less certainty about their desire to work in a field of science that involved animals and/or animal agriculture. Students agreed that as a result of taking the biology class that was taught using animal agriculture that they appreciated science more than they did before the class. Students were in agreement that as a result of the biology class they understand biology better and believe they retained the information better when compared to other biology classes they've taken that didn't emphasize animal agriculture.

Introduction/Theoretical Framework

Research findings have supported the claim that integration of science into agriculture curricula is a more effective way to teach science. Studies reveal that students taught by integrating agricultural and scientific principles demonstrated higher achievement than did students taught by traditional approaches (Enderlin & Osborne, 1992; Enderlin, Petrea, & Osborne, 1993; Roegge & Russell, 1990; and Whent & Leising, 1988). In addition, students who had participated in an agriscience course achieved significantly higher scores on the science portion of a state's standardized test of high school graduates than did non-agriscience students (Chiasson & Burnett, 2001).

Recent science publications have espoused the attributes of integrating the science curricula. However, the method of integration referred to is almost always with *other* science courses (Scotter, Bybee & Dougherty, 2000; Steckelberg, et. al., 2000; Henriques, 2000). Limited evidence exists to support the concept that science teachers are encouraged to look for ways to integrate more hands-on, applied science concepts into the science curricula. To date, the researcher could find no empirical evidence to suggest that science teachers have been advised to integrate agricultural science and/or food system concepts into their curricula in an attempt to make science more relevant to their students. Likewise, no information could be found advising science teachers to initiate contact with other teachers in an effort to gain assistance for integrating applied science curricula into their existing lessons.

The National Commission on Mathematics and Science Teaching for the 21st Century, referred to as the Glenn Commission, calls student performance in mathematics and science unacceptable (National Commission on Mathematics and Science, 2000). In addition, literature in science education reveals that attitudes of middle school students towards science and the relevance of science in our society are poor (Jelinek, 1997). Helping students understand the nature of science rather than what they know *about* science has been a recent focus of research in science teaching. Devlin (1998) states "it is neither possible nor necessary for the general population to have detailed scientific knowledge across a range of disciplines. Instead, what is important is scientific awareness" (p. B6). By approaching students with diverse interests in various disciplines with curriculum that supports formal science education, science could be relevant to those who are disengaged with traditional approaches to teaching science.

The theoretical framework for this project lies in the current research being conducted on the nature of science and is grounded in experiential learning theory. Although there is currently no agreement on the definition of the nature of science, researchers agree that too often students are asked to memorize and repeat facts and figures about science rather than studying the scientific enterprise and the nature of science. As a result, a negative effect upon student attitudes begins to form. Studies reveal that the longer students remain in school-based science classes the less likely they are to feel positively about science (Hofstein, Maoz & Rishpon, 1990a; Yager & Yager, 1985; Yager & Penick, 1986)

Obstacles that serve to minimize student attitude and interest toward the study of science are explained by Jelinek (1997):

> The first major obstacle is the considerable gap between school science instruction and real scientific activity (Brown, Collins & Duguid, 1989; Lemke, 1990). The second obstacle is the idealized and mythic image of the nature of science that prevails in our schools, portrayed as impersonal, sterile, and inflexible (Austin, 1978). The third obstacle is a sense of relevance. The fourth obstacle is lack of instructional time, resulting in a lack of in-depth science instruction including hands-on activities and science processing skills (Mullis & Jenking, 1988; Romance & Vitale, 1992; Schoeneberger & Russel, 1986) (1997, p.2).

The experiential learning model provides the theoretical basis for this project. According to Dewey (1938), education is not a single step in a moment of time but rather a series of overlapping events that serve to help the learner construct meaning in much more than just the subject matter being presented. Dewey (1938) wrote:

Perhaps the greatest of all pedagogical fallacies is the notion that a person learns only the particular thing he is studying at the time. Collateral learning in the way of formation of enduring attitudes, of likes and dislikes, may be and often is much more important...For these attitudes are fundamentally what count in the future. The most important attitude that can be formed is that of desire to go on learning. (p. 49-50)

Further evidence for providing students with multiple contexts is found in brain-based research and learning by Caine and Caine (1994) who call for education to recognize the big picture.

They add "the part is always embedded in a whole, the fact is always embedded in multiple contexts, and a subject is always related to many other issues and subjects" (p. 7). Brain-based theory and experiential learning theory suggest that the interface between context and content provide students with multiple opportunities for transfer and overlap of complimentary concepts.

In 1993, a biology teacher in a large high school in the Midwest began teaching a traditional biology course using agricultural science as the context for teaching scientific principles. The biology teacher's training includes a Bachelor of Science in Agricultural Education. However, the teacher did not enter the Agricultural Science and Business teaching field, but chose to teach traditional science for the past 31 years instead. The motivation for teaching biology using a year-long thematic approach centered around the teacher's desire to expose students to concepts of where their food originates. No classes in Agricultural Science and Business are taught in the high school involved in this study.

The teacher created a series of instructional units, field trips, laboratory activities, and guest speakers focused on a specific farm animal for each year. Alternating between poultry, swine, and dairy cows, the teacher taught traditional biology using the animal agriculture context for six years. Many of the students who live in the 60,000+ community had never experienced, first-hand, animal agriculture and never considered the scientific understanding necessary to be involved in animal agriculture.

Purpose/Objectives

The purpose of this study was to describe the attitudes of high school students towards science after completing a traditional yearlong biology class that used animal agriculture as the context. This knowledge should be helpful to science teachers interested in developing approaches that increase interest in science and improve the relevance of science in their classrooms. Agricultural Science and Business teachers should benefit from this knowledge through a greater understanding of the importance of linking agriculture and science instruction. To fulfill the purposes of the study, the following research questions were addressed:

1. What are the perceptions of students towards science after completing a traditional biology class that was taught using animal agriculture as the context?
2. What are the attitudes of students concerning their understanding and appreciation for science after completing a traditional biology class that was taught using animal agriculture as the context?
3. What is the influence of selected demographic variables on the attitudes of students who completed a traditional biology class that was taught using animal agriculture as the context?

Methods/Procedures

This study utilizes survey research design. Elements of Dillman's Total Design Method (1978) were utilized to achieve an optimal return rate. The school involved in the study changed to a trimester schedule during the early phase of the investigation. The new schedule did not allow for the continuation of the biology course under investigation and therefore the target population

for this study was limited to the completers of the high school biology class that used animal agricultural as the context for teaching science. The high school involved in this study has a population of over 2,000 students and does not offer Agricultural Science and Business courses. The target population for the study included all students who participated in the biology course from the time animal agriculture was used as the context for teaching biology, from 1993 until 1999 (N=531). The biology teacher provided the researcher with a database containing the names and home addresses of all students. Although this study provides findings that addressed the specific research questions involved, the population and scope of study were too limited to generalize beyond the original school involved.

A survey instrument developed by the researcher was used to identify the perceptions of the completers of the biology course. Input on face and content validity was gathered from selected agricultural education university professors. Input on construct validity was established by the high school teacher involved in teaching the biology course. The survey instrument was developed in conjunction with guidelines provided by the Institutional Review Board for governing research conducted using human subjects by the institution employing the researcher. In addition, permission to gather data from students and past high school graduates was granted by the administration of the high school.

The survey instrument, cover letter, and parent release form were mailed to the home of the subjects in June 2000. Subjects were instructed to return the survey instrument by mail to the high school office, or to hand carry the instrument and deliver it to the main office of the high school. Two weeks after the initial mailing, a follow-up letter was sent to all non-respondents. Four weeks after the initial mailing a second survey instrument and cover letter was sent to all subjects who had not responded, with a follow-up reminder letter coming 2 weeks after that. The population included all students who had taken the biology course utilizing animal agriculture as the context. Addresses for some students were not current and survey packets were returned to the researcher undeliverable as indicated by the post office. After subtracting 75 subjects who were unable to be contacted, the researcher received 311 useable responses for a response rate of 68%.

Data were analyzed and summarized using frequencies, t-tests, and analysis of variance. To control for unequal variance Levene's test for equality of variance was used. When the p-value for Levene's test was <0.05, the two-tailed significance was calculated on unequal variance between the two groups.

For reporting purposes the author determined, a priori, that aggregate mean responses for Likert type statements would be grouped into categories to aid in interpretation. Responses equivalent to 4.50 or greater were categorized as "strongly agree." Responses ranging from 3.50 to 4.49 were categorized as "agree", and those with mean scores ranging from 2.50-3.49 were categorized as "unsure." Responses ranging from 1.50 to 2.49 were categorized as "disagree", while those responses receiving mean scores lower than 1.50 were categorized as "strongly disagree." Internal consistency for the Likert-type questions was calculated for the overall instrument using Cronbach's alpha at $\alpha = 0.77$.

Results/Findings

Students who participated in the biology class that was taught using animal agriculture as the context were exposed to one of three different yearlong themes. During the school years of 1993-94 and 1996-97 biology students were taught with the theme "Swine Time", an emphasis on the nature of swine. During the school years of 1994-95 and 1997-98 students were taught with an emphasis on dairy animals called "Dairy Daze". And, in 1995-96 and 1998-99 students received instruction centered on poultry in a thematic approach called "Poultry Power". In each theme throughout each school year, students were exposed to traditional biology principles through an animal agriculture reference.

Of the students responding to the study 30.2% had experienced Dairy Daze, 28.2% had experienced Swine Time, and the remaining 41.6% had been exposed to the Poultry Power theme. Of the students reporting, 97.7% were high school freshman participating in their first high school science class. When asked about the grade they received in the class 40.0% reported receiving an "A", while 41.0% reported receiving a grade of "B". The mean overall high school Grade Point Average of the respondents was 3.46 (out of a possible 4.00 Grade Index). Approximately 60% were females, and over nine out of 10 reported they were Caucasian. When asked for background information that might connect them to agriculture, less than three percent indicated they lived on a farm, and less than one in five (18%) reported they had been in 4-H.

Students were asked to identify the surrounding area in which they lived. Seven out of 10 respondents indicated they lived in an urban/city location. Furthermore, 37.4% indicated they had relatives who lived and/or worked on a farm. Data concerning additional demographic information is listed in Tables 1-3.

Table 1
Frequency and Percentage of Students By Geographic Area in Which They Live (n=305)

Geographic Location	f	%
Farm	8	2.6
Rural area	83	27.2
Urban/City	214	70.1

Table 2
Frequency and Percentage of Students Concerning Their Interest in Food Systems and Animal Agriculture (n=309)

Item Statement *As a result of taking this biology class my interest in food systems and animal agriculture is:*	f	%
High. I'm very interested in it.	16	5.2
Moderately high	72	23.3
Moderate. I'm somewhat interested in it.	158	51.1
Moderately low	37	12.0

Low. I'm not interested in it.	26	8.4

Table 3
Frequency and Percentage of Students Concerning Their Involvement in Food Systems and Animal Agriculture (n=309)

Item Statement *As a result of taking this biology class my involvement in food systems and animal agriculture is:*	f	%
High. I live and/or work in agriculture	12	3.9
Moderate. I'm interested but have not been directly involved	162	52.4
Low. I'm not involved in it at all	135	43.7

To obtain additional information regarding the impact of the traditional biology class that used animal agriculture as the context for teaching science students were asked to identify their interest and involvement in food systems and/or animal agriculture since participating in the course. Slightly less than three in ten students identified their level of interest as either high or moderately high. One-half of all respondents indicated a moderate level of interest in food systems and/or animal agriculture.

When asked their involvement in the food system and/or animal agriculture more than two in five indicated they were not involved at all. Over half of all respondents reiterated their interest but indicated they were not involved directly in the food system and/or animal agriculture.
To address research questions one and two, the subjects were asked to respond to 14 statements regarding their perceptions of science, and their perceptions of agriculture and science, as a result of taking the modified biology class. Their responses were measured using a five point Likert-type scale where 1=strongly disagree, 2=disagree, 3=unsure, 4=agree, and 5=strongly agree.

The raw mean scores for the statements regarding the respondents' perceptions of science ranged from a low of 1.77, indicating their disagreement, for the statement "too much science is required for high school graduation" to a high score of 4.58, indicating their strong agreement, for the statement "science provides us valuable answers to complex questions". Table 4 indicates the perceptions of science in general for the students responding in this study.

Research question two sought to determine the attitudes of students concerning their understanding and appreciation for science after completing a traditional biology class that was taught using animal agriculture as the context. Table 5 highlights the responses of student to statements in this category.

Table 4
Perceptions of High School Students Regarding Science After Taking a Biology Course Using Agriculture As the Context (n = 311)

Item Statement *To what degree do you agree/disagree with each of the following statements?*	Mean	SD
Science provides us valuable answers to complex questions	4.58	.70
Becoming a scientist is a noble profession	4.38	.76
Science relates to all aspects of life	4.38	.82
Exciting careers exist in the field of science	4.37	.82
Science is fun	4.22	.83
A strong background in science is helpful regardless of your desired profession	4.16	.81
Experimentation on animals is sometimes necessary in science	4.01	.97
Scientists are concerned with ethics in their work	3.98	.84
Science is boring	1.83	.96
Too much science is required for high school graduation	1.77	.87

Table 5
Perceptions of High School Students Regarding Their Understanding and Appreciation of Science After Taking a Biology Course Using Agriculture As the Context (n = 311)

Item Statement *After taking this biology class that emphasized animal agriculture I:*	Mean	SD
Appreciate science more than I did before	4.02	.86
Understand biology better because of the emphasis on animal agriculture	3.86	.96
Retained the information better than other biology classes I've taken that didn't use animal agriculture as the theme for the study	3.69	1.01
Could see myself working in a science related field that dealt with animals and/or animal agriculture (e.g. veterinarian, animal nutritionist, etc.)	2.54	1.13

Research question three sought to determine the influence of demographic variables upon student responses. Tables 6, 7, and 8 illustrate the statistically significant results of demographic comparisons made on student responses.

Table 6
Summary Data and Analysis of Variance for Student Attitudes Toward Science By Grade Point Average

Variable	n	M[a]	SD	SE
Science is Fun				
4.00-3.50	183	4.22[a]	.83	.06
3.49-3.00	93	4.37[b]	.66	.07
2.99-2.50	17	3.59[ab]	1.18	.29
0.01-2.49	8	4.00	1.07	.38
(F = 4.66, p<0.05)				
Exciting Careers Exist in the Field of Science				
	183	4.43[a]	.79	.06
4.00-3.50	93	4.40	.74	.08
3.49-3.00	17	3.82[a]	1.07	.26
2.99-2.50	8	4.00	1.31	.46
0.01-2.49				
(F = 3.53, p<0.05)				

[a]Means with the same letter superscript within categories are significantly different

Results of T-tests performed on student responses showed male student attitudes to be significantly more positive towards using animals for experimentation in science than females (Table 7). Students who reported relatives living and/or working on a farm perceived that they understood and retained the biology material better as a result of the thematic emphasis on animal agriculture when compared to their classmates who did not report a link to the farm (Table 8).

Table 7
T-tests of Student Attitudes Towards Science By Gender (n=300)

Statement	M SD Male (n=122)	M SD Female (n=178)	t-value
Science is fun	4.35 .82	4.13 .82	2.27*
Experimentation on animals is sometimes necessary in science	4.20 .99	3.85 .94	3.11*

Note: Scale:1=Strongly Disagree, 2=Disagree, 3=Unsure, 4=Agree, 5=Strongly Agree; *=p<0.05

Table 8
T-tests for Student Attitudes Towards Science by Relatives Who Live/Work on a Farm (n=305)

Statement	M SD Relatives on farm (n=112)	M SD No relatives on farm (n=193)	t-value
Experimentation on animals is sometimes necessary in science	4.24 .71	3.88 1.07	3.56*
I understand biology better because of the emphasis on animal agriculture	4.01 .81	3.77 1.02	2.28*
I could see myself working in a science related field that dealt with animals and/or animal agriculture	2.74 1.17	2.41 1.09	2.55*
I retained the information better than other biology classes I've taken that didn't use animal agriculture as the theme for study	3.85 .99	3.59 1.02	2.18*

Note: Scale:1=Strongly Disagree, 2=Disagree, 3=Unsure, 4=Agree, 5=Strongly Agree; *=p<0.05

Conclusions/Recommendations/Implications

The conclusions of this study were based on the responses of students enrolled in a traditional biology course that was taught using animal agriculture as the context for teaching science. Students who were enrolled in the course were taught one of three yearlong units specializing in animal agriculture. Although other studies focus on the impact of using agriculture to teach science, caution must be exercised when generalizing the results beyond the population of the study.

The majority of students enrolled in the biology course were female and most lived in the city or urban area. Approximately 60% were females, and over nine out of 10 reported they were Caucasian. When asked for background information that might make a connection to agriculture, less than three percent indicated they lived on a farm, and less than one in five (18%) reported they had been in 4-H. More than six in 10 (62.6%) of the respondents reported that they had no relatives who lived and/or worked on a farm. The participating school in this study did not have an Agricultural Science and Business program. In fact, no Agricultural Science and Business program existed in the entire school district. It can be concluded that respondents had limited contact with animal agriculture, and that opportunities were minimal for the respondents to come in contact with agriculture and learn about food systems on a regular basis. Therefore, the respondents in this study were not predisposed to sympathetic attitudes towards agriculture

and did not enter the biology classroom involved in this study with extensive background knowledge of agriculture to transfer to the course.

Respondents were in strong agreement that science is necessary for providing valuable answers to complex questions. Respondents were also in agreement with statements concerning science as enjoyable. When asked to respond to statements regarding their perceptions of science students agreed, as evidence by scores within the range of 3.50-4.49 on a five-point Likert scale, with eight of ten statements that were stated positively about science. Respondents also disagreed with the statements that were constructed to read negatively towards science as evidenced by scores within the range of 1.50 – 2.49 on a Likert scale. It is concluded that the teacher of the biology class in this study conveyed the significance and importance of science to our world using animal agriculture as the context for study. Among statements that students agreed with included "Science is fun", "Experimentation on animals is sometimes necessary in science", and "Becoming a scientist is a noble profession."

Students were positive towards the relationship between science and agriculture when asked for their perceptions, however they had less certainty about their desire to work in a field of science that involved animals and/or animal agriculture. Students agreed that as a result of taking the biology class that was taught using animal agriculture that they appreciated science more than they did before the class. Students were also in agreement that as a result of the biology class they understand biology better and believe they retained the information better when compared to other biology classes they've taken that didn't emphasize animal agriculture. It can be concluded that teaching biology using animal agriculture as the context was effective for helping students appreciate and understand science better than traditional methods of teaching biology. This concurs with Jelinek's (1998) findings that closing the gap between school science instruction and real life scientific activity, and presenting science in a relevant form, helps to eliminate obstacles that minimize student attitudes and interest towards the study of science.

Students who performed well in all classes, as evidenced by a grade point average of 3.00 and above on a 4.00 scale, found science to be significantly more fun and believed that exciting careers exist in the field of science when compared to their fellow classmates who possessed a grade point average below 3.00 on a 4.00 scale. In total, over eight in 10 (81%) of the students in the biology class received a grade of an "A" or "B". It can be concluded that the science teacher in this study utilized animal agriculture to generate positive attitudes about science; and that through a series of instructional units, field trips, laboratory activities, and guest speakers, all based upon the context of agriculture, the teacher fostered fundamental attitudes that, according to Dewey (1938), "may be and often are…much more important than the particular thing [being] studied at the time."

Although uncertain about agriculture as a career for themselves, students who had relatives who lived and/or worked on a farm were significantly less negative about the possibility that they could someday work in a science related field that dealt with animals and/or animal agriculture than were their counterparts who did not have relatives involved in agriculture, although neither group was positive about entering a career involving animal agriculture themselves. This indicates that exposure to agriculture through relatives who live and/or work on a farm does have an effect on student attitudes towards animal agriculture, although not to the extent that it could

influence career choices. Further research is needed to clarify the basis for these inconsistent attitudes.

Finally, it is recommended that further study be conducted in this area that focuses on actual Biology learning achievement. Utilizing a comparison group to a treatment group would add considerably to the knowledge base concerning student performance when agriculture is used as the context for teaching biological sciences.

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Science Can Be Fun?
A Look AT Students Attitudes Towards Science After Completing A Year-Long Biology Course Taught Using Agriculture As The Context

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The paper is well-organized and was a pleasure to read. The author developed a strong theoretical framework based on both agricultural and science education concepts and communicated the design of the study clearly. The purpose of the study was to describe the attitudes of high school students towards science after completing a traditional yearlong biology class that used animal agriculture as the context. The author is to be commended on conducting a case study that extended over a six-year period and for noting that findings of this case cannot be generalized. It would add much to this study if the readers had background on the number and types of biology courses the students had taken prior to and after the biology course under study.

The author may be overstepping or overstating the impact of the biology course. For instance, statements regarding the enjoyable nature and importance of science appear to be linked exclusively with taking the biology course. How has the researcher controlled for other experiences that these students, some of them out of high school for several years, have had in other science courses, careers, etc?

This study is important to the agricultural education profession because it supports the argument that contexts from the food and fiber system bring relevance to the study of scientific concepts. It appears, however, that the course was taught differently than most biology courses (e.g., real-world context, field trips, guest speakers, an innovative teacher, etc.). How would the researcher counter the argument some might make that it was not the animal agriculture context, but the other novel modes of instruction and the teacher himself that brought life to this biology class and favorably impacted students' attitudes toward science? Could not the ocean, a forest, or other settings provide the same type of rich context for learning?

The author appears to understand the limitations of this study. Specifically, that no control groups were used to ascertain differences in traditional biology courses. The author also suggests further research is needed to ascertain the extent to which biological concepts were learned by the students who learned through animal agriculture contexts.

A Description of the Characteristics Attributed to Student's Decision to Teach Agriscience

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Abstract

One of the major issues facing agricultural education is the recruitment of qualified and quality young teachers to the profession. Attempts have been made to recruit new teachers by offering scholarship incentives, highlighting teachers at the National FFA Convention, and producing recruitment brochures. Still, the pool of quality new agriculture instructors remains too shallow to fill the demand. This Delphi study attempts to answer questions about what current agriculture teachers do to encourage their students to pursue teaching as a career. The study identified teachers (n=11) from six different southern states who prolifically produced agricultural education students and teachers. The research produced five constructs for recruitment of future teachers: encouragement, modeling, career counseling / awareness, program quality, and teacher effectiveness. The most influential constructs were determined to be encouragement and program quality. Career awareness / counseling was the least influential construct. Findings indicated that teachers serving as role models, building quality programs, and refraining from disparaging remarks and attitudes about the profession encourage students to select teaching as a career. Quality students may be attracted to the profession if teachers demonstrate high standards, leadership in the school and community, and take an interest in all aspects of a student's life.

Introduction

Agricultural educators play an important role in the lives of young people, serving as an FFA advisor, mentor, and even a quasi-parent. Secondary agricultural educators influence many decisions about a student's career and further education through teacher actions, comments, and instruction. Students spend hours with the agriculture teacher on FFA judging trips, working on FFA activities after school, and developing supervised agricultural experience programs. During these interactive moments teachers influence a student about the teaching profession.

For example, why has Joseph Park, agriculture educator of 34 years at Indian Creek High School, produced four agricultural educators, and yet other agriculture programs with similar degrees of success have produced none? What do students see in their current agriculture program to create the desire to teach as a career? What practices can current teachers provide to engage current students in considering and pursuing a career in agricultural education? What are the activities and attitudes that dissuade a student's decision and motivation to teach?

Recruitment from a teacher's influence may not arise from a single event or brochure, but may result from the accumulation of knowledge and perceptions about an organization, institution, or career. If teacher educators, state agricultural education supervisors, and current teachers knew and engaged in the influencing practices that prolifically produced agricultural education students and future teachers, then they could better encourage promising youth to enter the profession. Additionally, there may exist practices and attitudes that inhibit a person's desire to pursue teaching. If stakeholders could identify those practices and eradicate them from

agricultural education programs and teachers in the profession, agricultural education may witness an increase in the number of quality students pursuing teaching careers.

Theoretical Framework

Modeling career behavior and expectations of students' future performance and careers may help define why students pursue careers other than agricultural education. Central findings in Bandura and Walter's (1967) work on social cognitive theory were "new responses may be learned or the characteristics of existing response hierarchies may be changed as a function of observing the behavior of others and its response consequences without the observer's performing any overt responses himself" (p. 47). Students learned through modeling of teachers and others, especially about careers and professions. Bandura and Walters found that children playing with toys often reproduced "adult-role behavior patterns" and characteristic parental patterns of response, including "attitudes, mannerisms, gestures, and even voice inflections" (p. 48). Bandura and Walters concluded, "models who are rewarding, prestigeful, or competent, who possess high status, and who have control over rewarding resources are more readily imitated than are models who lack these qualities" (p. 107). Krumboltz (1979) determined "people have a tendency to form generalizations about entire occupations from very few examples" (p. 25), which tended to become permanent and lasting.

Krumboltz (1979) added to individual modeling career and occupational behaviors by concluding an individual could learn from observations or skilled applications of cognitive learning, recreate the observed experience with he or she as the actor, then "obtain reactions from other people about the quality of that performance" (p. 33). These reactions, or consequences, determined whether or not the individual would engage in the activity or experience in the future. He also posited that occupational choice was not based upon a single factor, but was the culmination of a wide variety of experiences, the individual's reaction to those experiences, and motivational stimuli in the complex environment.

Krumboltz (1979) proposed that individuals expressed preference for occupations in which the individual had observed a role model succeeding. Individuals chose careers in which their skills were reinforced by a role model who advocated that particular career (Krumboltz). Positive words and images also influenced an individual to pursue particular careers. Mitchell (1979) summarized, "positive reinforcement, modeling and encouragement by valued persons do seem to affect occupational or educational preferences" (p. 55).

Expectations that teachers hold for their students' future career success also play a role in encouraging or discouraging students from entering agricultural education. Vroom's expectancy model (1964) applied to occupational choice and asserted, "the probability of a person performing an act is a direct function of the algebraic sum of the products of the valence of outcomes and expectancies that they will occur given the act" (p. 276). People perform activities and make decisions as a result of anticipated outcomes and expectancy that those outcomes will occur. Vroom found that "people prefer tasks and jobs which they believe to require the use of their abilities" (p. 186). Agricultural education students learn a wide variety of skills and knowledge, for which many career options are available.

Burnstein (as cited in Vroom, 1964) found a tendency for persons with high need for achievement and low fear of failure to aspire to more prestigeful occupations, where probability of attainment was less than certain, than persons with low need for achievement and high fear of failure (p.60). Through Career Development Events and competitive activities, students develop a need for achievement and minimize fear of failure. Vroom proposed, "people who expect that they can attain all occupations, and for whom considerations of time and cost are relatively unimportant, should choose the occupation they most prefer and their choices should be quite highly predictable from their motives" (p. 63). Given a particular skill set, students chose occupations with highest expected return where they could use their talents.

Vroom (1964) concluded, "an individual tends to choose an occupation on the basis of his estimate of his similarity to its members" (p. 73). Friedmann and Havighurst (as cited in Vroom) found that a career tags a person with a certain status, which carries influence in the family and community. Super (as cited in Vroom) indicated "extensive effects of the occupation on recreation and friendship patterns and family activities as well as other aspects of the style of living" (p. 50) influenced a person's career decisions.

Combining Bandura's social cognitive theory with Vroom's expectancy theory, the teacher can influence a student's career choice through agricultural education as demonstrated in Figure 1. Influence is a product of the natural interactions between a student and a teacher. A teacher may influence the interactions with his or her attitude, classroom practices, reputation, and modeling of a teaching career. Teachers model career behaviors as significant adults, hence the social cognitive theory. By their expectations, thus the expectancy theory, they influence a student's career decisions toward college or trade schools and various kinds of careers.

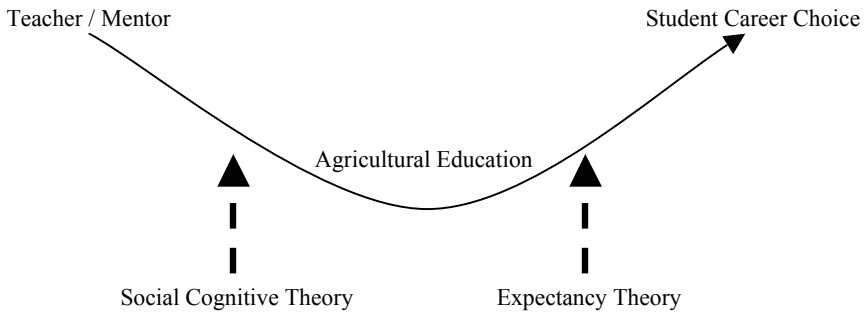

Figure 1. Student career choice as a function of the influence of teachers/mentors in agricultural education through social cognitive theory and expectancy theory.

Research Framework

Education is facing a teacher shortage. The National Commission on Teaching and America's Future (1996) asserted, "a caring, competent, and qualified teacher for every child is the most important ingredient in education reform" (p. 9). Recruiting quality teachers is significant in determining student success (Stroup, 2002). "Recruiting, preparing, and retaining good teachers is the central strategy for improving out schools" (National Commission on

Teaching & America's Future, p. 10). "Our Nation faces serious obstacles to improving teacher quality and enhancing the teaching profession to meet the needs of all students" (Stroup).

Agricultural educators also recognized a shortage of qualified secondary agricultural educators to fill current and proposed teaching positions as one of the top issues facing agricultural education. The shortage was often more pronounced in rural areas (van Kraayenoord, 2001). Camp (2002) concluded that there was and will continue to be a shortfall of qualified new teachers to fill teaching positions vacated by agricultural educators now and for future years. School boards of education and communities may have desired to initiate or reestablish a quality agriculture program in schools where one did not currently exist; however, Camp stated, they "likely would not operate because a teacher was not available" (p. 32). This shortage may be prohibiting agricultural education from infiltrating to new schools, or existing programs from rehiring a teacher, because no qualified teachers may exist.

Camp (2002) concluded agricultural education, as a profession, was growing slowly, but steadily. Additionally, Camp indicated a shortfall existed between "the number of newly qualified potential teachers actually seeking employment as teachers and the net number of replacements needed in 2001" (p. 31). With few exceptions nearly all states experienced a shortage of prospective teacher quantity and quality, creating limits to maintaining programs and viability of agricultural education.

To further compound the problem of agriculture teacher quantity, concern exists about the quality of teachers and their certification to teach agriculture. The National Research Council's Understanding Agriculture: New Directions for Education (1988) recommended, "…securing more competent teachers" (p. 34), and "…quality teachers are the critical ingredient for quality programs" (p. 34). Camp (2002) expounded, "a substantial proportion of our newly qualified potential teachers fail to take teaching positions even though positions are going to under-qualified people or indeed remaining unfilled" (p. 33). Stroup (2002) proclaimed, "research indicates that if States would open up the teaching profession to well-educated, highly qualified individuals from other fields, and to well-prepared liberal arts graduates, we could dramatically reduce shortages while increasing teacher quality" (p. 3). If individuals were seeking to gain conditional or alternative certification to teach agriculture, agriculture instructors may not be recruiting or adequately counseling students about teaching careers in agriculture.

Many factors influenced a student's career choice including parents, counselors, socioeconomic status, skills and abilities, interests, peers, prior experiences in the career, other significant adults, media, and anticipated effort to attain a career position (Arrington, 1985; Baker & Hedges, 1991; Bandura & Walters, 1967; Conroy, Scanlon, & Kelsey, 1998; Hillison, Camp, & Burke, 1986; Kotrlik & Harrison, 1987; Krumboltz, 1979; Miller, Williams, & Sprouse, 1984; Vroom, 1964; Wright & Custer, 1998).

Secondary agricultural education teachers hold one of the best positions and times to influence a student's decision to teach. Marso and Pigge (1997) concluded that teacher recruitment practices targeting post-high school students who have not decided to teach are not productive, and students who were determined to become teachers upon commencement of their teacher preparation were almost twice as likely to become teachers as those who were still

uncertain about their career decision. Hillison, Camp, and Burke (1986) determined that agriculture teachers ranked fourth and the student's high school vocational agriculture and FFA experience ranked fifth in determining whether an undergraduate chose agricultural education. Arrington (1985) found 73.4% of Florida's agricultural high school seniors attributed their agriculture teacher with influencing their choice to pursue a career in agriculture, and 96% of the seniors indicated that their teacher provided them with information on careers within agriculture. Edwards and Briers (2001) found that 91% of high school agriculture teachers had been at least "somewhat involved" in high school agricultural education and FFA. Kotrlik and Harrison (1987) maintained that agriculture instructors are highly influential in a student's decision to pursue college and an agricultural career after further education. Reis and Kahler (1997) added that parents are most influential in a student's decision to enroll in secondary agricultural education classes and FFA, with agriculture instructors following closely behind. Camp (2002) indicated that improvements are necessary in mechanisms whereby students are educated about available teaching positions.

Secondary agriculture teachers are not alone in their plight to recruit future teachers; industrial education faces similar shortages of qualified teachers. According to Johnson (1997), teachers should not only encourage students to consider technology education, but they should also show that they enjoy teaching. Wright and Custer (1998) determined personal interests were the most frequently cited reason to entering a career in industrial technology education, followed by influence from high school industrial arts/technology education teacher. The most influential factor for a student to pursue industrial technology teaching was encouragement from high school industrial arts/technology education teacher (Wright & Custer). Wright and Custer also found irony that encouragement from high school industrial arts/technology education teacher rated as highly influential, but less than a third of students experienced encouragement from their own teacher. This may hold true for agricultural education students. If students respect and admire their agricultural education instructor, and those instructors either fail to counsel the student into teaching or counsel them into another agricultural career, teachers could be the blame for our own shortages of quality teachers.

Miller, Williams, and Sprouse (1984) recommended "vocational agriculture teachers should attempt to portray their job roles and responsibilities in a realistic light to identify those students who are encouraged by their portrayal" (p. 21). Briers and Moss (1982) found that the teaching profession and rapport with students most closely correlated with plans to become an agriscience teacher, and called for an improvement in the image of agricultural teaching as a profession. Mentoring was found to be correlated to an individual's feeling regarding his or her career and satisfaction in that career (Eastman & Williams, 1993). Agricultural education faculty were influential in the career development and choices of younger faculty and graduate students (Eastman & Williams). Eastman and Williams further recommended, "efforts should be made by each individual to develop and maintain realistic but positive attitudes regarding the agricultural education profession" (p. 75).

Teachers may influence upper echelon students to seek other careers outside of education. Baker and Hedges (1991) concluded that teacher educators should continue to evaluate and modify courses in an effort to promote students entering the teaching field. They encouraged additional research in examining variables that influence graduate career choices.

Purpose

The purpose of this study was to determine encouraging and discouraging teacher practices that influence a student's pursuit of a career in agricultural education. In order to accomplish the preceding purpose, objectives of this study were to:

1. Determine practices that encourage students to pursue agricultural education careers.
2. Determine practices that discourage students from pursuing agricultural education careers.

Methods / Procedures

This study used a Delphi technique to identify those practices that influence a person's decision to teach secondary agriculture. The Delphi method is a "set of procedures for formulating a group judgment for subject matter where precise information is lacking" (Dalkey, Brown, & Cochran, 1969, p. 7). The Delphi technique is a method whose objectives are "three-fold: forecasting events; generating quantitative estimates; and, producing qualitative evaluations" (Sackman, as cited in Martin & Frick, 1998). Strauss and Zeigler (1975) proposed that the Delphi technique be used as a means of soliciting interpretations, predictions, or recommendations from experts in the field. Delphi uses a purposively selected panel that possesses competence on the issue, represent the chosen population, and peer nomination of the individuals removes researcher bias (Gordon, 1994). These experts may have a wide range of diverse opinions (Stufflebeam, McCormick, Brinkerhoff, & Nelson, 1985). Because little research has been done to explore what teachers do to encourage students to pursue agricultural education as a career, the Delphi method is appropriate for exploring this question.

The expert panel consisted of thirty secondary agriculture teachers in the Southern Region of AAAE nominated by agricultural education certification-granting institutions. Teachers were nominated for having prolifically produced post-secondary agricultural education students. Each nominated up to three expert teachers who had produced multiple teachers for consideration. Equitably representing six southern states, 11 teachers participated in the survey. The study used a series of three web-based questionnaires. Survey participants were contacted via email that contained an embedded link to the online survey.

The Delphi asked two open-ended questions: 1) what practices, activities, and attitudes do you recommend for teachers who want to encourage or persuade students to consider pursuing agricultural education as a career, and 2) what practices, activities, and attitudes do you feel teachers engage in that cause students to become discouraged about or dissuaded from considering agricultural education as a career. Responses were recorded and returned to the coordinator. According to Dunham (1996), these answers and ideas need not be validated or justified at this time, and should be brief answers. Submissions were used to generate a list of response categories that were used in subsequent rounds of questioning. Responses were categorized into a list of characteristics and ideas, which formed the constructs, affecting a student's intention to pursue an agricultural education career.

In the second wave, panel members were asked to rate each response generated from initial questionnaires using a five-point Likert-type scale, refine each idea, and identify any new ideas related to factors influencing a student to pursue a teaching career. Responses to practices in round two were recorded and returned to the coordinator via web survey.

The third round proceeded like the second. From results of subsequent waves and comments listed by participants, the third wave was developed. Participants were asked to rate and refine each practice. Round three meant to reach consensus about teacher practices that encouraged and discouraged a student to pursue agricultural education careers, resulting in a list of ideas of teachers' concomitant strengths and weaknesses (Dunham, 1996). Researchers set agreement level *a priori* at 80%. All items that did not receive agreement from 80% of the panel respondents were removed from the list. As noted by Roberts and Dyer (2002), most Delphi studies reached consensus at the third round. Consensus was sought with each successive round.

Data was analyzed using content analysis. Ideas were compiled from each wave of responses and descriptive statistics used to analyze ratings of each idea. Responses generated five overall constructs: encouraging, modeling, career awareness / counseling, program quality, and teacher effectiveness. Constructs were created for both encouraging and discouraging practices. Data collected using Likert-type scales was treated as interval data and reported with means and standard deviations for classification purposes. Nominal data for demographics of respondents was reported using frequencies and percentages.

Results

Of 11 teachers participating in the survey, seven were male (63.6%), and four were female (36.4%). Three teachers held national teacher certification. Six teachers earned an associate's degree, 10 earned a bachelor's degree, and seven earned a master's degree. The majority (54.5%) of the bachelor's degrees were in agricultural education, with one each in animal science, education, food and resource economics, and plant pathology and genetics. Four master's degrees were in agricultural education, with one additional degree in each career and technical education, curriculum and instruction, and vocational – technical education.

Years of teaching ranged from 9 to 31, with a mean of 19.00 and standard deviation of 7.09. The eleven teachers had 30 students (n=7) currently enrolled in a post-secondary agricultural education program and 24 former students (n=8) who were or are teachers. Average number of collegiate agricultural education students was 4.29 and average number of former students as teachers was 3.00.

Of 73 statements resulting from Round 1, the mean variance on mean responses was between Round 2 and Round 3 was 0.0394 with a range of 0.00 to 0.55 on individual questions. Findings, indicated in Table 1, determined encouraging constructs, by mean order, were encouragement, program quality, teacher effectiveness, modeling, and career awareness/counseling. Discouraging constructs were program quality, encouragement, modeling, teacher effectiveness, and career awareness/counseling.

Top encouraging practices, indicated in Table 2, that led to students pursuing teaching careers were having a program for students rather than just a class to take and serving as a positive example and role model for those wanting to major in agricultural education. Other responses that garnered greater than 4.50 were encouraging students to get involved in FFA activities, students enrolling in an agricultural education program, exhibiting a positive attitude about teaching agriculture, exhibiting an attitude of confidence as a teacher and in students' abilities to achieve, and demonstrating enjoyment of teaching.

Table 1
Construct Ranking (n=10)

Encouraging Construct	_	Discouraging Construct	_
Encouragement	4.53	Program Quality	4.97
Program Quality	4.50	Encouragement	4.73
Teacher Effectiveness	4.29	Modeling	4.13
Modeling	4.24	Teacher Effectiveness	4.10
Career Awareness / Counseling	3.64	Career Awareness / Counseling	3.83

Table 2
Top Encouraging Practices (n=10)

Practice	Construct[a]	_	*s*
Having a program for students rather than just a class to take.	PQ	5.00	0.00
Serving as a positive example and role model for those wanting to major in agricultural education.	M	5.00	0.00
Encouraging their students to get involved in FFA activities.	PQ	4.90	0.32
Students enrolling in an agricultural education program.	PQ	4.80	0.42
Exhibiting a positive attitude about teaching agriculture.	M	4.80	0.42
Exhibiting an attitude of confidence as a teacher and in students' abilities to achieve.	E	4.80	0.42
Demonstrating enjoyment of teaching.	E	4.80	0.42
Taking time, showing interest, and caring for students.	TE	4.78	0.44
Gaining student respect.	TE	4.70	0.48
Conducting a comprehensive agriscience program with many activities for students.	TE	4.70	0.67
Providing students with many leadership development activities.	TE	4.60	0.52
Working hard to have a successful agricultural education program.	PQ	4.60	0.52
Visiting students.	TE	4.50	0.53
Being prepared to teach students each day.	TE	4.50	0.53
Teachers keeping current with resources, equipment, and technology.	PQ	4.50	0.53
Caring for students' personal career goals.	E	4.50	0.53
Students seeing the "fun" in which agriscience teachers are involved.	M	4.50	0.85

[a] CAC = career awareness / counseling, E = encouragement, M = modeling, PQ = program quality, and TE = teacher effectiveness.

Major discouraging factors, found in Table 3, in a student's decision to teach were doing very little or absolutely nothing in the FFA component and not giving students an opportunity to

participate in FFA, each with a mean response of 5.00. Having a program that is seen as a dumping ground for students was the third discouraging practice.

Table 3
Top Discouraging Practices (n=10)

Practice	Construct[a]	$\bar{x}$	*s*
Doing very little or absolutely nothing in the FFA component.	PQ	5.00	0.00
Not giving students an opportunity to participate in FFA.	PQ	5.00	0.00
Having a program that is seen as a dumping ground for students.	PQ	4.90	0.32
Demonstrating constant complaining.	E	4.80	0.42
Complaining about students in the program and administration.	E	4.80	0.42
Demonstrating negative attitudes.	E	4.70	0.48
Dwelling on the negative aspects of teaching rather than the positives.	M	4.70	0.48
Telling students that there is not a future in agriculture.	CAC	4.70	0.67
Berating college students for majoring in agricultural education.	E	4.60	0.52
Doing a poor job.	TE	4.60	0.70
"Retiring" on the job years prior to actual retirement.	TE	4.50	0.76

[a] CAC = career awareness / counseling, E = encouragement, M = modeling, PQ = program quality, and TE = teacher effectiveness.

The least important encouraging practice was assigning students to write an oral report on a college of agriculture and present the report, eliciting a response of 2.50 (see Table 4). Other responses below 3.50 were teaching students about different types of agriculture across the U.S., taking field trips to teacher training institutions where students interact with university professors, inviting a college professor to speak about agricultural education, administration and professional organizations recognizing outstanding teachers, and modeling as a person who was a good student in school, was academically oriented, and also chose teaching agriculture. Least important discouraging practices were being pushy to try to get people to teach, encouraging top students to go into fields with highest pay, and lack of support or poor service students received from agricultural education departments at universities.

Conclusions, Implications, and Recommendations

With the shortage of agriculture instructors all means of recruiting potential teachers should be explored. Perhaps recruitment brochures and presentations by themselves are not the key to recruitment success. Findings indicate that teachers felt that assigning written reports on colleges, taking field trips to teacher training institutions, inviting teacher educators to talk with students about agricultural careers, and other career awareness/counseling functions were not effective in generating interest and commitment in a teaching career. Most of these efforts are targeted at upperclassmen in high school. According to Super & Bohn (1970), students have already selected a college major and career area of interest long before the senior year of high school. Although these means are the easiest and most concrete methods of recruiting future teachers, findings in this study indicate that they may be money and time wasted.

Teachers perceived their ability to serve as a role model and demonstrate a positive attitude about teaching encouraged students to enter the profession. The encouraging practices included developing a total agricultural education program, serving as a role model for students, challenging students to excel in a variety of agricultural education and FFA activities, and having a positive attitude about teaching, confidence in teaching and students, and demonstrating enjoyment of the career. Teachers who care about students and take interest in their activities outside of the classroom and FFA will be more influential concerning career decisions. Generally, teachers who are professional, respect students, mentor, and speak positively about teaching will produce far greater numbers of future teachers.

Table 4
Least Important Encouraging Practices

Practice	Construct[a]	_	*s*
Encouraging Practices:			
Assigning students to write an oral report on a college of agriculture and present the report.	CAC	2.50	0.85
Teaching students about different types of agriculture across the U.S.	CAC	3.00	1.15
Taking field trips to teacher training institutions where students interact with university professors.	CAC	3.10	0.88
Inviting a college professor to speak about agricultural education.	CAC	3.30	1.16
Administration and professional organizations recognizing outstanding teachers.	TE	3.30	1.34
Modeling as a person who was a good student in school, was academically oriented, and also chose teaching agriculture.	M	3.44	1.01
Trying to make teaching "cool" by emphasizing unique aspects of teaching, such as facilities, equipment, and technology.	M	3.50	0.97
Discouraging Practices:			
Being pushy to try to get people to teach.	TE	3.40	0.84
Encouraging the top students to go into the fields that pay the most.	CAC	3.40	1.26
Lack of support or poor service students received from agricultural education department at the university.	CAC	3.40	1.26

[a] CAC = career awareness / counseling, E = encouragement, M = modeling, PQ = program quality, and TE = teacher effectiveness.

Practices, attitudes, and activities that discouraged students from entering the profession could included non-functioning FFA components, the perception of the agriculture program as a dumping ground for students, and negative attitudes and comments about agricultural education, low teacher salaries, long hours, and students. Generally, teachers who are dissatisfied with their career, failed to respect students, or complained about teaching fail to produce future teachers. Teachers must guard against their negative comments and attitudes toward teaching.

Future research is necessary to determine the influencing factors associated with the decision to teach from the student perspective. Also, program quality was a major construct in this study, thus research should delve into what types of agriculture programs develop future teachers. Are future teachers the "offspring" of a highly competitive FFA program, or the result

of a balanced program that is a vital part of the community? What program components or characteristics enhance the development of future teachers?

Practical applications of the information in this study lead to questions about how to boost morale in the teaching ranks. Why do negative attitudes persist in teaching? What is the difference between those teachers who demonstrate positive attitudes, modeling, and professionalism, and those teachers who act to the contrary? What is to engage newly inducted teachers so that they develop positive, professional attitudes about agricultural education?

With self-assessment, secondary agriculture teachers may find that they engage in many attitudes and activities with both positively and negatively influence a student to pursue a career in agricultural education. Many of these influencing activities and attitudes may go unnoticed by the teacher, as they become second nature to the teacher's daily routine. Teachers and university faculty lament the shortage of quality agriculture teachers, but may be partially to blame for poor recruitment of the best students.

By employing encouraging practices, agricultural education could witness an increase in the population of quality students pursuing degrees in agricultural education and who actually teach secondary agriculture. Teachers may be contributing to the shortage of quality teachers in agricultural education through disparaging remarks about teaching, poor program quality, and failure in modeling. Teachers are also major factors in the solution to maintaining a ready supply of quality teachers and maintaining the viability of agricultural education. Teachers like Joe Park, while not winning the most FFA contests, may be producing the greatest service to the profession, that of serving as a role model and perpetuating agricultural education.

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This paper explores a topic of vital importance to the agricultural education profession—the recruitment of teachers into the secondary ranks. The authors develop a well-reasoned and convincing theoretical framework that combines social cognitive theory and expectancy theory to hypothyze the role of the teacher in a student's decision to pursue a career in agricultural education. The stated purpose of this study was to determine encouraging and discouraging teacher practices that influence a student's pursuit of a career in agricultural education. The subjects for the study were nominated by teacher credential granting institutions in agriculture education.
Eleven secondary teachers from a population of 30 participated in the Delphi study.

Based on this iterative process, the authors devise five constructs to categorize the data. What was the basis for these constructs? How did the researchers insure consistency in the coding of the data? On review of the data presented, some readers might code responses differently than the researchers.

The teachers in the study believe there are practices that encourage students to become teachers of agriculture. These practice are associated with being a positive role model, having a comprehensive agricultural education program, providing opportunities for FFA involvement, and displaying a positive attitude toward teaching, while the discouraging practices appear to be the opposite. Based on the beliefs of the teachers, the authors take a leap of faith and suggest "generally, teachers who are professional, respect students, mentor, and speak positively about teaching will produce far greater numbers of future teachers." Which data in this study supports this claim? It appears a cause and effect relationship is being established, but this is solely supported by the beliefs of teachers?

The authors point out that many current practices used to recruit future teachers may be a waste of time and money. If we accept the argument made in this study (teachers are a vital link in the recruitment of new agricultural teachers), how would teacher education institutions "encourage 'encouraging' practices? Do not many of the characteristics defined in this study meet at the nexus of school, community, students, and the individual teacher?

The paper could be strengthened if the well-developed theoretical framework was tied back to the findings.

Teacher Student Accommodating Model for Urban Agricultural Education Programs

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Abstract

Agricultural teacher education programs would be enhanced by teaching and learning models that encompass the components that contribute to "successful programs." This study sought to explain and describe an urban agricultural education program and to develop a programmatic model that would adequately express the components of the program.

A case study was conducted during the 2000-2001 school year in an Animal Management Technician program located in an urban career-center. Students and teachers were observed in the classroom, laboratory, and at extra-curricular events throughout the year. Data were elicited from students, teachers, and administrators through multiple qualitative research methods: observations, interviews, dialogue, and student work.

The resulting model depicts the teacher accommodating diverse students in an open laboratory supported by family, school administrators, and the community. The model also depicts four catalysts that enhance the program's curriculum: SAEs, FFA, facilities, and job placement. It is recommended that the proposed Teacher Student Accommodating Model for Urban Agricultural Education Programs be adapted and modified through similar research in other agricultural programs. A collection of agricultural education program models could then be offered to visual learners enrolled in agricultural education teacher preparation programs.

Introduction/Problem Statement

This study was a response to national agricultural education leadership's expressed goal to expand opportunities and accessibility to agricultural programs for all secondary education students. In 1995, the first National Forum on Agriculture Education in Urban Schools set as a specific goal "to design a strategy to increase the number of urban programs in agricultural education" (Russell, 1999, p. 2). The National Council for Agricultural Education, (1999), set a similar goal, "All students [will] have access to seamless, lifelong instruction in agriculture, food, fiber and natural resources systems through a wide variety of delivery systems and educational settings" (p. 7). To attain the goals proposed by the National Forum on Agriculture Education in Urban Schools and the National Council for Agricultural Education, "successful" urban secondary agricultural education programs need to be identified and studied, thereby,

providing research evidence to support the funding and establishment of similar urban agricultural education programs throughout growing metro-urban areas.

Purpose

Secondary urban agricultural education programs have been identified by state department personnel and agricultural education professionals as being "successful." Success of a program has been measured by teacher and student accomplishments. Phipps and Osborne (1988) defined several characteristics of a successful agricultural teacher; however, they listed commitment to students as the most practically significant characteristic:

> Above all, teachers must remember that their primary role in the public schools is to nurture and contribute to the educational, social, and personal development of people. . . . Teachers need to demonstrate a sincere interest in the needs and accomplishments of each individual student. Even the most difficult students will respond to teachers who provide encouragement and strive to build positive self-concepts in students. (p. 135)

Successful agriculture education teachers have been shown to promote holistic (i.e., educational, social, and personal) development of students and to be attuned to student needs (Lockaby & Vaughn, 1999). However, as early as 1982, Hirayama noted that urban secondary agriculture teachers had difficulty with accommodating the diverse needs of urban students in their classrooms. "Since there is no established tradition of urban agriculture, recruitment of both teachers and students is difficult. The transition of rural-oriented teachers to new positions in urban areas requires great changes in concepts and techniques" (p. 10). Part of the changes in concepts and techniques alluded to by Hirayama included the need for teachers to have the skills and sensitivity to work with and nurture multi-cultural and multi-need students so that they would successfully complete the program.

While the teacher and students are two obvious components of any educational program, this study sought to identify and describe other components of a "successful" secondary urban agricultural education program. From these findings, a working model for urban agricultural education was developed by interweaving the components of teacher and students with eight other program components. Specifically, the study addressed the following research question: What educational program model best explains an urban secondary agricultural education program?

Theoretical Framework

The initial theoretical framework for this study was formulated around three educational theories and models. These three models focused on student academic achievement and the components, factors, and variables that have been reported to be predictors of, or related to, academic success or failure of students. Hollins (1996) specifically looked at the school and home cultures as

predictors of academic success, while Phelan, Davidson, and Yu (1998) reported on the interaction of family, peers, and school on students' academic success. Steinberg, Brown, Cider, Kaczmarek, and Lazzaro (1988) identified four non-instructional variables as predictors of high school student achievement: parents, peers, extra-curricular activities, and part-time work. Hollins' model of educational programs proposed two spheres of influence on student success: the home culture and school practices. According to Hollins, the more these two spheres were in congruence, or overlapping, the better students performed. If the two spheres would be in total congruence, she concluded that students would perform the best and labeled this model the Mediating Model; however, if the two spheres were not in congruence, students would have a tendency to perform poorly, and she labeled this model the Immersion Model. When school practices' and home cultures were not congruent, such as in diverse urban schools, Hollins suggested that the teacher intervene by adjusting the pedagogy and curriculum of the program to minimize differences between the two spheres. When the two spheres partially overlapped due to teacher intervention, she concluded that students had a tendency to perform better than in the Immersion Model. She labeled this model, with overlapping spheres, the Accommodating Model:

> Cultural accommodation in instruction involves the [teacher's] use of isolated aspects of [students'] culture in contrived situations to facilitate learning. The most commonly used aspects of culture include socially constructed learning situations consistent with practices found in the students' home-culture and culturally valued knowledge in curriculum content. . . . The primary goal of cultural accommodation is to facilitate teaching and learning in situations where teachers and students do not share the same culture and there is a standard curriculum. (p. 145)

Phelan, et al. (1998) proposed a more complex model of academic achievement. Their model included the variables students, school, home, and peers; they labeled their model the Students' Multiple Worlds Model. Through analysis of their case study research, Phelan, et al. concluded that as students from different cultural and social backgrounds participated in educational programs, they were constantly negotiating among three spheres, school, home and peers, enveloped in the context of the wider community. Like Hollins, if the spheres were congruent then academic success was facilitated. If, however, the spheres were not congruent or overlapping, then the student (not the teacher as Hollins suggested) had to negotiate to bring the spheres into congruence; the ease with which students could or could not manipulate these spheres influenced a student's academic performance.

Steinberg, et al. (1998) proposed that a student's peer group involvement and the involvement with adult supervised organizations in or out of school were predictors of student success. They specifically examined extra-curricular school activities, club membership, and part-time work experiences.

From these three theoretical perspectives, the following components of an urban agricultural education program were chosen to be studied: teachers, students, students' home culture, school,

extra-curricular activities, and job placement. As the study progressed, additional components emerged from the data collected: school administrative support, school facilities, and community. Further data analysis suggested a different alignment of the components of an urban agricultural education program than those proposed by the three theoretical perspectives guiding the study; the initial theoretical framework morphed into a model unique among educational models.

Methods

The research methods used in this study were those outlined in ethnographic case study research design. Case study uses heuristic methods to conceptualize findings that emerge from a particular situation, event, context, or program. Findings are then supported through the development of in-depth descriptions of events and inductive reasoning (Merriam, 1988).

A case study must be bounded in context (Miles & Huberman, 1994); therefore, the context of this case study was a purposively selected (Patton, 1990) "successful" urban secondary agricultural education program housed within a metro-urban school district Career Center in Ohio. The agricultural education program chosen for the case study was a small animal production and care program, locally called the Animal Management Technician (AMT). This program was recommended as a "successful" program by state agricultural teacher educators based on the program's longevity, success with a diverse student body, and the recognition for excellence in teaching of the two teachers in the program by the State of Ohio Department of Education, the local school district, and several education organizations.

Multiple qualitative methods of data collection were employed. Standardized interview and observational protocols for students, teachers, and administrators were reviewed and approved by the researcher's graduate committee, the Institutional Review Board of the Ohio State University, the school district's administrative staff, and the teachers' union. Individual interviews, unstructured interviews, and conversations were conducted with students throughout the year. Students were observed during their classroom and laboratory periods, and during special extra-curricular events. The procedures for qualitative research outlined by Lincoln and Guba (1985) stated that the researcher after gaining access to a given group should become an active member of the group to establish credibility. The researcher assisted the teacher with instruction and assessment; the researcher also participated with students in cleaning cages, grooming animals, and studying for skills events. Lincoln and Guba also proposed a process of data collection that allowed for the triangulation, verification, and/or emendation of the data.

The researcher approached the study with what Patton (1990) labeled empathetic neutrality. Familiarity with other secondary agricultural programs contributed to the researcher's subjectivity on one hand, but on the other hand, this subjectivity allowed the researcher to carefully reflect on the data holistically. "Seen as virtuous, subjectivity is something to capitalize on rather than to exorcize," (Glesne & Peshkin, 1992, p. 104).

The researcher regularly participated in the 3 _ hour classroom and laboratory periods 2-3 times a week during the school year. The researcher also participated in several extra-curricular AMT activities including FFA skills events. The trustworthiness and dependability of the data collected was accomplished through member checking done by participants during and after the transcription of interviews and observations. Peer debriefings at the end of the study, with the two teachers of the AMT program and the researcher's graduate committee members confirmed that the constructs, theory, and educational program model developed were consistent with the data collected.

Data analysis followed the recommendations of Miles and Huberman (1994). Data were initially sorted and categorized by concepts and constructs in order to uncover linkages and connections among the data. Categories or components were developed that corresponded directly with the initial theoretical framework of the study: teachers, students, students' home culture, school, extra-curricular activities, and job placement. Once data were collected and coded, they were placed into one of these categories. However, some data began to spill out of categories, such as how the curriculum was influenced by the facilities available in the Career Center, so a new facilities category emerged. Also, the participation on the advisory board of people in the small animal industry, and the participation of people in the surrounding neighborhood who brought their pets in for grooming led to a community support category.

The next level of data analysis involved conceptualizing the different categories into a matrix, (Miles & Huberman, 1994). The matrix was helpful in eliminating data. Data that explained how the program's components fit together emerged from the matrix. So, finally, these concepts and constructs were woven together into a plausible model that described the total program.

Findings

Numerous components contributed to the success of the urban agricultural education program and individual students. This study identified 10 relevant components: classroom, students, teacher, families, school administration, community, facilities, FFA, SAEs, and job placement.

Each afternoon began with a classroom lecture discussion period. The teacher used overheads, the chalkboard, handouts, and audiovisual equipment to present each lesson. Students actively took notes and engaged the teacher during this time. Next, the students moved across the hall to the laboratory area. In the laboratory area, students practiced what was presented in the classroom. Groups of students were assigned a different work area each week. Every student was required to work in every area of the laboratory; however, the teacher would closely supervise multi-need students when they would be assigned to areas where tasks were difficult for them. Additionally, each week one student would be designated as the pet shop manager, and as such was responsible for every area of the laboratory. The AMT curriculum covered all aspects of small animal care and production. While some students disliked participating in some animal ward area activities, most students found the comprehensive curriculum challenging and rewarding. Nevertheless, some students complained about the curriculum. One student who

resisted being assigned to the rodent area found she could not negotiate herself out of this assignment. "The teacher pushed me a lot this year; I didn't want to touch rats in the rodent ward. Like I was all prissy and stuff. . . . But [the teacher] made us do it." Another student when asked her opinion about the AMT program said, "What I would change about this program is, we wouldn't have to do birds, I don't like them. I hate cleaning their cages. I would keep grooming; I like grooming." Another student responded to the same question with, "I wouldn't take out anything. I would want to do everything. It's a good program; you learn a lot of stuff."

Students from throughout the metro-urban school district and adjacent suburban school districts were eligible to apply to the AMT program. Students were admitted into the program based on interest. Because students had diverse educational backgrounds and some had special needs, the AMT teacher accommodated students by diversifying her lesson plans and assessments to progress through the content fast enough to keep the interest of her high level performing students but not so fast that she lost her low level performing students.

> One of the things that has changed over the past 20 years that I have been teaching AMT is the overall quality of the students; in general their academic abilities have decreased. So as a teacher I have to teach differently and basically scale my lessons down so they are academically easier for students to digest and more hands-on and fun. . . . And then when we get those kids out there who are high achievers, I have to provide them with extra assignments and project activities to keep them interested and motivated. (AMT teacher)

Urban agricultural education students' general knowledge of agriculture and agricultural terminology was limited. Therefore, the teacher accommodated student learning by incorporating students' past and present experiences with small animals, usually pets, into the curriculum. She encouraged students to talk about what they learned in the AMT program with their family and to find opportunities at home to practice what was being taught in the curriculum. One student gave this account of taking the curriculum home, "Now they [my family] all want me to take care of their animals. [Laughs]. They're like, 'Can you trim my dog's nails?' and I always have to trim my dad's dog's nails, too. I don't mind. It gives me something to do."

The teacher recognized the motivational benefits to academic success of students learning something that was of interest and practical value to them. She also used their interest in working with each other and peer group pressures to have students collaborative learn the curriculum.

> We have students that come from all over [the city]. . . . So their social backgrounds are usually very different; their personalities are different. I've seen them come in maybe they weren't the most accelerated in their home high school or they didn't have a lot of confidence, but once they get here and into a group of other students, I've seem some of them blossom with a lot of self-confidence. (AMT Teacher)

The AMT teacher brought students from diverse cultural backgrounds and academic levels into congruence with the program's curriculum. This congruence favored students successfully completing the program's objectives. Within her parameters, the teacher made accommodations for student classroom and laboratory expectations based on an individual student's past performance, academic level, and IEP status. From her high performing students, she demanded they go beyond the lesson materials presented in their textbooks and classroom lectures; she assigned these students extra computer time, library time, and special projects. Identifying the special ward areas of interest to low academic level students, the teacher allowed those students extra time in the laboratory ward areas of their choice after they had completed their required assignments. The teacher was in constant movement around the classroom and through the laboratory areas checking on students' progress. She was keenly aware of each student's ability level and if a student was not making progress, she would either stand over that student until he or she was back on task or if the student was not able to perform the assignment, the teacher paired the student with another student or group of students who had completed the lab assignment previously, and encouraged them to work together.

> [It is sometimes] very difficult to teach this class; but then I find this the biggest challenge every year I teach. It's hard to teach one class to all the different academic and skill levels of students that we have in our classes. . . . Trying to teach to that big a span and keep them all interested and motivated has always been a big challenge for me. (AMT Teacher)

Students also acknowledged how their teacher made accommodation for them and encouraged them to work collaboratively.

> The teacher grouped us up, like three or four of us. It didn't matter if you were smart or didn't really know much, she'd group you up. . . . The people who needed help, she'd group with the smart people, like the people who knew what was going on and how to do things with people who didn't know how to do it. (Student)

Parents and guardians of AMT students chose not participate directly in this study; however, students did talk about their families. The majority stated that their parents supported their enrollment in the AMT program.

> My mom thought it was okay [that I enroll in the AMT program]. She really didn't understand most of it until after she sat down with my counselor and my IEP teacher [at my home school] and talked to them about it; and they explained a little bit more to her about it. But my dad was really up for it because I've always wanted to be a veterinarian or a veterinary technician. And he's like whatever helps you reach your goals. He was very supportive and understanding. (Student)

The AMT teachers acknowledged the positive influence of parents/guardians on AMT students' performance and encouraged family involvement. Therefore, the AMT teachers were committed to communicating with students' families on a regular basis, either by sending written documentation home to parents/guardians, or by telephoning them. Parents/guardians were invited to participate in special Career Center and AMT events including student conferences, awards ceremonies, and banquets. When family members drove students to the Career Center for an AMT workday during the holidays or to a special event, they would visit with the AMT teacher about their child's progress.

> Kids whose parents are involved in their lives are 9 times out of 10 more successful in our program. The parents that say, 'Yes, I'll come to an open house; or yes, I'll be there for a special event'; or the parents who return my phone calls . . . those kids are just I use the word connected. . . . And those kids are just a lot more, just better prepared. . . . I do have lots of communication with parents by phone throughout the year, and it doesn't have to be because their student was doing something necessarily bad. I may call just to say that [Mary] is participating in this public speaking contest or she's going to be going to this event or convention, and I need to make sure that she brings XYZ with her, or that we need to have this special permission slip filled out. (AMT Teacher)

The AMT program received program support from three administrative sections: the Career Center director and his staff, the academic guidance counselor, and the VOSE coordinator. When multi-need students with Individualized Educational Programs (IEPs) were accepted into the program, the teacher had to work with the school administrators, academic counselor and VOSE coordinator to insure the AMT program would be compatible with the student's learning or physical limitations.

The community was involved with the AMT program on three levels: advisory board members, professional contacts, and customers. Both AMT teachers worked at making their programs known in the local animal care industry. They had professional contacts with a number of veterinarians, veterinary technicians, pet shop owners and managers, animal breeders, pet groomers, show dog owners, animal research technicians, managers of animal kennels and animal shelters, and pet supply wholesalers.

> Changes [in our AMT curriculum] have evolved over the years to make the curriculum more specific to our local needs. In other words, talking with the advisory committee and employers, what the job market is, we've added components and deleted others. . . . Employers want us to teach small animal care basics like handling and restraining animals and recognition of normal versus abnormal animal behavior rather than a lot of technical information. (AMT Teacher)

Through AMT's dog grooming service, students learned and practiced customer relations and communication skills with community members. Whether students were answering the

telephone, making grooming appointments, checking in customer's dogs, or responding to customers' needs and questions, AMT students were learning effective public communication skills. "Good communication skills are essential, as they can make the difference between the type of job and rate of pay the student will receive," (AMT Teacher).

The classroom and separate laboratory were located within a modern Career Center. A dog walk area was located behind the Career Center. The laboratory area was divided into separate fully equipped small animal management areas. The pet shop management area included fish, reptile, small rodent, and bird wards. The grooming area included grooming tables, bath area, and kennels. The clinic area had sinks, counter space, storage and an autoclave. The student clean-up area included student lockers and a large sink. The two teachers also had an office and storage room in the laboratory area. These modern facilities, state of the art equipment and variety of small animals enhanced the AMT program.

All AMT students were members of the FFA, student agricultural organization. The teachers integrated many FFA activities into the AMT curriculum including public speaking, job interview skills, and local and state small animal skills contests. Because being a part of a peer group was important to AMT students, the teacher took that need and channeled it into specific group FFA activities.

Participating in a state FFA skills event was for many of the AMT students the first time that they had participated in a formal contest with their peers. Placing in a state FFA skills event overwhelmed the urban AMT students. After accepting an award for their team's fourth place finish out of 50 teams in the animal management event, one student smiled and said, "Our team ended up fourth, yeah, fourth place! I guess we weren't that low because if we were that low we wouldn't have placed that high. [A Big smile lit up her face.]"

Supervised agriculture experiences (SAEs) included internships, mentoring experiences, and job shadowing. Students who cared for AMT animals over the summer months and kept a record book of their related activities, were given SAE credit for these projects. Teachers checked on the students and their animals throughout the summer by telephone. The AMT animals were returned to the AMT laboratory at the beginning of the following school year.

Beginning in March through the end of the school year in May, students worked part-time at their job placement sites in lieu of attending the Career Center. Although most of the students were paid at their job placement sites, a few students opted for non-paid intern positions at veterinary clinics. One student stated that one of the best things about job placement was getting paid. "I think it's good that we can get paid for doing pretty much what we do here [in the AMT laboratory]." Even though most students were successful at their job placement, a few were not. The teacher intervened on a regular basis with at-risk students who were not regularly reporting to their job placement site, who had problems completing their work, or who had problems with their supervisor. Behind the scenes, the teacher contacted many people and services in order to keep students at their job placement sites. She committed hours, and even days to student job placement issues.

In summary, most urban AMT students regardless of their diverse backgrounds and competencies were accommodated by the AMT teacher. The AMT teacher and program received exceptional support from students' families, the school administration and community. The teacher leveraged modern facilities and incorporated SAE projects, FFA activities, and job placement into enhancing the AMT curriculum.

Using these 10 components of an urban secondary agricultural education program a visually descriptive model emerged from the data. The model highlights the relationships of the 10 components.

Teacher Student Accommodating Model for Urban Agricultural Education Programs

The 10 components of the Teacher Student Accommodating Model for Urban Agricultural Education Programs are the classroom, students, teacher, family, school administration, the community, facilities, FFA, SAEs and job placement. In the model students are represented by individual circles either alone or interacting with their peers, and one large more fluid, amoebic-like figure representing the teacher. The student and teacher figures are dynamic not static; they are in constant motion. The teacher amoebic-like figure is represented in the model with a broken line that symbolizes the semi-permeability of the teacher's nature to take in new information about students and the environment. The teacher uses this information to adjust the curriculum and her teaching style.

In the classroom, the teacher attempts to interact with all her students simultaneously; however, in the laboratory, the teacher amoebic-like figure shifts constantly either overlapping or engulfing one or more student at a time before moving on to another student or group of students. In addition to physically shifting among her students, the teacher is constantly shifting teaching styles to accommodate individual student learning styles. Being dynamic, permits the teacher to adjust quickly to changing classroom situations, and to bring day dreaming students or socializing students back on task. Because students are working on different assignments or projects in different sections of the laboratory, this model more effectively portrays how the teacher is able to interact with one or more student at a time, while other students are working independently or in groups throughout the laboratory areas.

The model shows the program being supported by three triangular pillars: family, school administration and community. The size of these triangular pillars could be adjusted to show varying degrees of support from these three areas. In other words, the model itself is dynamic.

The model also considers four external elements that impact program delivery. These four elements are portrayed in the model as catalysts; in other words, the four elements are external to the agricultural education program but influence the program's teaching and learning processes. Like catalysts, these four components energize the teaching and learning processes in that they facilitate, speed-up, and enhance the curricular outcomes. These catalysts are depicted in the model as reflective arrows and include school facilities, the FFA student organization activities,

SAE projects, and job placement. While these components enhance the teaching and learning processes, they are extraneous or supplemental to the actual pedagogy of the agricultural classroom. Although successful teaching and learning could occur without these four catalysts, the processes would occur at a much slower and reduced rate.

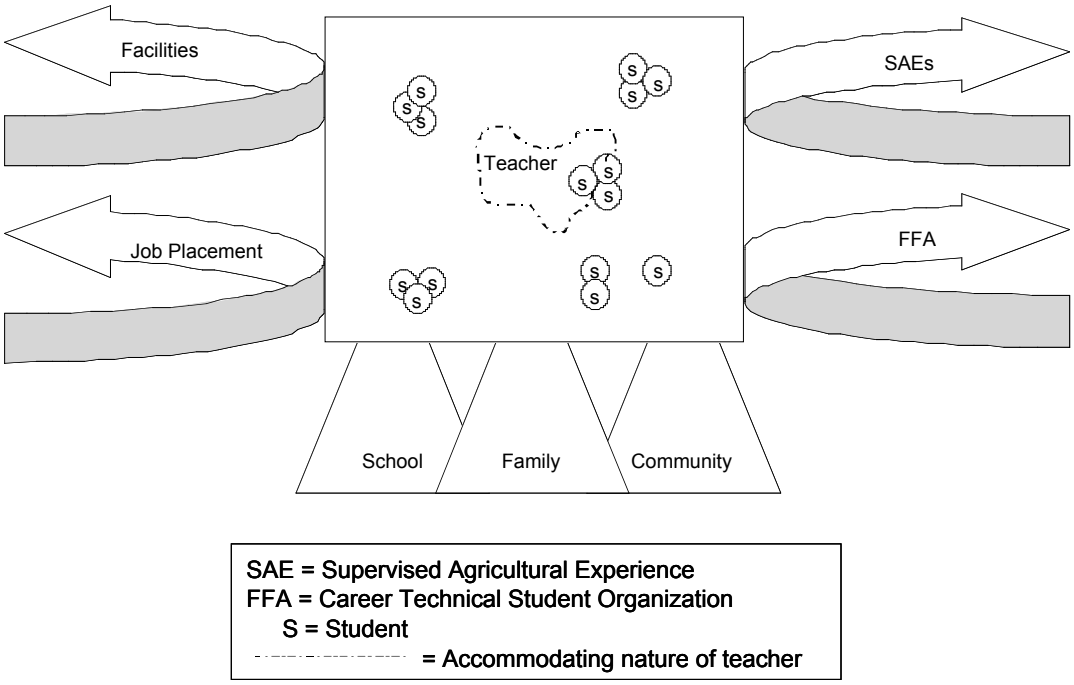

Figure 1. Teacher Student Accommodating Model for Urban Agricultural Education Programs

The Teacher Student Accommodating Model for Urban Agricultural Education Programs is recommended for use in agricultural teacher education programs that prepare teacher candidates for urban agricultural education programs. This model could be used to assist visual learners identify the different components and relationships of these components in a successful program. The model could also be used to encourage teacher candidates for urban programs to explore their individual needs to acquire or improve their cultural accommodation skills. Further research should be carried out in other agricultural education programs to determine the transferability of the model. A collection of different agricultural education program models could better capture the scope and breadth of agricultural education programs throughout the United States.

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Teacher Student Accommodating Model for Urban Agricultural Education Programs

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In comparison to most agricultural education research, this paper is unique. First the topic under examination is urban agricultural education and second the authors explore this topic through qualitative research methods. The authors sought to identify and describe the components of a "successful" secondary urban agricultural education program and tried to answer the following research question: "what educational program model best explains an urban secondary agricultural education program?"

I commend the authors on their skillful articulation of the theoretical framework of the study and then the framing of study around the theory. I question, however, if this was an "ethnographic case study" as the authors suggest. Much of the data provided in the findings comes from interviews and very little from ethnographic observations. I believe this was a case study that used a mix of qualitative techniques. This, to a qualitative researcher, means something completely different than an ethnographic study. Considering that the researchers were the sole instruments of interpretation of the data, it would be very helpful for me to understand the background, experiences, and standpoint of the researchers. This would help me judge the trustworthiness of the interpretations.
The researcher suggests that the teacher made accommodations for her students' abilities and cultural background. Would these accommodations be different than sensitive teachers in suburban and rural areas?

The researchers state parents and guardians did not chose to participate in the study. To my mind, this is glossed over by the researchers. The theoretical framework discusses home culture as a major component of an urban program. Why did the parents not choose to participate? Is this a noteworthy point needing to be looked at more fully?

Besides cultural background of students, how do the authors conceptualize an urban program as being different from one in a suburban or rural area?

The authors' propose a Model for Urban Agricultural Education Programs. How does this model differ from traditional agricultural education programs based on the classroom, FFA, and SAEP? How does the structure of a career center's pull-out program from local high schools impact an agricultural education program?

I commend the authors for bringing a topic to bear that is often overlooked and is under researched in agricultural education. I caution the researchers, however, to not be too over zealous in proposing a model based on only a case. There are many different types of urban programs that can contribute to the development of a model of urban programs.

Integrating Science Into The Agricultural Education Curriculum: Do Science Teachers And Agriculture Teachers Agree?

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Abstract

Agriculture teachers and science teachers who taught in a high school with an Agricultural Science and Technology Program were targeted for this study to determine and compare their perceptions of integrating science into agricultural education programs. The data indicate that while both groups have responded positively to the call to integrate science into the agricultural education curriculum, some differences in attitudes do exist. The majority of both science and agriculture teachers were in agreement that funding, equipment, and the science teachers' lack of an agricultural background were barriers to integration. However, they differed in their level of agreement about curriculum and teachers' philosophical differences as barriers. A majority of both groups agreed that teacher preparation programs should provide instruction to undergraduates as well as inservice to teachers in the field on how to integrate science. While both groups agreed their school has strong science and agriculture programs, that collaboration would benefit students, and that the two departments have something to offer each other, less than half of both groups reported that they work in a collaborative effort with the other department.

Introduction/Theoretical Framework

The merging of agriculture and science in the public secondary schools of America is not just a phenomenon of the past few years. Agriculture as a science course was debated at least ten years prior to the passage of the Smith-Hughes act of 1917 (Nolan, 1918). However, while the concept of agriculture as a science, or agriscience as it may be often labeled, is almost 100 years old, the content is certainly different as huge advancements in both agriculture and science have been made during that same time period.

Both academic and vocational groups have made calls for the integration of science and agriculture. In 1988, the National Research Council recommended that agriculture courses be expanded to increase scientific and technical content to better prepare students for advanced study and employment in the changing food and fiber industry (National Research Council, 1988). The American Association for the Advancement of Sciences has recommended connecting what students learn in school through interdisciplinary links, real-world connections, and connections to the world of work (American Association for the Advancement of Science, 1993).

Research findings support the claim that the integration of science into the agriculture curricula is a more effective way to teach science. Students taught by integrating agriculture and scientific principles demonstrated higher achievement than did students taught by traditional approaches (Enderlin & Osborne, 1992; Enderlin, Petrea, & Osborne, 1993; Roegge & Russell, 1990; Whent & Leising, 1988).

The theoretical model for this study consisted of factors that influence the amount of collaboration and integration between agriculture and science teachers. In their planned behavior theory, Fishbein and Ajzen (1975) suggest that demographic variables, knowledge and observations influence beliefs, which influence attitudes, intentions, and finally behaviors. In attempting to increase the level of collaboration and integration, the perceptions of agricultural science instruction by all stakeholders, including agriculture instructors, students, parents, administrators, guidance counselors, and science teachers, must be considered. Over the past decade, several studies have provided insight into the perceptions of different groups of stakeholders. Attitudinal surveys of agriculture teachers in Oregon (Thompson & Balschweid, 1999), Mississippi (Newman & Johnson, 1993), Texas (Norris & Briers, 1989), South Carolina (Layfield, Minor, & Waldvogel, 2001), and Indiana (Balschweid & Thompson, 2002), as well as winners of the National FFA's Agriscience Teacher of the Year Award (Thompson & Schumacher, 1998) have all provided information regarding the perceived needs and barriers of integrating science. Other studies have provided insight into the perceptions of guidance counselors, administrators, parents, and students toward integrating science into the agricultural education curriculum (Balschweid, 2002; Dyer & Osborne, 1999; Johnson & Newman, 1993; Osborne & Dyer, 2000; Thompson, 2001). However, none of these studies compared the perceptions of science and agriculture teachers.

The perceptions of science teachers, in particular, are extremely important to the successful integration of science and agriculture (Johnson and Newman, 1993). Collaboration and resource sharing between the science teacher and agriculture teacher are often required, and it is often the science teacher groups within a state, district, or school that influence whether or not students enrolled in agriscience courses receives science credit toward graduation. Greater understanding of the perceptions and attitudes of science teachers toward integrating science and agriculture should assist in implementing changes and programs that will increase the level of integration and collaboration. In a study of attitudes of Illinois high school science teachers toward education programs in agriculture, Osborne and Dyer (1998) recommend further studies of science teacher teachers' perceptions toward agriculture program quality.

Major questions of concern include the need for integration of science and agriculture, the ability and preparation of the agriculture teacher to integrate science into the agriculture curriculum, and the barriers the hinder integrating science and agriculture.

Purpose/Objectives

The purpose of this study was to determine the perceptions and attitudes of Oregon high school science teachers and agricultural science and technology teachers (agriculture teachers) toward

programs in agricultural education and toward integrating science into the agricultural education curriculum. The following research questions were addressed:

1. What were the demographic characteristics of Oregon agriculture teachers and science teachers who teach in schools with agricultural science and technology programs?

2. What were the perceived barriers to integrating science into the agricultural education program?

3. What were the agriculture teachers' and science teachers' perceptions regarding the role of teacher preparation programs in agriculture?

4. What were the perceptions of science teachers and agriculture teachers concerning support of the agricultural education program as the level of science integration is increased?

5. What were the perceptions of collaboration between science and agriculture departments?

Methods/Procedures

The target population for this study consisted of Oregon science teachers (N=360) in schools that had secondary agricultural science and technology programs during the 2001-2002 school year and Oregon agricultural science and technology teachers (N=121) during the 2001-2002 school year. The Oregon Department of Education provided the researchers with a current database containing the name and school address of each science teacher. This database was matched with the database of all Oregon secondary school agriculture instructors during the 2001-2002 school year. Science teachers employed at schools with no agricultural science and technology program were eliminated from the population. Caution should be exercised when generalizing the results of the study beyond the population.

The instrument used in this study to identify the perceptions of science and agriculture instructors was adapted from the Integrating Science Survey Instrument developed by Thompson and Schumacher (1998). Face and content validity for the version of the instrument used in this study was established by a group of university teacher educators in agricultural education and science education, and by state supervisors of agricultural education. Two forms of the questionnaire were created, one for agriculture teachers, and one for science teachers. The primary difference between the two forms was the wording of the questions. The two forms were pilot tested by science teachers (n=9) and agriculture teachers (n=10) in a neighboring state to establish face and content validity and initial reliability (_ = 0.87). As a measure of the reliability of the attitudinal scale, internal consistency for the science teacher form was measured at _ = 0.90 using Cronbach's alpha with construct reliability ranging from _ = 0.71 to _ = 0.85.

Internal consistency for the agriculture teacher form was measured at _ = 0.86 with construct reliability ranging from _ = 0.71 to _ = 0.83.

The survey instrument was mailed to all subjects along with a cover letter and return envelope. Two weeks after the initial mailing, a follow-up postcard was mailed to all non-respondents. After another two week waiting period, a second survey instrument and return envelope were mailed to non-respondents. Usable responses were received from 222 science teachers for an overall response of 61.7% and from 106 agriculture teachers for an overall response of 87.6%. To examine for non-response bias a *t*-test was used to compare early and late respondents. The *t*-values obtained verified that the difference between early and late respondents was not statistically significant.

The two forms of the instrument consisted of three parts. Part one included 62 five-point Likert scale questions designed to obtain information about the perceptions of integrating science and agriculture. Subjects were asked to respond to statements using a 5 for strongly agree, a 4 for agree, 3 for neutral, 2 for disagree, and 1 for strongly disagree. Part two requested that the subjects report demographic information about themselves, and part three consisted of four open-ended questions.

Data received from part one of the survey were analyzed and frequencies reported as the percentage of respondents that chose each of the five response levels. To simplify reporting, strongly agree and agree were combined, as were disagree and strongly disagree. Responses by question and by construct from science teachers and agriculture teachers were then compared using the Mann-Whitney U Test. This test was chosen due to the ordinal nature of the data (Likert-scale responses) and the independence of the sample groups (Courtney, 2002; Huck, 2000; Mertens, 1997). The alpha level for statistical significance was set a priori at .05.

Results/Findings

Research question one sought to determine demographic information for the respondents (Table 1). The average science teacher in Oregon teaching in a school with an agricultural science and technology program was 42 years old (*SD*=10.1) with 14.6 years of teaching experience (*SD*=9.27) and had taught approximately 10 years at their current school (*SD*=8.158). The majority were male (68.2%) and lived in a town/city (59.5%) at the time of the survey. Approximately one in four science teachers (24.7%) reported they had participated in an inservice workshop or course that demonstrated how to integrate science and agriculture and slightly fewer than half of the teachers (46.9%) reported that students attending their school received science credit toward high school graduation for successful completion of agricultural education courses. Slightly over one fourth of the respondents (28.0%) reported they had taken agricultural education courses in high school and/or been involved in 4-H.

The average agriculture teacher in Oregon was 39.6 years old (*SD*=11.4) with 13.5 years of teaching experience (*SD*=10.5) and had taught approximately 10 years at their current school (*SD*=8.8). The majority were male (82.9%) and lived on a farm or in a rural area (74.0%) at the time of the survey. Over three in four agriculture teachers (79.2%) reported they had participated in an inservice workshop or course that demonstrated how to integrate science and agriculture and slightly fewer than half of the teachers (45.2%) reported that students attending their school received science credit toward high school graduation for successful completion of agricultural education courses. A large majority of the respondents (87.6%) reported they had taken agricultural education courses in high school and/or been involved in 4-H.

Table 1
Demographics of Oregon Science and Agriculture Teachers

Demographic Variable		Science Teachers	Agriculture Teachers
Years of teaching experience		M=14.59 (SD=9.27)	M=13.51 (SD=10.49)
Years taught at current school		M=9.71 (SD=8.15)	M=9.82 (SD=8.81)
Age		M=42.33 (SD=10.11)	M=39.55 (SD=11.44)
Gender			
	Female	39.3%	17.1%
	Male	60.7%	82.9%
Participation in 4-H or agricultural education as a youth		28.0%	87.6%
Type of area raised in			
	Farm/Rural	46.3%	84.6%
	Town/City	53.7%	15.4%
Type of area lived in at the time of survey			
	Farm/Rural	40.5%	74.0%
	Town/City	59.5%	26.0%
Participated in inservice/workshop courses on integration			
	Yes	24.7%	80.0%
	No	75.3%	20.0%
Current school awards Science credit toward high school graduation for agricultural education courses			
	Yes	46.9%	45.2%
	No	53.1%	54.8%

Research question two was explored by asking agriculture teachers and science teachers to identify perceived barriers to integrating science into agricultural education programs. Science and agriculture teachers differed in the level to which they agreed with perceived barriers to integrating science and agriculture (Mann-Whitney $U = 9316.5$, $p = .105$). Results from science teachers for the ten statements ranged from 19.35% to 63.59% of the teachers in agreement

(Table 2). Over 63% of the science teachers perceived their lack of an agriculture background as a barrier, while only 39% agreed that the agriculture teachers' lack of science competence was a barrier to integrating science. Only 19% of the science teachers agreed that the lack of agriscience jobs in the local community was a barrier to integrating science into agriculture programs.

Agriculture teachers' response to the ten questions regarding barriers to integrating science ranged from 29.25% to 83.02% of the teachers in agreement (Table 2). Over 83% of the agriculture teachers perceived the lack of appropriate equipment as a barrier, and over 70% agreed that the science teachers' lack of agriculture background was a barrier to integrating science. Less than 30% of agriculture teachers agreed that their lack of science competence was a barrier.

Table 2
Perceptions of Barriers to Integrating Science

Statement	Science A / DA	Agriculture A / DA	Mann-Whitney U, p-value
Science teacher's lack of agricultural background	64% / 21%	71% / 11%	$U = 8859.5$, $p = .015$
Lack of federal, state, and local funding	63% / 21%	58% / 10%	$U = 10402.0$, $p = .889$
Lack of appropriate equipment	60% / 23%	83% / 8%	$U = 8025.0$, $p < .001$
Lack of integrated science curriculum	55% / 27%	42% / 29%	$U = 8645.0$, $p = .008$
Lack of agriscience inservice or workshops	50% / 44%	46% / 24%	$U = 8993.0$, $p = .029$
Lack of prior student preparation in science	39% / 24%	36% / 38%	$U = 10431.5$, $p = .922$
Teachers' philosophical differences	39% / 29%	63 % / 15%	$U = 7455.0$, $p < .001$
Agric. teachers' lack of science competence	39% / 36%	29% / 30%	$U = 9480.0$, $p = .145$
Lack of close proximity to high-tech. Firms	29% / 41%	42% / 28%	$U = 9398.5$, $p = .116$
Lack of agriscience jobs in the local community	19% / 28%	30% / 30%	$U = 8944.0$, $p = .025$

Note: A = agree, DA = disagree. Strongly agree and agree are collapsed into the agree column and strongly disagree and disagree are collapsed into the disagree column.

Research question number three contained six statements designed to address the agriculture and science teachers' perceptions regarding the role of teacher preparation programs in assisting teachers to integrate science (Table 3). Overall, the science and agriculture teachers differed in the level to which they agreed on the role of teacher preparation programs in integrating science and agriculture (Mann-Whitney $U = 7465.5$, $p < .001$). A majority of both the science teachers (90%) and agriculture teachers (92%) strongly agreed or agreed that teacher education programs should provide instruction for undergraduates as well as for teachers in the field (87% and 90% respectively) on how to integrate science into the agriculture curriculum. While 47% of science teachers agreed that science teachers should mentor beginning agriculture teachers, only 31% of agriculture teachers agreed. A higher percentage of science teachers agreed that student teachers in agricultural education should be placed with a cooperating teacher who integrates (80%) than did the agriculture teachers (54%).

Table 3
Perceptions of the Role of Teacher Preparation Programs in Agriculture

Statement	Science A / DA	Agriculture A / DA	Mann-Whitney U, p-value
Provide instruction for undergraduates on how to integrate science	90% / 2%	92% / 0%	$U = 10577.5$, $p = .663$
Provide inservice for teachers in the field on how to integrate science	87% / <1%	90% / 0%	$U = 10176.5$, $p = .295$
Should place student teachers with a cooperating teacher who integrates science	80% / 1%	54% / 11%	$U = 7027.0$, $p < .001$
Teach a course that allows future teachers to learn to team teach and model collaboratively	75% / 4%	65% / 5%	$U = 8793.5$, $p = .003$
Increase basic science course requirements for undergraduates	67% / 2%	54% / 20%	$U = 8114.5$, $p < .001$
Science teachers should mentor beginning agriculture teachers to help them integrate	47% / 12%	31 % / 30%	$U = 7939.5$, $p < .001$

Note: A = agree, DA = disagree. Strongly agree and agree are collapsed into the agree column and strongly disagree and disagree are collapsed into the disagree column.

Research question number four asked agriculture teachers and science teachers for their perceptions regarding support of the agricultural education program if the integration of science is increased (Table 4). Science and agriculture teachers differed in the level to which they agreed with perceived increase in stakeholder support (Mann-Whitney $U = 9243.0$, $p = .022$). More science teachers agreed (73%) than agriculture teachers (56%) that science teacher support would increase with increase integration of science, while agriculture teachers agreed more strongly (68%) than science teachers (42%) that administrator support would increase. The agriculture teachers also reported a higher level of agreement (63%) that counselor support would increase than did the science teachers (31%).

Table 4
Perceptions of Support for Agriculture Programs from Increased Integration of Science.

Statement	Science A / DA	Agriculture A / DA	Mann-Whitney U, p-value
Science teacher support will increase	73% / 6%	56% / 12%	$U = 8387.5$, $p < .001$
Business/Industry support will increase	56% / 2%	56% / 6%	$U = 10828.0$, $p = .836$
Administrator support will increase	42% / 11%	68% / 4%	$U = 7844.5$, $p < .001$
Parental support will increase	42% / 9%	58% / 4%	$U = 9076.0$, $p = .006$
Community support will increase	39% / 8%	51% / 6%	$U = 9635.0$, $p = .054$
Counselor support will increase	31% / 12%	63 % / 7%	$U = 7739.0$, $p < .001$

Note: A = agree, DA = disagree. Strongly agree and agree are collapsed into the agree column and strongly disagree and disagree are collapsed into the disagree column.

Research question number five was explored by asking agriculture teachers and science teachers to report their perceptions of collaboration and cooperation efforts between the agriculture and science departments in their school (Table 5). For the construct, there was no evidence of an overall statistical difference between the two groups, but differences were seen in responses to the individual statements. Eleven statements were included in this construct with agreement percentages ranging from 3% to 95%. Some of the items were phrased negatively, which resulted in a wider range of means and percentages. Over 90% of the science teachers agreed or strongly agreed they had a strong science program in their school, while only 72% of agriculture teachers agreed they had a strong science program. Differences were also seen in the level to which they agreed that collaboration would benefit science students, with 91% of agriculture teachers in agreement and only 79% of science teachers agreeing. More agriculture teachers agreed (95%) than science teachers (75%) that the agriculture department had something to offer the science department. While 58% of the science teachers disagreed with the statement the agriculture program does not want to work with the science program, 82% of the agriculture teachers disagreed with this statement.

Table 5

Perceptions of Collaboration between Science and Agriculture Departments

Statement	Science A / DA	Agriculture A / DA	Mann-Whitney *U*, *p*-value
We have a strong science program	91% / 2%	72% / 9%	$U = 7095.5$, $p < .001$
The science department has something to offer the agriculture department	85% / 2%	89% / 5%	$U = 9443.0$, $p = .113$
Collaboration would benefit science students	79% / 6%	91% / 2%	$U = 8617.0$, $p = .005$

Table 5 (continued)

Statement	Science A / DA	Agriculture A / DA	Mann-Whitney *U*, *p*-value
The agriculture department has something to offer the science dept.	75% / 9%	95% / 0%	$U = 7252.0$, $p < .001$
We have a strong agriculture program	71% / 11%	80% / 7%	$U = 9941.5$, $p = .456$
The departments have a cooperative relationship	48% / 21%	56% / 16%	$U = 9375.0$, $p = .120$
The departments share similar viewpoints toward agriculture and the environment	43% / 21%	46% / 31%	$U = 9954.0$, $p = .472$
The agriculture and science departments have similar philosophies on teaching and learning	34% / 30%	49% / 23%	$U = 8874.55$, $p = .024$
The departments work together in a collaborative effort	29% / 38%	39 % / 30%	$U = 9429.5$, $p = .146$
The science program does not want to work with the agriculture program	14% / 57%	14% / 61%	$U = 10277.5$, $p = .779$
The agriculture program does not want to work with the science program	11% / 58%	3% / 82%	$U = 7065.5$, $p <.001$

Note: A = agree, DA = disagree. Strongly agree and agree are collapsed into the agree column and strongly disagree and disagree are collapsed into the disagree column.

Conclusions/Recommendations/Implications

Many of Oregon's science and agriculture teachers held positive attitudes toward the integration of science in the agricultural education curriculum. Demographically, science and agriculture teachers were quite similar in age, years of teaching experience, and the number of years taught at their current school. However, science teachers and agriculture teachers were quite different in gender makeup, as agriculture teachers were an 83% male dominated profession, while science teachers were 61% male dominated in this state. Agriculture teachers tend to have grown up and presently live in more rural areas, and were in 4-H and/or agricultural education while in high school as compared to science teachers.

While just less than one-fourth of the science teachers had participated in workshops that taught them to integrate, 80% of the agriculture teachers had participated in workshops on integration of academics. Agriculture teachers should be encouraged to form partnerships with science teachers and share not only resources, but also teaching material that was presented at workshops. Programs such as the Agriscience Institute and Outreach Program (National FFA, 1991) for science and agriculture teachers should be reinvigorated on the state level. Science and agricultural education teacher preparation programs should work together to develop workshops that integrate science and agriculture, and encourage participation from science and agriculture teachers.

Science and agriculture teachers identified specific barriers to integrating science concepts into the agricultural education curriculum. The teachers differed in the level to which they agreed with perceived barriers, but most were in agreement that funding, equipment, and the science teacher's lack of an agriculture background were barriers to integrating science. Studies by Balschweid and Thompson (2002) of Indiana agriculture teachers, Layfield, et al (2001) of South Carolina agriculture teachers, and Thompson and Balschweid (1999) of Oregon agriculture teachers, and a study of Oregon principals (Thompson, 2001) all rated the highest scores on the same barriers to integrating science. The biggest disagreement concerning barriers between the science and agriculture teachers was the teacher's philosophical differences. More agriculture teachers (over 20% more) agreed or strongly agreed that the teachers' philosophical differences was a barrier to integrating science. It should also be noted that less than 40% of the science teachers were in agreement that the agriculture teacher's lack of science competence was a barrier to integrating science into the agricultural education curriculum. It is recommended that science and agriculture teachers team up to seek external funding sources for grants that emphasize integrating academics.

Both the science and agriculture teachers felt teacher preparation programs should provide instruction on how to integrate science both at the preservice and inservice levels. The teachers also agreed that student teachers should be placed with cooperating teachers who integrate science. Although differing in amount of agreement, both science and agriculture teachers

agreed that undergraduates need more basic science courses and team teaching should be emphasized in teacher preparation programs.

It should be noted and communicated to agriculture teachers that science teachers agreed more strongly than agriculture teachers that science teacher support will increase if integration of science is increased in agriculture programs. Knowing this, agriculture teachers may be more willing to work with science teachers in a collaborative effort to integrate science.

At the same time, agriculture teachers should be made aware that almost three fourths of the science teachers perceive they have a strong agriculture program, which has something to offer the science program in their school. At the same rate, agriculture teachers feel they have strong science programs in their school, and the science program has something to offer the agriculture program. This positive attitude toward the science and agriculture programs can be the catalyst to collaboration and cooperation amongst programs. Presently, less than half of the science and agriculture teachers do not work together in a collaborative effort, but over half of the science and agriculture teachers disagree that the science and agriculture programs want to work together. It seems the attitudes and respect for each program is present, the teachers are aware of the benefits of integrating science and agriculture, but integration isn't happening to a high degree. Administrators should be made aware of the implications of these findings to incorporate ways to help science and agriculture teachers form partnerships.

The data presented serves as a benchmark for identifying and comparing science and agriculture teachers' perceptions of integrating science and agriculture. Effective strategies for collaboration should be studied to help develop an effective model of integration between science and agriculture teachers. Further studies should be initiated to assess students' achievement using agriculture as the context to teach science skills.

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Integrating Science into the Agricultural Education Curriculum: Do Science Teacher and Agricultural Teachers Agree?

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This is a well-written and clearly presented study. The authors set out to determine the perceptions and attitudes of Oregon high school science teachers and agricultural teachers toward agricultural education programs and toward integrating science into the agricultural education curriculum. To do this, they followed a survey research design and were successful in garnering a high response rate from the two groups studied. The authors' caution generalizing the results of this study beyond the population under examination. With this said, the authors present several general findings that contribute to the body of knowledge in agricultural science education.

With regard to perceptions of barriers to integrating science into agricultural education, it appears that agricultural teachers believe they lack resources to teach science and that they hold a different philosophical orientation that do there science education counterparts.

In general, it appears that science and agricultural educators believe that more can be done at the preservice level to provide knowledge and skills to young teachers for the integration of science into agriculture. It is interesting to note that agriculture teachers were less likely to suggest perservice teachers be placed, in part, with science teachers. Agriculture teachers appear to believe that integrating science into the agriculture curricula would legitimize their programs in the eyes of the school and community. This authors point out that in Oregon, science and agricultural education teachers appear to be willing to collaborate. But that agricultural education teachers maybe more willing and see a greater benefit.

It is interesting to note that the philosophical differences were the area of biggest disagreement in terms of barriers to integrating science. Can the authors offer examples of what they believe these differences are? How would they go about defining these differences in a systematic way? Are these philosophical differences so deeply rooted in the preparation of agricultural education teachers as to prevent teaching science like science teachers? Is this an important concern?

The authors suggest, "integration of isn't happening to a high degree." Why is this the case when there appears to be positive perceptions toward the benefits of integration? What might catalyze the process of integration of science into the agricultural education curriculum?

Finally, were the researchers surprised that over 25% of the science teachers had been involved in university agricultural education or 4-H? Or, that a quarter had been involved in professional development activities that focused on the integration of agriculture and science? Does this impact the perceptions of agriculture in the eyes of the science teachers? It appears that Oregon science teachers have a high level of sensitivity toward agriculture, how did this come about?

Problems of Agricultural Education Teachers: Beginning and Current

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Abstract

If the agricultural education profession is going to grow and prosper in the 21st century, it will need an adequate supply of qualified teachers. In 2001, however, the number of qualified potential agricultural education teachers actually seeking employment as teachers fell far short of the net number of replacements needed (Camp, Broyles, & Skelton, 2002). Two contributing factors include qualified potential teachers fail to accept employment in the profession and a number of beginning teachers fail to remain in the teaching profession.

One way to improve the number of qualified agricultural education teachers is to reduce the number of teachers who leave the profession early through attrition. The purpose of this study was to take the first step in the process by attempting to identify problems faced by beginning and current teachers of agricultural education.

The research revealed twenty problem areas experienced by beginning and current teachers. The categories included administrative support, discipline, class preparations, time management, paperwork, facilities and equipment, community support, self-confidence, developing a course of instruction, budgets/funding, footsteps, faculty relationships, undergraduate preparation, student motivation, guidance counselor issues, enrollment numbers, balancing school and home, University relations, special needs students, multi-teacher issues, mentorship, image of agricultural education, financial rewards, and changes in FFA and agriculture.

Introduction

In 2001, the number of qualified potential agricultural education teachers actually seeking employment as teachers fell far short of the net number of replacements needed (Camp, Broyles, & Skelton, 2002). Although the number of agricultural education teachers has fluctuated over the 37-year life of the study, the shortage of qualified individuals has been an annual phenomenon. The teacher shortage is exacerbated by the fact that approximately 50% of newly qualified potential teachers accept employment in an occupation other than teaching (Camp, Broyles, & Skelton, 2002; Hovatter, et al., 2002).

Another factor in the teacher shortage problem is the number of beginning teachers who fail to remain in the teaching profession. In a national study of all K-12 teachers employed in April 1994, approximately 20% were not in the same occupation category three years later (Henke & Zahn, 2001). Osborne (1992), reflecting on the high percentage of agricultural education beginning teachers who leave the profession by the end of the third year, felt the stress, heavy workload, and constant pressure to be better resulted in a profession that "literally devoured its young" (p. 3).

If the profession is going to grow and prosper in the 21st century, it will need an adequate supply of qualified teachers. One way to improve the number of qualified agricultural education teachers is to decrease the number of teachers who leave the profession through attrition. One can assume that many teachers leave the profession because of problems they faced in the classroom. In order to improve the retention of high school agricultural education teachers, one should examine the problems faced by new and veteran teachers alike and through the preservice education program and/or teacher in-service address these problems. The purpose of this study was to take the first step in the process by attempting to identify the problems faced by beginning and current teachers of agricultural education.

Review of Literature

The review of literature examined a number of areas; including job satisfaction, induction programs, inservice needs, and problems to determine the body of knowledge associated with problems of agricultural education teachers. The components of induction programs, inservice needs, and job satisfaction, although indirectly, address problems of beginning and current teachers. For example, workplace condition factors/problems, such as administrative support, parental involvement, and teacher control over classroom are significant contributors to teacher satisfaction (Perie & Whitener, 1997).

Job Satisfaction

Agricultural teachers who are satisfied with their positions perceive themselves as effective classroom teachers (Bruening & Hoover, 1991). A number of studies have been completed on job satisfaction of agricultural education teachers. In a study of burnout among agricultural education teachers in Ohio, about 24% of the teachers strongly agreed with statements indicating that they were satisfied with their jobs. An additional 68% agreed with the statements (Newcomb, Betts, & Cano, 1987). In a study of 76 beginning teachers in Illinois, Flowers and Pepple (1988) found agricultural education teachers to be moderately satisfied with their jobs. Salaries received and teacher load was associated with lower levels of morale.

Cano and Miller (1992b) studied the job satisfaction of all secondary agricultural education teachers in Ohio. Using the Grayfield-Rothe "Job Satisfactions Index," they found agricultural education teachers slightly to somewhat satisfied with each of five job satisfier factors. When all facets of the job were considered, the teachers were undecided about their job satisfaction. Seven years later Castillo, Conklin, and Cano (1999) found similar results with agricultural education teachers in Ohio.

Induction/Inservice Programs

Programs have been developed by universities, State Departments of Education, and local school districts to provide assistance to beginning agricultural education teachers (Joerger & Boettcher, 2000). Overall these programs have great value to both teachers and principals (Nesbitt & Mundt, 1993). Teacher induction programs should emphasize skills such as time

management, developing organization skills, developing and maintaining self-confidence, and balancing personal and professional responsibilities (Wonacott, 2002). Community-based orientation programs should be implemented to assist new teachers, especially females, to integrate into the community (Castillo & Cano, 1999).

In a study of 37 first- and second-year teachers in Missouri, 12 professional competencies were rated as having a greater need for inservice. These competencies included: completing reports for local/state administrators, motivating students to learn, preparing FFA degree applications, developing an effective public relations program, preparing proficiency award applications, teaching agriscience - integrating science and agriculture, utilizing a local advisory committee, developing SAE opportunities for students, using computers in classroom teaching, supervising students' SAE programs, teaching using experiments, and conducting local FFA chapter activities (Garton & Chung, 1996). Birkenholz and Harbstreit (1997) found beginning teachers perceived their inservice needs to include skill development, FFA involvement, agricultural mechanics, program development and SOEP supervision.

Problems of Agricultural Education Teachers

Farrington (1980) found that beginning teachers had moderate problems with the high number of students with low academic ability, adapting instruction for students with low academic ability, motivating students and keeping them interested, and coordinating the activities of an active young farmer organization. Participants in Farrington's research also rated planning and implementing programs for adults, making the agriculture program a career preparation, and obtaining proper facilities and equipment as being close to a moderate problem.

In a study of four-year agricultural education programs in Iowa, Miller and Scheid (1984) identified four areas of difficulties faced by agricultural education teachers. The areas were conducting adult programs, occupational experience programs, program administration, and advising the FFA.

In a case study of three beginning teachers, Talbert, Camp and Camp (1994) found a number of common themes in the teachers' experiences. These experiences included student discipline, preparing for several different classes, managing a laboratory, teacher isolation, student acceptance, time management, and lesson planning.

Mundt and Conners (1999) studied state NVATA Outstanding Young Member Award winners for 1995 and 1996. Participants rated managing the overall activities of the local FFA chapter; balancing professional and personal responsibilities and maintaining personal motivation and a positive outlook; building the support of faculty, counselors and administrators within the school system; recruiting and motivating students in agricultural education; using proper classroom management strategies and dealing with student discipline problems; building support from parents, organizations and adult groups within the community; and properly managing your time, completing paper work and meeting required deadlines as very important.

Purpose/Objectives

The purpose of the study was to examine the problems agricultural education teachers faced in a selected Mid-Atlantic state. The information will be incorporated into the teacher preparation program at the land-grant university in an effort to improve the retention of agricultural education teachers in the profession. The primary objective was to develop and categorize a list of problems encountered by teachers of agricultural education during their first years in the profession as well as problems they are facing in their current teaching assignment.

The following research questions provided direction for the study: 1) what were the most significant problems faced by beginning teachers? and 2) what are the most significant problems you currently face as an agricultural education teacher?

Methods/Procedures

A descriptive research design was used to collect answers to two open-ended questions on beginning and current problems encountered by agricultural education teachers in a Mid-Atlantic state. The populations consisted of 95 teachers employed in a selected Mid-Atlantic state during the 2002-2003 school year. The population frame was established using the state's secondary agriculture teacher directory.

Procedures

After reviewing the available literature, a questionnaire was developed that consisted of two open-ended questions. The first question asked the respondents to list five problems they encountered as a beginning teacher in agricultural education. The second question asked respondents to list five problems they were currently facing. Teachers who had taught three years or less were instructed to only answer the question dealing with beginning problems.

A cover letter requesting assistance in the research study and a copy of the questionnaire were emailed to every teacher in the accessible population. They were given two weeks to complete the questionnaire. A second cover letter and copy of the questionnaire were emailed to all teachers who failed to respond to the initial email message. A two-week deadline was given for the completion of the questionnaire. At the end of second deadline, a cover letter and questionnaire were mailed to each of the non-respondents. Fifty-three respondents (56%) returned completed questionnaires.

All identifiers were removed from the questionnaires prior to the data entry process. The data were transcribed verbatim into an Access database by an administrative assistant in the department to assure the data's dependability. The researcher could not match respondents to responses during the data analysis process. The principal investigator, having experienced a nine-year high school agricultural education teaching career in the Mid-Atlantic state, had first hand knowledge of the problems faced in the state by beginning and veteran teachers. Peer

debriefings were conducted at key stages in the data analysis process to assure the procedures were credible.

Qualitative data analysis techniques were used to analyze the open-ended questions. This included a review of the responses, establishment of response categories, and placing the responses into the categories. To establish the response categories, each statement was read and assigned a category based on the major theme of the statement. The problem categories were based on the review of literature and the researchers' personal knowledge of the teaching profession. The statements and tentative categories were organized and reviewed at least three times before a final category was assigned to the response. The questionnaire, coding rubric, and final results of the coding were presented to the researcher's peers to establish trustworthiness and credibility of interpretation and to ensure confirmability. Copies of data from each step in the process have been maintained.

Results/Findings

Problems Experienced by Agricultural Education Teachers

The responses to the open-ended question on problems encountered as a beginning and current agricultural education teachers were analyzed. As the data were analyzed 24 categories emerged. The categories included administrative support, discipline, class preparations, time management, paperwork, facilities and equipment, community support, self-confidence, developing a course of instruction, budgets/funding, footsteps, faculty relationships, undergraduate preparation, student motivation, guidance counselor issues, enrollment numbers, balancing school and home, University relations, special needs students, multi-teacher issues, mentorship, image of agricultural education, financial rewards, and changes in FFA and agriculture. The top twelve problems of beginning teachers and the top twelve problems of current teachers will be discussed. The top twelve problems of beginning teachers will be discussed in order of importance. Problems of current teachers, not included in the beginning problem list will be discussed.

The number one problem for beginning teachers, as well as the number one problem teachers currently face, was administrative support. Forty-seven percent of the respondents indicated that administrative support was a problem as a beginning teacher. Forty-five percent of the respondents indicated administrative support was currently a problem. Examples of the responses included "my administration was not interested in my program," "I did not receive support from my administration," "my administration did not understand my program," "school policies made hands-on learning more difficult," and "I experience a lack of communication with my administrators."

Classroom discipline was the second most frequently mentioned problem (33%) for beginning teachers. Discipline problems declined in importance for current teachers. Fourteen percent of the respondents indicated discipline was one of the top five problems they currently face. Responses in this category included; "overall lack of discipline in their school," finding

effective ways to handle discipline problems was a problem," "flagrant actions by students were a problem," "I was not prepared to handle major discipline problems," and "senior students become lazy."

A number of respondents (25%) indicated that class preparations were a problem as a beginning teacher. Only four percent of the respondents indicated that class preparations were a current problem. Problem statements included "I had too many class preparations per day," "I had too many laboratories to manage," "administration constantly changed the style of lesson plans required," "it was difficult to include hands-on activities in my lessons," and "it was difficult to prepare effective lessons."

Twenty-four percent of the respondents indicated that time management was a problem for them as a beginning teacher. The time management problem increased in frequency as a current problem. Thirty-five percent of the respondents indicated time management was a current problem. Respondent statements included; "I had difficulty finding the time to get everything done," "I was involved in too many FFA activities," "There was not enough time to teach all of the CSOs (State Content Standards and Objectives)," "Too often I failed to set priorities for tasks associated with my program," "I never have enough time to do everything I want," and "I had trouble knowing when to go home."

Nearly one-fourth of the respondents (24%) indicated problems with paperwork as a beginning teacher. The percentage of respondents who indicated paperwork was a current problem increased to 31%. The problems included; "the increased level of paperwork was a problem," "the level of paperwork was overwhelming," "I spent too much time doing paperwork," and "extended employment justification required too much paperwork."

A number of respondents indicated that facilities and equipment (24%) were a problem as a beginning teacher. The percentage of respondents who indicated facilities and equipment were current problem declined to 14%. Problem statements included; " I did not have adequate teaching supplies," "inadequate facilities were a problem in my program," "I did not have the quality equipment needed for the program," "I did not have resources needed to expand my program," "my facilities needed major improvements," and "I did not have access to adequate curriculum materials."

Community support was a problem for 18% of the respondents during their years as a beginning teacher. The number of teachers (22%) indicating community support was a current problem increased slightly. Problem statements included; "'anti-vocational' sentiments reduced community support for my program," "cultural changes resulted in reduced support by parents," I was not respected by local community leaders," and "the community did not support my program."

Budgets/program financing was a problem for 16% of the respondents during the beginning stages of their professional career. The percentage of respondents that indicated budgets/program financing was a current problem increased to 28%. Respondents indicated the

following problems; “There was inequity in the way funds were distributed in my school district,” “budget cuts were a problem for my program,” “the administration did not provide adequate financial support for my program,” “there was little funding for equipment replacement,” “financing FFA activities was a problem,” and fundraising for the FFA chapter was a problem.”

Sixteen percent of the respondents indicated problems developing a course of instruction as a beginning teacher. None of the respondents indicated the development of a course of instructions was a current problem. Beginning problems included; “I did not know what to teach,” “I was not aware of the school area needs,” “I experienced difficulty identifying units of instruction,” and “my program was poorly conceived.”

Sixteen percent of the respondents indicated self-confidence problems as a beginning teacher. None of the respondents indicated self-confidence was a current problem. The problems included; “I felt inadequate in my knowledge of some aspects of agriculture,” “I experienced problems ‘establishing’ myself as the new teacher,” “I was concerned that my students knew more than I did in certain areas,” and “my lack of experience caused me to doubt my abilities as a teacher.”

Fourteen percent of the respondents indicated problems as a beginning teacher with faculty acceptance/relationships. Faculty relationships were a current problem for 12% of the respondents. Respondents reported the following problems; “there was a lack of communication among teachers in my school,” “the faculty in my school did not accept me,” “my relationship with faculty peers was strained,” “my relationship with school staff was strained,” “faculty peers resented my extended employment,” and “I felt separated from other teachers in my school.”

The author coined the term “footsteps” to represent one category of problems indicated by a number of respondents. “Footsteps” could be divided into two polar situations. In one situation, respondents were constantly compared to their well respected predecessor. The reverse of this situation also occurred. The beginning teacher had problems with credibility because their predecessor was not well respected in the school and/or community. Fourteen percent of the respondents encountered a problem walking in a predecessor’s “footsteps” as a beginning teacher. Footsteps were listed as a current problem by two percent of the respondents. Problem statements included; “being told ‘that is not the way Mr. Doe did it,’” “being told ‘that is not the way it has always been done,’” students resented the fact they received no closure with the previous instructor,” and “my predecessor ordered the supplies for the next year.”

The top 12 current problems for agricultural educators in the Mid-Atlantic state included five problems that were not in the top 12 problems of beginning teachers. The five problem categories not in the top 12 beginning problem list included “student motivation,” “enrollment numbers,” “balancing school and home,” “special needs students,” and “changes in FFA and agriculture.”

Forty-one percent of the respondents indicated that student motivation was a current problem. This was an increase from 12% of the respondents who indicated student motivation was a beginning teacher problem. Respondents indicated; "it was difficult to motivate students," "students were apathetic about my program," "students had a poor attitude toward learning," "students had a poor attitude about the educational system," and students were reluctant to make FFA the number one priority."

Sixteen percent of the respondents indicated that enrollment numbers was a current problem. Twelve percent of the respondents felt that enrollment numbers was a problem as a beginning teacher. Problem statements included; "enrollment numbers were more important than student quality," "state course requirements required me to 'fight' to maintain satisfactory enrollment in my program," "I experienced overloaded classes because students were "dumped' in my program," "I experienced problems recruiting students in my program," "too many students enrolled in classes were not interested in the program," and "small enrollments forced me to combine two classes during the same class period."

The number of respondents were about equal who felt balancing school and home was a beginning and current problem of agricultural education teachers. Fourteen percent of the respondents felt that balancing school and home was a current problem while 12% of the respondents indicated it was a problem for them as a beginning teacher. The problems included; "creating a balance between my teaching career and my family," creating a balance between my teaching career and graduate education," "I did not have enough time for my family," "I spent too much time at my job," "I did not have enough time for a social life," and "creating a balance between my teaching career and marriage."

Table 1
Beginning and Current Problems Experienced by Agricultural Education Teachers

	Beginning Problem			Current Problem		
	Rank	*f*	%	Rank	*f*	%
Administrative support	1	24	47.1	1	23	45.1
Discipline	2	17	33.3	10	7	13.7
Class preparations	3	13	25.5	15	2	3.9
Time Management	4	12	23.5	3	18	35.3
Paperwork	4	12	23.5	4	16	31.4
Facilities and equipment	4	12	23.5	10	7	13.7
Community support	7	9	17.6	6	11	21.6
Budgets-funding	8	8	15.7	5	14	27.5
Developing a course of instruction	8	8	15.7		0	0.0
Self confidence	8	8	15.7		0	0.0
Faculty relationships	11	7	13.7	13	6	11.8
Footsteps	11	7	13.7	17	1	2.0
Student motivation	13	6	11.8	2	21	41.2

Enrollment numbers	13	6	11.8	9	8	15.7
Balancing school and home	13	6	11.8	10	7	13.7
Guidance counselor issues	13	6	11.8	13	6	11.8
Undergraduate preparation	13	6	11.8		0	0.0
Special needs students	18	3	5.9	7	9	17.6
Multi-teacher issues	18	3	5.9	17	1	2.0
University relations	18	3	5.9	17	1	2.0
Mentorship	18	3	5.9		0	0.0
Changes in FFA and agriculture	22	1	2.0	7	9	17.6
Financial rewards	22	2	3.9	15	2	3.9
Image of agricultural education	22	2	3.9	17	1	2.0

Dealing with special needs students was a current problem for 18% of the respondents. Only six percent of the respondents indicated special needs students were a problem as a beginning teacher. Respondents provided the following problem statements; "inclusion was used for too many special needs students," "too many special needs students were mainstreamed," " I was not prepared to deal with special needs students," "special education teachers expect special needs students to be 'given' grades," and "my program was a dumping ground for special needs students with behavioral problems."

A number of the respondents (18%) indicated that changes in the FFA and agriculture were current problems for agricultural education teachers. Only 2% of the respondents indicated that changes in the FFA and agriculture were a problem as a beginning teacher. The problems included; "implementing changes in the program was a problem," "keeping abreast of new technology was a problem," "keeping current with advancements in agriculture," and changes in the FFA."

Conclusions/Recommendations/Implications

Conclusions and Discussion

Administrative support is a major problem for agricultural education teachers in the selected Mid-Atlantic state. Nearly 50% of the respondents indicated administrative support was a problem for them as a beginning teacher. Forty-five percent of the respondents indicated they current experience problems with administrative support.

The frequency six problem categories were mentioned as current problems increased dramatically over the frequency they were mentioned as beginning teacher problems. The six problem areas included time management, paperwork, student motivation, enrollment numbers, dealing with special needs students, and changes in the FFA and agriculture. Additional analysis of this phenomenon is needed to determine if this was a function of the "changing times" or if it was a problem more likely to be encountered by experienced teachers.

There were a group of four problem areas that were more prevalent for beginning teachers. Beginning teachers were more likely to have problems in the areas of self confidence, the mechanics and number of class preparations, preparing a course of instruction, and walking in the "footsteps" of a predecessor. To a lesser degree, beginning teachers were more likely to experience problems with discipline and facilities/equipment than experienced teachers. Having first hand knowledge of the preservice curriculum, the researcher questions why beginning teachers had problems in the areas of class preparations and preparing a course of instruction. On the other hand, one would expect beginning teachers to experience problems in the areas of self confidence and problems, both good and bad, of following in a predecessor's footsteps.

In addition to administrative support, three problem areas were rated high as problems of beginning teachers and as current problems. The areas included community support for the program, budgets/financing the program, and faculty relationships. Because of local, state and federal budget issues, the budget/financing area was no surprise. Budgets also have been and will continue to be a problem. A group of individuals, regardless of their composition, will always have disagreements; therefore, faculty relationships will always be an issue.

Recommendations

The researcher recommends that the problem statements in the twenty problem areas be further quantified using the Delphi research techniques. Use a Likert scale, the teachers should be asked to evaluate the degree each statement was a problem as a beginning teacher and at the current time in their profession career. The Likert scores should be added together to create a summated score for each of the problem areas. This will give the research freedom to explore correlations between age, years of teaching experience, degree held, and program areas taught.

The research should be repeated to determine if similar trends exist in the area and nation. First, the survey should be repeated on a regional basis. An organization such as the Mid-Atlantics 5-Star Consortium could provide a vehicle for regional duplication of the research. Finally, the research should be replicated on a national basis.

Teacher preparation programs across the United States should use review their curriculum to determine if changes could/should be made to help prepare prospective teachers to handle problems they will face as an agricultural education teacher.

Implications

The research in its current stage, as well as the advanced research previously recommended, has wide spread implications for agricultural education teacher preparation programs. The content of teacher education programs, the inservice opportunities provided for current teachers, induction and/or first-year teacher programs, and coordination between state

departments of education and teacher preparation programs could, and should, be impacted by the results of this and similar research. By adequately preparing teachers, at the preservice and entry levels, to handle the potential problems of agricultural education teachers, the profession can increase job satisfaction and reduce teacher attrition.

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Problems of Agricultural Education Teachers: Beginning and Current
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Educational Importance and/or contributions to an increased body of knowledge and/or application and practice:

Few teachers enter the profession without encountering problems. The author postulates that problems encountered by beginning and current teacher have may be linked to teacher attrition, which is a perennial state and national concern of those in agricultural education. This topic deserves substantive attention if, in fact, teachers leave the profession because of the problems they encounter. Often times, needs assessments are used to determine the in-service needs of agricultural education teachers as they pertain to program, curriculum and instruction. Problems, however, are not so easy to identify and can be difficult to operationally define.

Implications/usefulness/application of information for practitioners:

Several teacher problems were revealed. While some problems cited are pedagogical in nature, this study revealed what most competency-oriented needs assessments would not. For example, this study identified management and support issues. Other problems that were identified are nonetheless important to recognize and address as problems encountered by teachers. The exploratory in nature of this study possess some inherent challenges for the usefulness and application of the results. The broad and somewhat ambiguous themes fail to provide specific guidance for application. "Paperwork" for instance, remains vague and subject to interpretation. Similarly, some problem areas may be site and/or person specific and a complex function of personality and other differences. Nonetheless, these problems must be addressed. Which theme areas will self-correct with time, and with will continue to plague teachers?

Methodology Issues:

It is refreshing and novel to read research that begins at the "grassroots" level in addressing an area of inquiry. The author simply allowed the respondents to list problems they encountered and/or are encountering as beginning teachers (reflective response for some) and problems currently encountered. This leads me to seek clarification as to the nature of the open-end question. Were respondents asked to rank, or simply list five problems they have encountered? Was it implied that the scope of problems be limited to their profession? Were the problems listed reflective of the time of year, consequently framing problems by this variable? Where problems considered to be chronic or problems for that moment in time? Furthermore, with respect to the 53 respondents, how many were considered "beginning" teachers?

I applaud the author for the efforts demonstrated to convey the systematic efforts and trustworthiness of the data collection and analysis process.

Results and/or conclusions and recommendations:

Do teachers leave the profession because of problems encountered? What are other reasons for leaving the profession? Would an ex post facto (Causal Comparative) study of those teachers who left the profession and those who have remained highlight the problems teachers encounter that are related to attrition? I applaud the author for his recommendations to further quantify and qualify the nature of these finding with additional research.

Overall comments:

This study brings to light and discussion real problems teachers are encountering. Are we adequately targeting the problems teachers most need addressed? Overall, this study stimulates thinking and the direction in which we address teachers' need and concerns. I commend the author for this line on inquiry and encourage him to refine this data collection instrument.

A Comparison of Cooperating Teachers' and Student Teachers' Perceptions of Important Elements of the Student Teaching Experience in Agricultural Education

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Abstract

This study compared cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience and identified selected characteristics of cooperating centers. Thirty-one cooperating teachers and 36 student teachers provided the data. Questionnaire items were divided into five "core" areas based on a review of literature. Respondents rated the elements using a scale of "5" = "High Importance" to "1" = "No Importance." Return rates were 89% for cooperating teachers and 100% for student teachers. Reliability estimates for the five core areas ranged from .49 to .86 for cooperating teachers and from .69 to .90 for student teachers. The overall importance scale of 34 items yielded estimates of .91 and .89, respectively. Both groups rated all elements as "important" and agreed on the highest rated element: "A well rounded program emphasizing instruction, SAEs, and youth leadership activities." However, significant differences existed ($p < .05$) in overall ratings of importance in two of the five core areas of the student teaching experience. Teacher educators should design and implement programming to ameliorate the perceptual differences held by the groups. Accordingly, "discrepancies" between the groups about fundamental program areas—"Supervised Agricultural Experience Programs" and "Classroom and Laboratory Instruction"—warrant further study.

Introduction and Conceptual Framework

Schumann (1969) argued that the most important component of the preservice professional development of an aspiring agriculture teacher is the student teaching experience. Norris, Larke, and Briers (1990) asserted, "the student teaching center and the supervising (cooperating) teacher are the most important ingredients in the student teaching experience" (p. 58). Barnes and Camp (2002), Deeds (1993), Deeds, Arrington, and Flowers (1988), Garton and Cano (1994), and Martin and Yoder (1985) have supported that assertion.

Further, DeMoulin (1993) stated that students should demonstrate a positive change in their attitudes about teaching and "come away from the student-teaching experience with a positive attitude toward their chosen profession" (p. 160). In support, Deeds and Barrick (1986) concluded that the perceptions of preservice teachers regarding the quality of program in which their early field-based experiences transpired were related to the extent that their attitude was positive. Byler and Byler (1984) analyzed student teacher morale before and after student teaching and found "a significant relationship after the student teaching experience between student teachers' morale and the morale of their cooperating teachers" (p. 27). Clearly, the student teaching experience holds great potential for positively impacting student teachers and setting them on a course of professional induction that is rewarding and purposeful.

Martin and Yoder (1985) theorized a successful student teaching experience as one in which a "team approach" (p. 19) defined the relationship between cooperating teacher and student teacher. They contended that the success of the relationship depended "upon the general supervisory climate in the department and on the educational leadership abilities of the cooperating teacher" (p. 21). Further, Korthagen and Kessels (1999) stated that cooperating student teacher centers "must be able to offer a sound balance between safety and challenge" (p. 14), and that the needs of student teachers and the needs of schools must be considered. Henry and Beasley (1996) also investigated the unique and essential role of supervising (cooperating) teachers and centers in facilitating the professional induction of preservice teachers; they supported the aforementioned positions, as did Barnes and Camp (2002) in regards to the important role of cooperating centers.

Concerning instructional practices, DeMoulin (1993) argued that it was the cooperating teacher's role to encourage student teachers to use innovative teaching practices and to support their creativity. Moreover, Garton and Cano (1994) asserted that cooperating teachers should be selected "who model the desired teaching behaviors expected of student teachers" (p. 213).

The student teaching experience, an important line of inquiry, may hinge on the attitudes and perceptions of two key actors—the cooperating teacher and the student teacher. To this end, Harlin, Edwards, and Briers (2002) suggested that the perceptions of these two stakeholder groups should be compared to determine if significant differences exist. And, if incongruence was identified, then preservice and inservice programs should be developed and implemented to ameliorate the differences (Edwards & Briers, 2001; Harlin et al., 2002). However, are the perceptions of these two groups—cooperating teachers and student teachers—similar or different concerning the important elements of the student teaching experience in agricultural education?

Purposes and Research Questions

The primary purpose of this study was to compare cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience in agricultural education. Another purpose was to describe selected characteristics of cooperating student teaching centers. The following research questions guided this study:

1) What were selected characteristics of cooperating student teaching centers used by the Department of Agricultural Education at Texas A&M University?
2) What were cooperating teachers' perceptions of important elements of the student teaching experience?
3) What were student teachers' perceptions of important elements of the student teaching experience after completing their student teaching semester?
4) Were there significant differences between cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience?

Methods and Procedures

This descriptive study sought to compare cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience and to identify selected characteristics of cooperating student teaching centers. An agriculture cooperating teacher workshop, hosted by the Department of Agricultural Education at Texas A&M University, included a focus group exercise to determine cooperating teachers' perceptions of "important elements" of the student teaching experience. The participants included teachers that had either served as cooperating student teaching centers during the previous three years or were future placement sites.

Prior to the workshop, the teachers were divided into five different focus groups of seven members each. Each of the five focus groups represented a "core" component (area) of the student teaching experience as identified by a review of literature (Briers & Edwards, 1998; Edwards & Briers, 1998; Larke, Norris, & Briers, 1992; Martin & Yoder, 1985) and by teacher education faculty in the Department of Agricultural Education at Texas A&M University. The five core areas were classroom and laboratory instruction, supervised agricultural experience programs (SAEPs), student leadership development (FFA), school and community relationships, and cooperating teacher-student teacher relationships. The teachers identified 34 elements of the student teaching experience as being "important."

In an effort to "triangulate" (Gall, Borg, & Gall, 1996) the earlier findings, the 34 important elements (items) were included in a mail questionnaire that was sent to the cooperating teachers following the workshop. The instrument was divided into five "core" areas of the student teaching experience and included the 34 "important elements": classroom and laboratory instruction (5 items), supervised agricultural experience programs (SAEPs) (4 items), student leadership development (FFA) (7 items), school and community relationships (9 items), and cooperating teacher-student teacher relationships (9 items). The teachers were asked to indicate their perceived "level of importance" for the elements (Edwards & Briers, 2001). The final rate of return—deemed to be acceptable (Tuckman, 1999)—was 89% (31 of 35) for the cooperating teachers representing 91% (21 of 23) of the cooperating student teaching centers. Cooperating teachers perceived all items to be of either "much" or "high" importance ($M \geq 4.00$); the overall mean was 4.54. Cronbach's coefficient alpha reliability estimates for the five core areas ranged from .49 to .86. The overall importance scale yielded an estimate of .91.

To identify students' perceptions about their "level of importance" for selected elements of the student teaching experience, the 34 important elements (items) comprised one part of a questionnaire administered to student teachers (Harlin et al., 2002). The student teachers were also asked to rate the "level of importance" of the elements using a Likert-type rating scale ("5" = "High Importance," "4" = "Much Importance," "3" = "Some Importance," "2" = "Low Importance," and "1" = "No Importance"). Cronbach's coefficient alpha reliability estimates for

the five core areas ranged from .69 to .90. The overall importance scale of 34 items yielded an estimate of .89. The second part of the student teachers' instrument included 12 questions describing selected characteristics of their cooperating centers. Data were collected from the student teachers at the conclusion of their 11-week off-campus field experience during the 2000-2001 academic year; a 100% response rate was achieved (N = 36).

Research questions one, two, and three were analyzed descriptively with frequencies, percentages, means, and standard deviations. Research question four was analyzed by computing independent samples *t*-tests ($p \leq .05$).

Findings

When describing their cooperating centers (Table 1), 28 of the 36 student teachers reported student teaching in a high school of 780 students or larger. (This school size benchmark is an accepted point of demarcation between "large" and "small" high schools in Texas.) Three-fourths (27) reported that either two or three classrooms comprised their department's facility. With regard to laboratory facilities, a majority had access to agricultural mechanics facilities (35), greenhouses (20), and project centers (22). However, a large majority reported not having access to meats (31), aquaculture (28), or land (27) laboratories.

A majority of the student teachers had access to email (33) and to the World Wide Web (34) in their cooperating center; however, their students' access to the World Wide Web (17) was less common. Eight student teachers reported that computer labs for student use were located in their center's facility (Table 1). See Edwards and Briers (2001) and Harlin et al. (2002), respectively, for selected personal and professional characteristics of the cooperating teachers and student teachers who participated in this study.

Table 1

Selected Characteristics of Cooperating Student Teaching Centers as Reported by Student Teachers for the 2000-2001 Academic Year (N = 36)

Characteristics	*Frequency*	*Percentage*
	School	
Campus Size		
779 students or less	8	22.2
780 students or more	28	77.8
	Agriscience Department	
Number of Classrooms		
1	1	2.8

Characteristics	*Frequency*	*Percentage*
2	15	41.7
3	12	33.3
4 or more	8	22.2
Ag Mech Laboratory		
Yes	35	97.2
No	1	2.8

(table continues)

Greenhouse		
Yes	20	55.6
No	16	44.4
Horticulture Facility (Not a Greenhouse)		
Yes	18	50.0
No	18	50.0
Meats Laboratory		
Yes	5	13.9
No	31	86.1
Aquaculture Facility		
Yes	8	22.2
No	28	77.8
Land Laboratory		
Yes	9	25.0
No	27	75.0
Project Center/Feeding Facility		
Yes	22	61.1
No	14	38.9
Email access at cooperating Center		
No access	1	2.8
No access in department	2	5.6
Access in department	33	91.7
Access to World Wide Web		
No access	1	2.8
No access in department	1	2.8
Access in department	34	94.4
Student access to technology		
No access	2	5.6
Access outside the facility	5	13.9
Access to computers, no WWW	4	11.1
Access to computers with WWW	17	47.2
Facility included a computer lab	8	22.2

Characteristics	*Frequency*	*Percentage*

The 34 "important elements" of the student teaching experience as rated by cooperating teachers and student teachers are shown in Table 2. Both groups rated elements (items) of the student teaching experience on level of importance ("5" = "High Importance". . . "1" = "No Importance") via a questionnaire. Cooperating teachers perceived all of the 34 items as having either "much" or "high importance" ($M \geq 4.00$) (Table 2). Their overall mean was 4.53 or midway between "much" and "high importance." The overall mean for student teachers was less (4.34); it was slightly below the midway point between "much" and "high importance."

Further, the elements were grouped into five "core" areas of the student teaching experience; a composite mean was computed for each subject group by area (Table 2). Among cooperating teachers, two core areas were tied for highest composite mean (4.69): "Cooperating Teacher-Student Teacher Relationships" (9 elements) and "Classroom and Laboratory Instruction" (5 elements). The core area "Student Leadership Development (FFA)" (7 elements) also had a high composite mean (4.54). The core areas "Supervised Agricultural Experience Programs" (4 elements) and "School and Community Relationships" (9 elements) had the second lowest (4.40) and lowest (4.36) composite means, respectively.

For student teachers, the elements were grouped into five "core" areas as well, and composite means were computed for each. Their highest rated core area was also "Cooperating Teacher-Student Teacher Relationships" ($M = 4.56$). However, contrary to the cooperating teachers, the student teachers rated the core area "School and Community Relationships" ($M = 4.41$) second while "Classroom and Laboratory Instruction" was a close third ($M = 4.40$). "Student Leadership Development" ($M = 4.39$) followed closely. Finally, the core area "Supervised Agricultural Experience Programs" ($M = 3.97$) was rated fifth in importance (Table 2).

Individually, the highest rated element for both groups was "a well rounded program emphasizing instruction, SAEs, and youth leadership activities": cooperating teachers ($M = 5.00$; $SD = .00$); student teachers ($M = 4.78$; $SD = .49$) (Table 2). The second highest rated element for cooperating teachers was "Daily (systematic) classroom and/or laboratory instruction" ($M = 4.94$; $SD = .25$). However, "A student teacher who is willing to be mentored by the cooperating teacher" ($M = 4.72$; $SD = .66$) held that position for student teachers. The third ranked element for both groups was "A cooperating teacher who has a positive attitude": supervising teachers ($M = 4.90$; $SD = .30$), student teachers ($M = 4.69$; $SD = .62$).

Conversely, the two lowest rated elements for cooperating teachers were "A cooperating teacher who supports other school activities (e.g., sports banquets)" ($M = 4.10$; $SD = .75$), and "A cooperating teacher who supports activities in the community (e.g., service organizations)"

(M = 4.13; SD = .81). For student teachers, two elements were tied for least important: "All students meeting state SAEP requirements with accurate record books" (M = 3.89; SD = 1.08) and "Diversity within students' SAEPs" (M = 3.89; SD = .98) (Table 2).

Independent samples t-tests revealed that overall means for cooperating teachers and student teachers were significantly different ($p < .05$) (Table 2). Also, the composite means for two of the five core areas of the student teaching experience were significantly different ($p < .05$): "Classroom and Laboratory Instruction" and "Supervised Agricultural Experience Programs." No significant differences ($p > .05$) were found for cooperating teachers' and student teachers' ratings of the core areas "Student Leadership Development," " School and Community Relationships," and "Cooperating Teacher-Student Teacher Relationships" (Table 2). (Multiple t-tests inflate the experiment-wise alpha; so, the difference in overall means is most important.)

Table 2

Comparison[a] of Means of Cooperating Teachers' and Student Teachers' Perceptions of Important Elements of the Student Teaching Experience

Elements[b]	*M[c]* *SD*	*M[c]* *SD*	*t-value*
	Coop. Tchr.	*Stud. Tchr.*	
Classroom and Laboratory Instruction			
Daily (systematic) classroom and/or laboratory instruction	4.94 .25	4.39 .73	
A discipline management plan used in a structured environment	4.65 .55	4.44 .70	
Current technology used in instruction	4.32 .70	4.17 1.00	
Creative teaching methods as a basis for daily instruction, e.g., use of multimedia and varied teaching techniques	4.52 .63	4.22 .93	
A well-rounded program emphasizing instruction, SAEs, and youth leadership activities	5.00 .00	4.78 .49	
Composite Mean[d]	4.69 .29	4.40 .52	-2.819*
Supervised Agricultural Experience Programs			
All students meeting state SAEP requirements, with accurate record books	4.48 .72	3.89 1.08	
Diversity within the students' SAEPs	4.10 .79	3.89 .98	
Project supervision and an explanation of this commitment to the student teacher	4.61 .50	4.00 1.04	
Student participation in advanced awards and degrees on district, area, state and national levels	4.39 .62	4.22 .96	
Composite Mean[d]	4.40 .44	3.97 .83	-2.655*
Student Leadership Development (FFA activities)			
Strong classroom instruction in leadership development	4.55 .57	4.44 .61	
These activities as essentials for a balanced program	4.68 .48	4.39 .65	
A history of successful participation	4.32	4.14	

Elements[b]	*M*[c] *SD*	*M*[c] *SD*	*t-value*
	.70	.90	
Cooperating teachers who are familiar with current rules for participation in events (e.g., CDEs and LDEs)	4.52 .57	4.53 .85	

(table continues)

Elements[b]	*M*[c] *SD*	*M*[c] *SD*	*t-value*
	Coop. Tchr.	*Stud. Tchr.*	
Resources available to train a competitive team	4.71	4.58	
	.53	.65	
Opportunities for the student teacher to judge or monitor a district or area Leadership Development Event (LDE)	4.42	4.25	
	.72	.81	
Composite Mean[d]	4.54	4.39	-1.401
	.39	.51	
School and Community Relationships			
Recognized integrity of the cooperating teacher and program	4.74	4.67	
	.45	.59	
Departmental support organization(s) (e.g., advisory committees, booster clubs, and Alumni)	4.29	4.55	
	.69	.56	
A cooperating teacher who supports other school activities (e.g., sports banquets)	4.10	4.25	
	.75	.77	
A cooperating teacher who supports activities in the community (e.g., service organizations)	4.13	4.36	
	.81	.64	
A spirit of professional cooperation among fellow teachers	4.58	4.53	
	.50	.61	
Use of local media	4.23	4.11	
	.62	.71	
School administrators who are involved in program activities	4.42	4.57	
	.62	.61	
Community service projects	4.23	4.26	
	.67	.69	
Availability of facilities (e.g., computer lab, shops, horticultural lab, school farm)	4.48	4.50	
	.72	.74	
Composite Mean[d]	4.36	4.41	.455
	.45	.50	
Cooperating Teacher-Student Teacher Relationships			
A cooperating teacher who is willing to be a mentor	4.77	4.67	
	.43	.76	
A student teacher who is willing to be mentored by the cooperating teacher	4.77	4.72	
	.43	.66	

A cooperating teacher who has a positive attitude	4.90 .30	4.69 .62	
A cooperating teacher who is a "good" role model	4.77 .50	4.56 .84	

(table continues)

Elements[b]	*M*[c] *SD*	*M*[c] *SD*	*t-value*
	Coop. Tchr.	*Stud. Tchr.*	
A cooperating teacher who communicates clear expectations to the student teacher (e.g., role in the classroom and calendar of events)	4.71 .46	4.64 .64	
A cooperating teacher who provides frequent evaluations and feedback to the student teacher	4.65 .55	4.50 .81	
Discipline policies that are in place and enforced	4.77 .43	4.48 .94	
"Reinforcement" techniques in teaching (e.g., pace, reteaching, retesting, and accommodation of various learning styles)	4.45 .62	4.42 .97	
Assistance in job placement	4.42 .62	4.33 .96	
Composite Mean[d]	4.69 .31	4.56 .60	-1.184
Overall Mean	4.53 .29	4.34 .38	-2.290*

Note. [a]Comparison does not assume equal variances. [b]Important elements were determined by cooperating teacher focus groups and reflect the "language" of those groups. [c]5 = High Importance . . . 1 = No Importance. [d]Composite mean of elements for that core area. *$p < .05$.

Conclusions and Recommendations

Cooperating student teaching centers used by the Department of Agricultural Education at Texas A&M University tended to be larger high schools, usually having enrollments of more than 779 students. Most of the agriculture departments had two or more classrooms, nearly all had an agricultural mechanics facility, and many had other learning laboratories such as greenhouses and project centers. Many centers were equipped with Internet and email access, and nearly one-half had these and related technologies available for student use. Cooperating teachers and student teachers rated all 34 elements of the student teaching experience as "important" (Table 2). However, a significant difference existed between the two groups

regarding "level of importance"; cooperating teachers' overall ratings were the higher of the two. Although both groups reserved their highest rating for the core area "Cooperating Teacher-Student Teacher Relationships," significant differences were detected for two of the five core areas: "Classroom and Laboratory Instruction" and "Supervised Agricultural Experience Programs." Again, student teachers' ratings were lower (Table 2).

Recommendations for practice and future research follow: 1) Prior to student teaching, preservice teachers should be made aware of the important elements of the student teaching experience that were identified by cooperating teachers and by student teachers who had completed a student teaching experience. To this end, Edwards and Briers (2001) contended that, "these elements could serve as 'talking points' (i.e., points of reference) for the student teacher, when defining and 'negotiating' duties, roles, and responsibilities with their cooperating teacher at the onset of student teaching" (p. 40).

2) Armed with a better understanding of cooperating teachers' and student teachers' perceptions about the important elements of the student teaching experience, teacher educators should design and implement preservice learning activities for student teachers and inservice programs for current and future cooperating teachers to address any significant incongruence that was identified.

3) The core areas and specific elements for which significant differences were found should serve as sources of "directed-questions" for future focus groups including both cooperating teachers and student teachers. The groups could explore why these differences exist. Moreover, additional items of importance may be identified and then investigated through the use of focus groups or other qualitative techniques (Barnes & Camp, 2002).

4) The student teachers who provided data for this study should be "tracked," and those who entered teaching surveyed with a similar questionnaire at the completion of their first, third, and fifth years of teaching. Then, their "post-entry" longitudinal responses could be compared to responses they provided at the conclusion of student teaching and analyzed to see whether, over time, their perceptions moved closer to those held by the cooperating teachers who were examined. To this end, other researchers (Argyris & Schön, 1989; Harlin et al., 2002; Henry & Beasley, 1996; Korthagen & Kessels, 1999) have posited that teachers' perceptions about their work and their working environment will change with the advent of more and deeper "concrete" experience, and the concomitant reflection accompanying that experience, including one's related actions, choices, and behaviors.

Discussion and Implications

Would results of this study have differed if the cooperating teachers who provided data had been supervising teachers of the student teachers who were surveyed? Arguably, the perceptions of each group might have been more similar for the variables that were investigated. Perhaps a similar study should be conducted to examine the validity of this premise. Additionally, because both groups rated all elements of the student teaching experience

"important," should current practices in student teaching be examined further to determine if other aspects exist that are "unimportant," or that may be better served through early field-based experiences (Deeds & Barrick, 1986; Harlin et al., 2002)?

Moreover, what is to be made of the finding that, in contrast to cooperating teachers, student teachers viewed SAEPs as the least important core area? In fact, it was the only core area rated below 4.00 or "much importance" by either group; student teachers' perceptions differed significantly from the views expressed by cooperating teachers (Table 2). Other researchers (Dyer & Osborne, 1995) have reported ambiguous findings, as well as made calls for significant changes (Camp, Fallon, & Clarke, 1999), regarding supervised agricultural experiences. Do these and similar findings mean that teacher educators and cooperating teachers need to "re-conceptualize" the ways in which they "frame" SAEs and their importance as a primary component of the agricultural education model (Camp et al., 1999), especially as it relates to the induction of student teachers? Or are the students in front of the teachers on this issue? That is, are the "lenses" being used to examine as well as portray this phenomenon in need of adjustment, or is the profession in need of a brand new pair of glasses entirely? Finally, the core area "School and Community Relationships" received the lowest rating given by cooperating teachers. It was the only area that teachers rated lower than the student teachers. This finding may also warrant further study.

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A Comparison of Cooperating Teachers' and Students Teachers' Perceptions of Important Elements of the Student Teaching Experience in Agricultural Education

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Educational Importance and/or contributions to an increased body of knowledge and/or application and practice:

Few educational experiences have the type of impact that student teaching has on prospective agricultural education teachers. Investigating perceptions as to important elements in the student teaching experience in agricultural education is a worthy area of inquiry. Data of this nature can direct and guide pre-service teacher curriculum and structure the student teaching experience. Of particular value, this study identifies specific student teaching experience elements that both cooperating teachers and student teachers find important. Equally of value are the student teaching elements that differ in level of importance between these two groups. The comparison in the perceived level of importance, then allows practitioners to recognized congruent perceptions for the purposes of structuring the student teaching experience.

Implications/usefulness/application of information for practitioners:

The results identify dissimilarities in level of importance of selected elements between student teachers and cooperating teachers. An immediate usefulness and application of this information lies in the areas of congruence. An interesting core area of congruence is "Teacher –Student Relationships". As such, both groups can be said to be pre-occupied with knowing whether they will get along…which I would argue is an important element to consider in promoting an overall good student teaching experience. Historically, teacher educators have maintained responsibility for coordinating the placement of student teachers with cooperating teachers. How would the authors propose practitioners apply this finding? What are current practices among teacher educators with respect to this element? When teacher–student relationships are strained, does this jeopardizes the quality of the student teaching experience? With respect to other core areas where differences exist in level of importance between groups, whose perception (cooperating teachers', or student teachers') should be used to guide practice?

Methodology Issues:

Focus groups of agricultural education teachers were used to determine the important student teaching elements. This is a commendable approach for generating a list of elements. Questions remain as to the process for identifying, ranking and prioritizing these elements. Additionally, how were the core areas determined and what was the basis for assigning teachers to core areas? The authors report that the elements identified were later formatted into a questionnaire that was

administered to both subject groups at two different points in time. Did the data collected from these subject groups also serve as the basis for determining the range of reliability estimates? Reliability estimates reported ranged from .49 to .86 for the cooperating teacher group. What was the reliability estimate for each core area? Should one proceed with data collection instrument that yields such a low alpha as .49? Because the subject groups were purposeful samples, can the use of inferential statistics to determine differences between groups it be justified?

Results and/or conclusions and recommendations:

How would the results differ if references to inference (t-tests) were eliminated?

Overall comments:

Identifying important student teaching elements is worthy line of inquiry. Determining similarities and differences between cooperating teachers and pre-service teachers further contributes to understanding how these elements can guide practice. I applaud the authors for directing the attention of practitioners to student teaching elements that might be considered at their own respective teacher education institutions.

In-Service Education Needs Of Minnesota Agricultural Education Teachers in the Induction Phase of Their Professional Careers

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Abstract

This cross-sectional census study was an investigation of the views of teachers with 6 months to six years of teaching experience regarding their need for in-service education. Average Mean Weighted Discrepancy Scores (Borich, 1980) revealed that the first year and teachers with four to six years of experience had the greatest need for in-service education for addressing competencies within the Program Design and Management and Leadership and SAE Development categories. Teachers with two to three years of experience had the greatest in-service education need for competencies in the Leadership and SAE Development and Teaching and Classroom Management category. The researchers concluded that the in-service education needs for addressing individual competencies and categories of competencies differed for teachers with varying years of teaching experience. They recommended needs assessments be conducted on a regular basis to accurately determine in-service needs of teachers in the induction phase of their careers.

Introduction and Theoretical Framework

Student achievement levels are highly influenced by the level of preparation, experience and effectiveness of their teachers (Sanders & Rivers, 1996; Darling-Hammond, 2000a, 2000b, 2003). Therefore, it is critical that teachers keep current with the latest changes in education and the agriculture industries through in-service education activities.

Teacher in-service programs are an integral part of the professional development programs for teachers with all levels of teaching experience. Historic teacher attrition rates of up to 50% in the first five years in the profession (Marso & Pigge, 1997; DePaul, 2000; Darling-Hammond, 2003) alone require on-going programs that meet the changing needs of each cohort group of novice teachers. Teachers must have the knowledge and skill to teach revised and totally new topical areas such as agriscience, biotechnology, and agribusiness (Dillon, 1989). Osborne and Miller (1985) reported that teachers with high ability levels are more confident and will more frequently teach new skills more often using real specimens and student practice; teachers with low levels of confidence were reluctant to demonstrate and employ experiential learning strategies.

The process of identifying the professional needs of teachers is a critical step in establishing useful and effective in-service programs (Edwards & Briers, 1999; Garton & Chung, 1996; Joerger, 2002; Layfield & Dobbins, 2002). Desired education outcomes are increased by involving participants in the selection of professional competencies and topics for in-service programming (Waters & Haskell, 1989). Consideration of the needs of teachers at all

stages of their professional induction is critical for their continued effectiveness in classroom instruction.

There are a number of models of teacher development that are used to explain how teachers evolve given the influence of personal, professional and/or organizational factors (Vonk, 1984; Fessler & Christenson, 1992; Steffy,Wolfe, Pasch & Enz, 2000). A modification of the Huberman Model (Huberman, Grounauer, & Marti. 1993), with adjustments reflecting the unique needs of first year (Birkenholz & Harbstreit, 1987; Joerger, 2002; Layfield & Dobbins, 2002) was used in this study as the framework for organizing the data for determining the in-service needs for each group of teachers. Huberman, Grounauer, and Marti (1993) forwarded a framework described in Figure 1 that reflects common patterns of transition throughout the teaching career cycle. Acknowledging that the relationship between years of teaching experience and phase of teacher life cycle varies by individual, they stated:

> While we have not set forth a linear or monolithic model of the career cycle (i.e., all teachers traversing each phase in succession) we have evoked *central tendencies* general junctures, notably with respect to the leitmotives or different phases in the ordering of these phases. (p 12)

Though there are a number of factors that affect the lives of teachers, there appears to be common experiences and professional development needs of teachers as they progress through each phase of their professional careers (Huberman et al., 1993). However, little is known about how the in-service education needs differ among teachers within each of the teacher induction phases.

Agricultural education researchers have concluded the Borich Model (1980) is more accurate than direct assessment in determining in-service education needs of agricultural education (Barrick, Ladewig, & Hedges, 1983; Edwards and Briers, 1999; Layfield & Dobbins, 2002). Recent research findings have focused on the needs of entry-level teachers with limited reporting of the needs of experienced teachers (Garton & Chung 1996; Briers & Edwards, 1998; Mundt & Connors, 1999; Joerger, 2002).

In-service education programs for agricultural education teachers need to accurately address the real needs of teachers, especially during periods of limited fiscal resources. Evidence shows that the needs and experiences of teachers differ due to variations within personal, organizational, and professional factors (Fessler & Christenson, 1992). AS noted Huberman, Grounauer, and Marti (1993) proposed an evolving model of career development that differentiates typical phases and corresponding needs by ranges of years of teaching experience. Could it be that the magnitude of need for in-service education for selected professional competencies differs for agricultural education teachers within the phases of the life cycle as proposed by Huberman et al.? If so, the findings of this research could lead to a more efficient and effective means to design and deliver in-service and pre-service instruction. In the past, topics for in-service education programming have been selected professional association leaders and teacher education and state agency personnel without the benefit of data from practicing

teachers. Therefore, this study was conducted to provide more accurate information for planning effective in-service education programs for agricultural education teachers in their induction phase of teaching.

Figure 1

Huberman's Model of the Sequences of the Teacher Career Life Cycle (Huberman, 1989)

Career Phases or Themes	Features of the Career Phase or Theme
Beginnings, Feeling One's Way	**Years 1-3** A period of survival and discovery. Focus is upon learning how to teach, deciding what to teach,, navigating through the teaching environment, learning how to manage students and self, and developing an overall sense of efficacy. Teachers discover a lot about themselves, the system, and instruction.
Career Entry **Stabilization** Consolidation of a Pedagogical Repertoire	**Years 4-6** The teacher commits to teaching and sets aside other occupational ambitions. Autonomy, independence, and membership in the teaching profession mark this phase. Teacher believe they have achieved some degree of pedagogical mastery thus placing more focus upon the instructional concerns and needs of students. With their recommitment to teaching, they further expand and develop a broad repertoire of teaching strategies while feeling a greater sense of technical competence.
Diversification Experimentation → Reassessment	*Diversification* **Years 7-25** Teachers experiment with teaching, evaluation strategies, and instructional content. They seek to effect change by serving in leadership roles in their education systems and professional organizations. Likewise, the look for involvement in alternate teaching and administrative roles and appointments. Teacher use this time of increased effectiveness and competence to search for new ideas, commitments and challenges to counter emerging thoughts regarding the tedious nature of teaching. Reassessment Re-assessment occurs simultaneously or in parallel with diversification between ages 35 and 50 or between the fifteenth and twenty-fifth year of teaching. This is a time when some teachers take an inventory of what they have accomplished, the time remaining to make occupational changes, and if they should seek a new path in life.
Serenity Affective Conservatism Distance	Serenity Years 26-33 **Teachers often arrive after experiencing a time of uncertainty or crisis. Some lament the differences between their current and initial levels of enthusiasm, activism, and energy they possessed when they entered teaching. Others experience a sense of decreased professional ambition and acceptance of their real self in their professional roles. Increased distance emerges between the teachers and their students as they view one another as being from different subcultures and age groupings.** Conservatism While individual antecedents differ, individuals from about age 50 and older are characterized as displaying greater rigidity, carefulness, stubbornness, and reluctance to accept innovations. They may arrive from the serenity phase, express their discontent with school administration and policies, the levels of preparedness and commitment from

	students and other teachers. Others elect to reassess their achievements and future options. Some choose to continue teaching in a re-invigorated and committed manner.
Disengagement (Serene or bitter) ↓	Years >33 **While occurring for some teachers early in their careers due to not accomplishing their goals, is usually occurs later. It is typified by a sense of withdrawal from professional commitments and greater use of time for personal activities. While some willingly pass the baton to the younger professional, others do not. Irrespective of the needs and experiences of colleagues, many elect to only partially disengage by focusing on highly preferred courses, and accomplishing preferred tasks and aspects of the program.**

Purpose and Objectives

The professional development needs change as teachers progress through the induction phase of their career. The purpose of this study was to compare the in-service education needs of beginning agricultural education teachers in selected years within the induction phase. The primary objective of this study was to compare the in-service education needs of agricultural education teachers with one semester to six years of teaching experience in the areas of teaching and classroom management, program design and management, and leadership and Supervised Agricultural Education program development.

Procedure

The population of this cross-sectional, descriptive census study included 43 agricultural education teachers employed full and part-time in urban, suburban and rural schools of a large Midwestern state. The frame was the listing of teachers in the directory of teachers provided by the agricultural education specialist from the state education agency.

The characteristics and data from the corresponding years of teaching experience groupings are displayed in Table 1. Teachers ranged in age from 23 to 46 years with an average age of 28 (SD = 6.8) years. Fifty-one percent of all teachers were female, however, 61% of the first year teachers were female. Over 16% of the teachers had a Masters Degree as their highest level of education. An annual average of 221 students (duplicated number) enrolled in agricultural education courses within each program in school districts that averages 2,324 students from communities of an average size of 12,744 residents. There was an average of 49 FFA members in each chapter, 40% of the FFA members were female.

The *Secondary Teacher Professional Development Needs Assessment* was the four-part instrument used to collect the data. In addition to collecting descriptive demographic data, the assessment was designed to collect teacher importance and competence ratings of professional

Table 1

Demographics of Minnesota Agricultural Education Teachers by Years of Teaching Experience

Teacher Characteristics		Years of Teaching Experience			
		Total	1	2-3	4-6
Teachers	N	43	18	9	16
Age	M	28	26	27	32
Gender - Female	N	22	11	4	7
Education - Highest Degree					
Masters Degree	N	7	1	1	5
No. of Students	N	221	256	175	207
FFA Members	N	49	57	58	37
Females in the FFA	%	40	29	46	46
School District Size	M	2,289	1,232	1,334	3,946
Community Size	M	9,545	11,813	6,471	9,504

competencies. The competencies were developed by the authors and selected from research studies completed by Garton and Chung (1996) and Joerger (2002). The professional competencies were validated for face and content validity by a panel of five experts including a state agricultural education specialist, coordinator for in-service education, current and previously practicing secondary agricultural education teachers, and agricultural education faculty members. The assessment and scoring procedures were designed following the principles of the Borich Needs Assessment Model (Borich, 1980) to create an in-service education needs index using the Mean Weighted Discrepancy Score (MWDS). High MWDS result from a high importance rating and a low competence score. Relatively higher MWDS indicate a greater need for in-service education for individual or groups of competencies. The professional competencies were placed into three categories. A majority of the competencies are included in Tables 2, 3, and 4. The categories and corresponding number of professional competencies within each category were: Program Design and Management (7), Teaching and Classroom Management (17), and Leadership and SAEP Development (11). Participants responded to the importance of the professional competencies and their levels of competence by darkening responses on Likert-type scales. The responses for the importance and competence scales ranged from 5 = very high to 1 = very low. The Cronbach's alpha coefficients of internal consistency for the scores for the importance and competence scales for the Program Design and Management, Teaching and Classroom management, and Leadership and SAEP Development categories were 0.91 and higher.

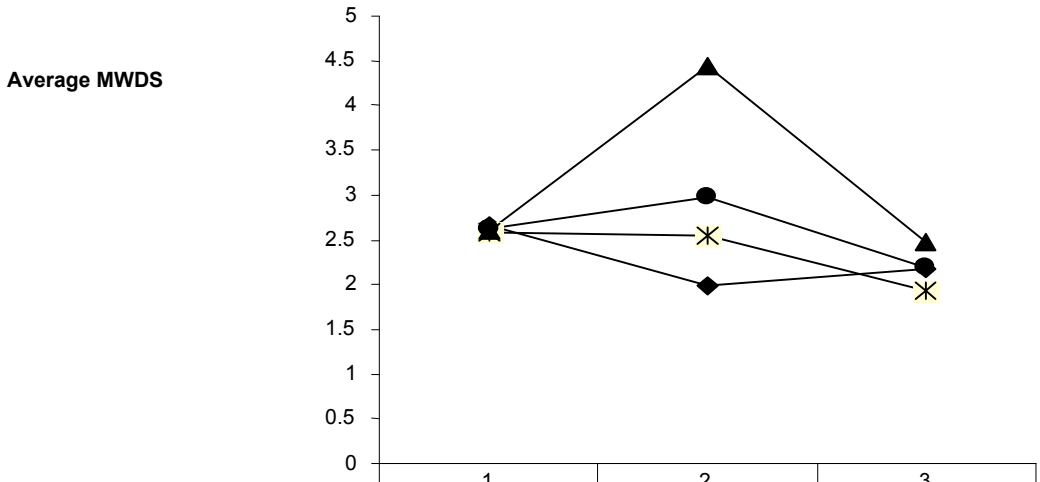
The instrument was administered to agricultural education teachers who attended a statewide professional development conference in January of 2003. Instruments along with self-addressed stamped return envelopes were sent to teachers unable to attend the conference or did not return instruments at the conference the week following the conference. A follow-up e-mail message was sent to non-respondents 10 days later. Ten days later an additional message was sent with an offer to send another instrument. A final reminder was sent 10 days later. Usable instruments were received from 43 teachers. Importance and competence data from the first half of respondents was compared to data from the second half of the respondents using T-test analysis procedures (Lindner, Murphy & Briers, 2001) to control for non-response error. Since no significant differences existed, the data were placed in one dataset for subsequent analyses.

The data from usable instruments were entered into and analyzed using functions of an Excel™ spreadsheet and SPSS. Descriptive parameters were created for the importance and competence ratings of the teachers. Mean Weighted Discrepancy Scores, that reflected the design and specifications of the Borich Needs Assessment Model (Borich, 1980) and used by researchers (Garton & Chung, 1996; Edwards & Briers, 1999, Joerger, 2002; Layfield & Dobbins, 2002) were established for determining the prioritization of the in-service needs. Data were aggregated by teaching experience intervals for teachers according to the Huberman et al. (1993) model with one modification. Since the experience and needs of first year teachers are unique, Year Group I (years 1-3) of the Huberman et al. (1993) was divided into year 1 and years 2-3 to highlight potential differences.

Findings

The Mean Weighted Discrepancy Scores (Borich, 1980), indices of relative need for in-service education programming, are displayed for categories of professional competencies by years of teaching experience in Figure 2 and Tables 2 – 4. The objective of the study was to

determine how in-service education needs for teachers of a Midwestern state differed based on phase of professional induction as reflected by years of teaching experience. Mean Weighted Discrepancy Scores (MWDS) were calculated for each professional competency and three categories of competencies within each interval of years of teaching experience. The data in Figure 2 reveal that teachers with one year of teaching experience had the greatest relative in-service education needs for topics within the Program Management and Teaching and Classroom Management categories. Teachers with two to three years of experience had the greatest relative need for in-service education for competencies within the Leadership and SAE Development. By overall average MWDS, the 2-3 year teacher experience group had the highest level of in-service education need for the competency categories compared to the other teaching experience groups. Regardless of years of teaching experience, the average MWDS indicate that the greatest needs for in-service were in the categories of Leadership and SAE Development followed by Teaching and Classroom Management. Average MWDS reveal that teachers with four to six years of experience believed they had the least overall need for in-service education.



	1	2	3
Program Management	2.65	1.98	2.17
Teaching	2.59	2.55	1.92
Leadership and SAE	2.6	4.43	2.48
Mean	2.61	2.99	2.19

Years of Teaching Experience

(Note: 1 = year one; 2 = years 2-3; 3= Years 4-6)

Figure 2

Average Mean Weighted Discrepancy Scores of the Categories of the Professional Teaching Competencies by Years of Teaching Experience

Tables 2, 3, and 4 contain the MWDS for corresponding high-ranking competencies within the categories. Italicized scores indicate the competency is among the top ten of all competencies in the instrument for that teaching experience group. The MWDS and rankings for the top three competencies in each teaching experience group are displayed for the Program Design and Management category in Table 2. The data reveal there is need for in-service

education for all three teacher groups for learning how to evaluate their programs, develop a public relations program, and effectively use advisory committees.

Table 2

Rankings and Averages of the Mean Weighted Discrepancy Scores of Competencies Within the Program Design and Management Category

	Years of Teaching Experience					
	1		2-3		4-6	
Professional Competencies	N=18	Rank	N=9	Rank	N=16	Rank
Evaluating the program	*3.99*[1]	1	3.20	2	*4.04*	1
Developing public relations	*3.47*	2	2.94	3	*3.40*	2
Coordinate with community activities	3.02	3	0.74	5	1.84	5
Using an advisory committee	2.53	4	*6.26*	1	3.25	3

Note: [1]Italicized values indicate the competency is among the top ten for the group.

The top five competencies with the highest MWDS for each experience group in the Teaching and Classroom Management category displayed in Table 3 were from 11 of the 17 competencies listed in the instrument. Competencies with relatively high need of in-service education for at least two of the three teaching experience groups were: (a) teaching decision making skills, (b) motivating students, (c) teaching students with exceptionalities, (d) managing student behavior, and (e) organizing laboratories. Motivating students ranked highest in need of in-service education for teachers of both the two to three and four to six year groups.

Table 3

Rankings and Averages of the Mean Weighted Discrepancy Scores of Competencies within the Teaching and Classroom Management Category

	Years of Teaching Experience					
	1		2-3		4-6	
Professional Competencies	N=18	Rank	N=9	Rank	N=16	Rank
Select references & materials	*4.75*[1]	1	2.22	11	1.55	11
Teach decision-making	*3.90*	2	3.56	5	*3.72*	2
Teach students with exceptionalities	*3.88*	3	0.77	16	3.34	3
Motivating students	*3.80*	4	*5.06*	1	*4.10*	1
Managing student behavior	3.66	5	2.96	9	3.33	4
Assessing student needs for creation of courses	3.16	7	3.36	8	2.42	7
Assessing and evaluating	3.05	8	3.75	2	2.32	8

student learning						
Organizing laboratories	2.48	10	3.75	2	2.58	5
Use experiments in teaching	2.10	11	3.46	7	2.58	5
Providing guidance concerning student post secondary plans	1.83	12	2.74	10	1.38	12
Design and use Internet instruction	1.78	13	1.48	13	0.20	16
Repair and recondition equipment	0.94	15	3.65	4	0.84	13

Note:[1]Italicized values indicate the competency is among the top ten for the group.

Table 4 contains eight of the 10 competencies within the Leadership and SAE Development category which were ranked in the top six MWDS by one or more of the

Table 4

Rankings and Averages of the Mean Weighted Discrepancy Scores of Competencies within the Leadership and SAE Development Category

	Years of Teaching Experience					
	1		2-3		4-6	
Professional Competencies	N=18	Rank	N=9	Rank	N=16	Rank
Developing SAE opportunities	*3.24*[1]	1	3.11	8	3.28	3
Conducting local FFA activities	3.09	2	3.95	6	1.78	8
Motivating students to participate in FFA activities	3.01	3	3.95	7	*4.25*	2
Developing recognition events for students	2.89	4	*6.74*	1	-0.24	10
Supervising SAE projects	2.48	6	3.02	9	2.36	7
Involving Alumni/ or Young Farmer members	2.41	7	*5.04*	4	2.64	6
Preparing FFA proficiency applications	2.37	8	*5.48*	2	2.79	4
Preparing FFA Degree Applications	1.98	9	*5.48*	2	*4.45*	1

Note:[1]Italicized values indicate the competency is among the top ten for the group.

experience groups. High ranking and common competencies between teachers with one and four to six years of experience included: (a) developing SAE opportunities for students and (b) motivating students to participate in FFA activities. High ranking competencies for the two to three and four to six year experience groups were: (a) preparing FFA degree applications and (b) preparing FFA proficiency applications. Developing recognition events for students, was the only common high ranking in-service education need for the one year and two to three year groups.

The ten professional competencies that ranked highest for in-service education across all categories for each teacher experience grouping were determined by the authors to assist with targeting in-service education efforts. Average MWDS scores for the top ten competencies across all teaching experience categories for each experience group are italicized in Tables 2, 3, 4, and 5. The number of competencies ranked in the top ten for need of in-service education within each category are displayed in Table 6, with the two to three year group having more than ten because of equivalent scores. The data reveal that the need for in-service for competencies from the Teaching and Classroom Management category was greatest for teachers in their first year of teaching. The data also show that teachers with two to three years of experience believe their greatest needs for in-service are encompassed by competencies that lie within the Leadership and SAE development category. Approximately 80% of the in-service needs of teachers with six or less years of experience lie within the categories of Teaching and Classroom Management and Leadership and SAE Development.

Table 5

Number of Top Ten Competencies in Need of In-service Education Within Each Category

	Years of Teaching Experience		
Categories	1 N=18	2-3 N=9	4-6 N=16
Program Design and Management	2	1	3
Teaching & Classroom Management	7	3	4
Leadership & SAE Development	1	7	3

Conclusions

Teacher development theory and research suggest that professional development needs of teachers vary due to personal, professional and organization influences and differences (Fessler & Christenson, 1992; Huberman, Granauer, & Marti, 1993). As a result, on-going assessments of their in-service education needs, such as conducted in this study, were recommended (Birkenholz & Harbstreit, 1987; Joerger, 2002; Layfield & Dobbins, 2002). Findings from this study provided the basis for one conclusion. The authors concluded that while there were some common needs for in-service education for selected competencies, most in-service programming for addressing individual competencies and categories of competencies differed for teachers with varying years of teaching experience. Teachers with four to six years of experience had the lowest overall felt need for in-service education. This may be explained by the fact that teachers with more experience are more aware of the instructional and curricular needs of their students

and their teaching strengths and limitations (Huberman et al., 1992). As such, their felt in-service needs were more dispersed among the three competency categories. Their highest needs for in-service education were: (a) helping students complete FFA degree applications, (b) motivating students to participate in FFA activities, (c) motivating students to participate in classroom activities, and (d) evaluating their program.

The teachers with two to three years of experience had substantially greater in-service education needs in the category of Leadership and SAE Development than the other two groups of teachers. The competency areas of overall greatest need for the teachers with two to three years of experience were as follows: assisting students with FFA proficiency applications, assisting students with FFA degree applications, planning student recognition activities/ banquets, and planning and using an advisory committee. The findings of this study confirm earlier findings regarding the need for in-service education relating to aspects of managing and advising the FFA program (Birkenholz & Harbstreit, 1987; Mundt & Connors, 1999; Edwards & Briers, 1999; Joerger, 2002).

Teachers in their first year of teaching had the highest in-service need rating for two of the competency categories: (a) Program Design and Management and (b) Teaching and Classroom Management. The first year teachers had the greatest in-service need for five out of the seven competency areas within the category of Program Design and Management. In addition, they also had the highest in-service need rating in eight of the seventeen competency areas within the category of Teaching and Classroom Management. The proceeding evidence provides support for findings suggesting the need for in-service education for entry-level teachers addressing difficulties with classroom and student management (Garton & Chung, 1996; Mundt & Connors, 1999; Joerger & Boettcher, 2000; Joerger, 2002; Layfield & Dobbins, 2002). Further, the findings confirm the need of novice teachers to give attention to improving teaching skills and competencies (Vonk, 1984; Fessler & Christensen, 1992; Huberman, Grounauer, & Marti, 1993). The areas of greatest need for first year teachers within the category were: selecting resource materials, evaluating their program, teaching problem solving and decision making skills, and teaching students with exceptionalities.

There were common needs for in-service programming regardless of the years of teaching experience. Professional competencies among the top fifteen competencies in need of in-service education as reflected by relatively higher MWDS for all three of the teaching experience groups included: teaching problem solving and decision making skills, motivating students to participate in classroom activities, and motivating students to participate in FFA activities.

Implications and Recommendations

In-service education programs are one way the professional development needs of agricultural education teachers are met by state supervisory staff, professional association leaders and teacher educators. The findings and conclusions resulted in four recommendations for practice. One, assessments of the in-service needs and phases of professional induction cycle of teachers need to be conducted on a regular and systematic manner. This is needed due to teachers arriving and leaving the profession; emergence of new and emerging technologies and practices in agriculture; new understandings about teaching and learning, and our knowledge that the needs, foci, and aspirations of teachers change throughout their professional induction.

Two, due to characteristic unique and common experiences and needs for teachers in different phases of professional induction, in-service education experiences should be designed for teachers to experience the programs as cohorts whenever possible. For example, the data reveal that separate in-service education programming is warranted for year one and year two and three teachers for numerous competencies within the Teaching and Classroom Management category.

Three, in-service education activities across all three experience groups are justified when common high ranking needs exist for all teachers. Four, teacher educators can use the findings of the needs assessments to inform the content of the curricula for preservice teachers. Carefully designed course work that includes direct instruction and authentic experiences within early teaching practicum and student teaching assignments can assist future teachers become more skilled in conducting highly important professional competencies.

The findings and conclusions also provided the information for four recommendations for research. One, since more needs to be understood about the common in-service education needs of teachers with differing amounts of teaching experience, variations and replications of this study are proposed with other populations of agricultural education teachers throughout the United States. Two, though Huberman et al. (1993) forwarded a theory that associates years of experience with corresponding phases of development, further research is needed to identify factors and their relative influence upon the phases of the life cycle of teaching for agricultural education teachers. Once the factors are known, a self-scoring assessment of the phases of the career cycle of a teacher needs to be developed for agricultural and career and technical education teachers. Three, further research must also be done to determine the accuracy of the phase groupings forwarded by Huberman et al. (1993) for agricultural education teachers. Four, research must be completed to determine how in-service education can best be delivered to practicing teachers with differing years of teaching experience so that rates of participation and positive permanent outcomes are optimized.

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In-Service Educational Needs Of Minnesota Agricultural Education Teachers in the Induction Phase Of Their Professional Careers

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Educational Importance and/or contributions to an increased body of knowledge and/or application and practice:

Determining in-service needs of agricultural education teachers must continue to be on-going. New technologies, innovative methods of instruction, pressing issues in the profession are among several reasons for determining the needs of teachers at frequent interval. Further, the entry of novice teachers makes a good case for conducting needs assessments. For many in-service providers, a simple needs assessment provides the information needed to plan and implement program. However, the authors take an interesting twist to determine teacher needs. Needs are presented by the phase (as defined by experience) in which the teacher finds him/her self. This, I find to be the greatest strength and contribution to the existing body of knowledge pertaining to needs assessment data. Of particular interest is that entry-level teachers identified the competency, "Evaluating the program" as an area for in-service education. Conventional wisdom might suggest that entry level teachers are "just trying to survive" and get acclimatize to the teaching profession and of their least concerns would be overall program evaluation.

Implications/usefulness/application of information for practitioners:

The results reveal that teachers, at different points in their career, have different needs. Entry-level teachers have unique needs that are and would be expect to be different than those with more teaching experience. This finding was not too surprising. However, a surprising result was the similarities between entry-level teachers and teachers with 4 to 6 years teaching experience. This difference raises some interesting questions. Why are they similar? What is it about the first year experience that would lead to similar needs 4 to 6 years later? Are the needs identified by entry-level teachers more idealized "goals" in nature, while after having several (4-6) years of teaching experience, these goals now become more obtainable? Questions of a different orientation include, why do the needs from the first year teachers to second and third year teachers change? Do they give up on (or reprioritize) their needs after having some experience teaching?

Methodology Issues:

Methodologically, the study was sound and conducted with approved practices. The Borich Model for determining needs was used and well described. The data collection instrument was developed using previous studies that presented in-service needs of agricultural education teachers. Perhaps justifying the number of items for each category and describing the process for determining reliability would add to the clarity of the instrumentation development process. Determining the size of the responding sample needs clarification. For example, if after

conducting several appropriate follow-up efforts yield an accepting sample size of 43, what was the size of the census (reported as 43)?

Results and/or conclusions and recommendations:

Results are well presented and easy to navigate. Notations and font manipulation allow for a clear presentation of the findings. Conclusion are closely linked to the findings. Four recommendations are offered for practice. It is recommended that needs assessments be conducted on a "regular" basis. At the risk of splitting hair, what would the authors consider "regular". Would the authors be willing to extrapolate these conclusions and recommendations to other states and/or agricultural education teachers?

Overall comments:

The needs assessment study is well framed and constructed. The need to investigate in-service needs by years of teaching is not new, however, the presentation of data in this manner is highly valued. The authors are to be commended for investigating the in-service needs of agricultural education teachers in Minnesota.

Cooperating Teachers' Perceptions of the Student Teaching Experience

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Abstract

The goal of the student teaching experience is for the student teacher to develop his or her unique style of teaching and to begin to master appropriate teaching skills and behaviors. Likewise, every teacher education program must set goals and work hard to accomplish the established goals. Since student teaching is such an important part of the teacher education program, it is important that it be a high quality experience. Every teacher education program wants to be successful by reaching the student teaching established goal of a high quality experience. The purpose of this study was to determine the perceptions of previous cooperating teachers towards the agricultural student teaching experience of a university. The cooperating teachers in the study were willing to supervise one student teacher per year. In addition, the cooperating teachers believed 3 visits made by the university supervisor were appropriate. Cooperating teachers reported that student teachers reached a proficiency level between week 11 and week 12. Furthermore, the cooperating teachers reported that Autumn Quarter was their first choice for student teaching to occur. Additionally, the cooperating teachers' indicated that student teachers should be involved in summer activities prior to student teaching. The cooperating teachers agreed that supervision of student teachers should be conducted by university faculty members. The top three student teacher strengths were: strong organizational skills; excellent rapport with students and faculty; and, good lesson planning skills, while the three greatest weaknesses of the student teachers were: knowledge of agricultural subject matter; knowledge of the FFA; and poor discipline skills.

Introduction/Theoretical Framework

Student teaching in agricultural education is the opportunity for a senior or earned bachelor's degree student to put into practice the tools, acquired knowledge, and learned teaching methods. Student teaching is the most practical way for a pre-service educator to sharpen and hone those tools, utilize their knowledge, and practice learned methods in a "real" classroom experience. Thus, it may be concluded that student teaching is the culminating field experience in the agricultural teacher education program.

The goal of the student teaching experience is for the student teacher to develop his or her unique style of teaching and to begin to master appropriate teaching skills and behaviors (The Ohio State University, 2002). Likewise, every teacher education program must set goals and work hard to accomplish the established goals. Pfister and Newcomb (1982) articulated that, "Since student teaching is such an important part of the teacher education program, it is important that it be a high quality experience" (p. 2). Every teacher education program wants to be successful by reaching the student teaching established goal of a high quality experience.

However, the student teacher is not alone is this venture. Every student teaching experience includes three major players: the student teacher; cooperating teacher; and, the university supervisor of the teacher education program. The cooperating teacher is the key person in the experience who guides and evaluates the student teacher's activities on a daily basis. Schools and cooperating teachers are chosen because they provide a fertile climate for the student teacher to grow and mature. The university supervisor is involved in defining and communicating the purposes and expectations to be fulfilled by the student teacher and the cooperating teacher. Furthermore, it is the university's responsibility to provide the student teachers with: a school to practice; practical guidelines; assignments on and off campus; feedback on assignments; suggestions; and, support.

Thus, each player (student teacher, cooperating teacher, and teacher educator) plays a major roll in determining the success of each student teacher's experience. Davis-Wiley (1993) assured that "clear, well-communicated and mutually-decided upon expectations for all" (p. 5) players, "are a prerequisite to a successful" student teacher experience (p. 5). Kreamelmeyer's (1991) book, Successful Student Teaching, stated that "It is impossible to overemphasize the importance of communication in student teaching" (p. 99).

The need for all players to communicate and work together is essential for the student teaching experience to be well integrated. Kaufman (1992) reported that "cooperating teachers and the university supervisor(s) create a working relationship based on mutual respect and understanding for each others' expertise, perspectives, and roles" (p. 3). Through listening and sharing, the university supervisor and the cooperating teacher can help a student teacher overcome the barriers that may hinder his or her potential to become a successful educator.

According to Kreamelmeyer (1991), the three players must "work to establish, protect, and maintain effective means of communication" (p. 100). During the student teaching experience, the three players "must form a team, working toward common goals" (Kreamelmeyer, 1991, p. 100). Furthermore, Thorpe (1972, as cited in Pfister & Newcomb, 1984), alleged that a "need for synergistic action in this triad is fundamental to a well-integrated student teaching program" (p. 2). Without the synergistic action called upon by Thorp, how can the team form goals, much less work as a team to accomplish those goals?

Edwards and Briers (1999) concluded that "there is a general consensus among all educators that resources are precious" (p. 40). In the student teaching experience, cooperating teachers are a resource, thus their opinions should be viewed as precious. "Identifiable areas of needs may be used as decision rules for determining future resource allocations" (Edwards & Briers, 1999, p. 40). Witkin (1984) agreed and added that "Effective needs assessment provides a basis for decisions on priorities, either for program development or retrenchment" (p. x). As opinions, attitudes, perceptions, expectations, and recommendations are collected and studied, the data from cooperating teachers should be utilized to make critical decisions.

In the process of making critical decisions, Deeds, Plowers, and Arrington (1991) reported that by ascertaining cooperating teachers attitudes and perceptions, a sense of "ownership" was developed in the change produced. Thus, ownership will not only influence attitudes, it will strengthen the bond and the overall student teaching experience. Moreover, Yee (1968, as cited by Peck & Tucker, 1973) concluded that student teachers' attitudes were

influenced by their cooperating teachers. Because teacher educators can influence cooperating teachers' attitudes, and cooperating teachers can influence student teachers, there is a definite tie between the three players. The more the cooperating teachers' attitudes are positively influenced, the stronger the experiences and relationships will be for agricultural education (Davis-Wiley, 1993).

However, in order to create stronger experiences in agricultural education, Edwards and Briers (2001), and Norris, Larke, and Briers (1990), recommended further research to identify cooperating teachers' opinions of important elements of the student teaching experience. By actually asking for cooperating teachers' opinions, and by actively involving them in the process of identifying potential improvements to the teacher preparation program, increases the likelihood of implementing relevant improvements; thus, increasing the likelihood of achieving appropriate outcomes (Waters & Haskell, 1989). Achieving the outcomes and goals advocated by Waters and Haskell (1989) will ensure greater success for the overall teacher education program.

The greater success of the overall teacher education program under study was being questioned due to many external pressures. Because of budget challenges, upgrades in technology, and lack of time, suggestions were made to change the student teaching experience and process. Suggestions were made to eliminate or reduce the number of visits to student teachers. Another suggestion was to tap into and incorporate retired secondary agriculture instructors to assist in supervision. Other suggestions were offered in an effort to deal with the budget challenges, upgrades in technology, and other stresses on the overall teacher education program.

Historically, at the university which serves as the basis for the current study, each student teacher had been visited by the university supervisor (teacher educator) three times during the experience, as well as the student teachers gathering as a group at least two times during the experience to share, learn, and grow. The university teacher educator had been the sole person responsible for the supervision of the student teacher, in conjunction with the cooperating teacher. In addition, there have been some assignments to complete, all of which incorporate certain aspects of the overall teacher education program, broadly defined.

The problem was that the university's Agricultural Education teacher education program was in the midst of a financial struggle and cuts were being investigated concerning the student teaching program. However, prior to implementing any proposed cuts in the student teaching program, the opinions of previous cooperating teachers regarding the student teaching experience and supervision was needed to complete the decision making process.

Purpose/Objectives

The purpose of this study was to determine the perceptions of previous cooperating teachers towards the agricultural student teaching experience of a university. Furthermore, the current study aimed at collecting data relative to the supervisory aspects of the student teaching experience.

The objectives of the study were to:

1. determine the level of supervision perceived by the cooperating teachers to be acceptable;

2. determine the cooperating teachers' perception related to alternative supervision of student teacher models; and,

3. determine the strengths and weaknesses of the student teachers as perceived by the cooperating teachers.

Methods/Procedures

Population and Sample

The population for this descriptive study was cooperating teachers who had served as a cooperating teacher anytime during the three years prior to data collection. The population of the study was 75 (N = 75). Because of the size of the population, the researchers chose to use a census for the study.

Instrumentation

A questionnaire entitled, "Supervision of Student Teaching Perceptions," was developed by the researchers. The questionnaire contained four sections: Demographic Information; Procedural Matters; Supervision Alternatives; and, Rating of Student Teacher Traits. The questionnaire was tested for validity and reliability.

Validity was established by a panel of six experts, all who had served as teachers of agriculture and as a cooperating teacher in their professional careers. The panel of experts consisted of university faculty and graduate students. The panel of experts evaluated the questionnaire for content and face validity. Several suggestions were offered by the panel of experts and incorporated into the questionnaire prior to the reliability test.

Reliability was conducted by selecting 25 extension agents who had served as cooperating agents sometime during the previous five-year period. Because student teachers and extension interns generally are required to reach a common level of mastery in the teaching and learning process, extension agents were used for testing reliability. Of the 25 extension agents invited to participate in the reliability test, 20 agents returned completed questionnaires. The reliability coefficient for the "Supervisor Alternatives" section of the questionnaire, was = .88. As the other sections of the questionnaire contained categorical or nominal data, reliability could not be calculated for the other sections.

Procedures

The questionnaire was mailed to the population of cooperating teachers (N = 75). Ten days after the initial mailing, a follow-up post-card was sent to all 75 of the cooperating teachers thanking those who had participated in the study, and encouraging those who had not yet participated to return the completed questionnaire. Prior to the mailing of the follow-up

postcard, 29 cooperating teachers had responded, constituting the "early respondents" for non-response error measurement.

Seven days after the first follow-up postcard, a second letter and questionnaire was sent to those who had yet failed to respond. Twenty days after the initial mailing, 47 questionnaires had been returned. The 18 questionnaires received after the mailing of the first follow-up postcard were considered "late respondents" for non-response error measurement.

It is uncertain as to why 28 cooperating teachers failed to respond, however, non-response error was measured by comparing the early respondents to the late respondents as advocated by Miller and Smith (1983). The section on "Supervisor Alternatives" of the questionnaire was used in the comparison, yielding no significant difference. Thus, it was concluded that early respondents did not differ significantly from late respondents, and thus the results of the study could be generalized to the population of 75 cooperating teachers.

Data Analysis

The data were entered into SPSS PC for analysis. Descriptive statistics were employed to yield the data results.

Results

The results indicated that the majority of the cooperating teachers were male (89.0%) (Table 1). The majority (63.0%) of cooperating teachers reported that they held a master's degree (Table 1). Similarly, the majority (91.0%) of cooperating teachers reported that they taught in a comprehensive high school (Table 1). Related to the number of agriculture teachers in their program, 45.7% reported that there were 2 teachers in their program. Moreover, 37.0% of the cooperating teachers reported themselves as the only teacher in their program (Table 1).

The majority (89.0%) of the cooperating teachers reported that they were not Pathwise certified. In addition to not being Pathwise certified, 26.0% of the cooperating teachers reported that they were not willing to be Pathwise certified. Furthermore, 24.0% of the cooperating teachers reported being undecided in their willingness to be Pathwise certified (Table 1).

The cooperating teachers in the study were willing to supervise one student teacher per year (78.3%) (Table 2). In addition, 54.3% (Table 2) of cooperating teachers believed 3 visits made by the university supervisor (teacher educator) were adequate during the student teaching experience. Cooperating teachers reported that student teachers reached a proficiency level between week 11 and week 12 (11.7 weeks) (Table 2) of the student teaching experience. Furthermore, the cooperating teachers reported that Autumn Quarter (71.7%) (Table 2) was the first choice for student teaching to occur. Additionally, the cooperating teachers' indicated that student teachers should be involved in summer activities with their cooperating teacher (71.7%) (Table 2) prior to student teaching, such as FFA camp, WLC, state fair, and county fair.

Table 1. Demographic Data of Cooperating Teachers (n = 46)

Item			
	Male	Female	
Gender	89.0%	11.0%	
	No	Yes	Undecided
Pathwise certified	89.0%	11.0%	
Willing to be Pathwise certified	26.0%	50.0%	24.0%
	B.S.	M.S.	Other
Highest degree earned	30.0%	63.0%	7.0%
	Comprehensive	Vocational	
Type of school	91.0%	9.0%	
	1	2	3+
Number of teachers in program	37.0%	45.7%	17.4%

Table 2. Student Teaching Procedural Matters (n = 46)

Item	Mean	S.D.	
Number of student teachers willing to supervise	1.20	.41	
(1 = 78.3%; 2 = 19.6%; other = 2.1%)			
Number of visits made by supervisor	3.07	.76	
(2 = 19.6%; 3 = 54.3%; 4 = 17.4%; other = 8.7%)			
Week student teacher reaches proficiency	11.7	4.48	
	AU	WI	SP
Quarter of student teaching experience	71.7%	23.9%	4.3%
	Yes	No	
Inclusion of summer activities	71.7%	23.9%	

Alternatives to student teaching supervision were measured utilizing a Likert-type scale. The scale included: 1 = Strongly Agree; 2 = Agree; 3 = Undecided; 4 = Disagree; and, 5 = Strongly Disagree. The results indicated that the cooperating teachers agreed (1.61) that supervision of student teachers should be conducted by university faculty members (Table 3). In addition, the cooperating teachers reported that they were undecided in allowing retired teachers of agriculture to supervise student teachers. Furthermore, the cooperating teachers disagreed with all other forms of alternative supervision proposed in the questionnaire (Table 3).

Table 3. Level of Agreement on Who Should Serve as a Student Teacher Supervisor (n = 46)

Statement	Mean *	S.D.
University faculty member	1.61	.75
Retired agricultural teacher	2.61	1.20
Neighboring district agricultural teacher	3.39	1.18
Pathwise mentor	3.70	1.19
VEPD contact	3.83	1.06
Two-way interactive video	3.85	1.07
Use web based	3.89	1.08
Graduate student	3.89	1.12
Video recorded	3.91	1.05
High school principal	3.91	1.09

*Based on: 1 = Strongly Agree; 2 = Agree; 3 = Undecided; 4 = Disagree; 5 = Strongly Disagree

Related to the strengths and weaknesses of the student teachers, the cooperating teachers were asked to identify a maximum of three strengths and three weaknesses of their past student teachers. Most of the cooperating teachers in the study have been a cooperating teacher to several student teachers. The cooperating teachers reported that the top three strengths were: strong organizational skills; excellent rapport with students and faculty; and, good lesson planning skills. The cooperating teachers further reported that the three greatest weaknesses of the student teachers were: knowledge of agricultural subject matter; knowledge of the FFA; and poor discipline skills.

Conclusions/Recommendations/Implications

The current study of cooperating teachers' perceptions of the student teaching experience has focused on determining cooperating teachers perceptions of: level of acceptable supervision; alternative supervision of student teacher models; and identification of the strengths and weaknesses of past student teachers. In addition, demographical data were collected in an effort to be able to describe the cooperating teachers.

The demographical data indicated that the average cooperating teachers in Ohio were male, possessed a Master's degree, taught in a comprehensive high school, and either taught in a one or two person department.

Table 4. Strengths and Weaknesses of the Student Teachers as Reported by Cooperating Teachers (n = 46)

Item	Frequency
Strengths	
Strong organizational skills	10
Excellent rapport with students and faculty	8
Good lesson planning skills	8
Enthusiasm	5
Hard working	5
Weaknesses	
Knowledge of agricultural subject matter	11
Knowledge of the FFA	6
Poor discipline skills	5
Very low voice level	4
Poor shop skills	4
Lack of experience	4

The State Department of Education instituted the PRAXIS III system of entry year teacher evaluation. Pathwise certification parallels the PRAXIS III system of teacher evaluation. The Pathwise system is the "mentoring" program designed to mentor the entry year teacher for preparation in the PRAXIS III assessment. The teacher education program in agricultural education has fully implemented the PRAXIS III assessment system into the pre-service program. Thus, the cooperating teachers are required to be Pathwise certified prior to a student teacher being placed with the cooperating teacher beginning 2003.

The data further indicated that 50% of the cooperating teachers were either not willing to be Pathwise certified or were unsure if they were willing to be Pathwise certified. The implications of this finding were surprising to the teacher education staff. Even though the State Department of Education has responsibility for the Pathwise Certification Program, is it possible that all cooperating teachers do not fully understand what Pathwise mentoring is and how they might be certified? If cooperating teachers are not willing to be Pathwise certified, the number of cooperating teachers can be drastically affected, thus providing a more limited number of cooperating teachers for placement. With a more limited number of placement centers for student teachers, cooperating teacher burnout could be a factor in the future. Further investigation is warranted to ascertain the reasons why cooperating teachers are not willing to become Pathwise certified.

It is clear in the current study that teacher educators are the individuals expected to be supervising the student teachers. The student teaching experience is the most important process of the pre-service students' preparation and needs to be of the highest quality (Pfister & Newcomb, 1982). Budgets may be tight and getting tighter, but it is apparent that cooperating teachers will accept only one group of people to supervise student teachers, university teacher educators. Alternative forms of supervision including graduate students, retired secondary agriculture teachers, and forms of high-tech communications were not acceptable to the cooperating teachers. In conclusion, according to the cooperating teachers in the current study, there is no substitute for the university teacher educator in the role of supervision of student teachers. A qualitative study is warranted to ascertain the cooperating teachers' hesitation to other forms of student teacher supervision. It is only through the exploration of potential barriers

to alternative forms of supervision that teacher educators can communicate the underlying rationale to the cooperating teachers who do not fully understand the university expectations for student teaching supervision (Deeds, Plowers, & Arrington, 1991).

The findings within the current study illustrated that cooperating teachers were willing to supervise only one student teacher per year, expected the supervising teacher educator to make three visits, and believed student teaching should occur during the Autumn Quarter. In addition, the cooperating teachers reported that as part of the student teaching experience, summer activities (such as FFA camp, WLC, state fair, and county fair), which involved the student teacher, must occur. Furthermore, the cooperating teachers reported that student teachers peak in proficiency between the eleventh and twelfth week of student teaching.

The teacher education program needs to consider the current study's findings and reevaluate its budget or practices to allow for all student teachers to be supervised by teacher educators three times during the student teaching experience. To accommodate both the student teachers needs and the budget limitations, student teachers should be placed in close proximity to each other with one teacher educator supervising all student teachers in a more localized area to reduce travel time and expenses. In addition, student teachers might need to be placed closer to the university to reduce travel time and expenses. If qualified teachers who are willing to be cooperating teachers are closer to the university and are not being utilized, perhaps teacher educators need to approach them as potential student teaching sites. All available and willing teachers and resources should be sought out and considered.

Furthermore, summer activities (such as FFA camp, WLC, state fair, and county fair) need to be incorporated into the student teaching program, not on a voluntary basis, but on an "assignment" basis. Related to student teachers peaking in proficiency between the eleventh and twelfth week, it is recommended that the student teaching experience be limited to twelve weeks. Currently student teachers begin at the cooperating center prior to classes starting at the university, thus increasing the student teaching experience from 10 weeks to as many as 16 weeks. In discussions with student teachers, student teachers have also indicated "peaking" around the tenth week of the experience.

Keeping lines of communication open between teacher educators, cooperating teachers, and student teachers is very important (Davis-Wiley, 1993; Kreamelmeyer, 1991). Collecting and evaluating perceptions will strengthen the program as a whole and develop ownership by those giving input (Waters & Haskell, 1989). Cooperating teachers understand budget cuts and shrinking budgets. Communicating any changes regarding sites and budget rational will need to be done immediately with all cooperating teachers involved.

Related to the strengths and weaknesses of the student teachers, it is interesting to note that of the top five strengths, the variable "good lesson planning" is the only variable that is directly taught within the teacher education pre-service program. Clearly, organizational skills, rapport, and enthusiasm are indirectly taught, however, lesson planning is the only item that was reported by the cooperating teachers as a strength that is taught within the pre-service program. The data clearly shows that what is perceived to be strengths of the student teachers by the cooperating teachers, are items that comes with the "baggage" of the student teacher. Palmer (1998) argued that teachers chose their vocation for reasons of the heart (rapport, enthusiasm, hard working), because they cared deeply about students and their subject. Perhaps teacher

educators should continue to teach the pedagogy, and not be so concerned about the "baggage" that student teachers bring.

In the weakness category, the cooperating teachers clearly have identified some content areas needing expansion. The top three weaknesses, knowledge of agricultural subject matter, knowledge of the FFA, and poor discipline skills, are areas that every agricultural teacher education unit teaches, directly or indirectly. It is recommended that the teacher education unit in the current study began immediately to review the curricular changes necessary to increase the knowledge level of pre-service students in the areas of agricultural subject matter, FFA, and student discipline.

A final overall recommendation is that teacher educators and student teachers need to be surveyed to compare their perceptions of the student teacher program and compare those findings with the findings of the current study. The comparative data would allow researchers to identify any areas of concern and then promote discussions between all three players (Deeds, Plowers, & Arrington, 1991; Kreamelmeyer, 1991; Thorpe, 1972).

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Cooperating Teachers' Perceptions of the Student Teaching Experience

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Educational Importance and/or contributions to an increased body of knowledge and/or application and practice:

The student teaching experience can be argued to be the pinnacle of pre-service teachers' education before entering the teaching profession. Soliciting cooperating teachers' perceptions of the student teacher experience is a valued line of inquiry. This line of inquiry aids practitioners with information to guide the structure and format for constructing the student teaching experience. However, in times of budget constrains the ideal structure and format can often be compromised. During these times, teacher education programs are expected to look for alternative ways of doing things, or worse, eliminated programs or practices.

Implications/usefulness/application of information for practitioners:

The immediate usefulness and application of these findings suggest that cooperating teachers are less than willing to reject the noted three university supervisory visits. I question whether cooperating teachers in Ohio are different from other cooperating teachers in the expected number of supervisory visits. Do cooperating teachers in Ohio identify three supervisory visits as appropriate because this is what they, as a group, have come to expect given historical practice? Would we expect to find these results in other state? The nature of these questions

also applies to other student teaching procedural matters (e.g., time of student teaching, and number of weeks for the student teaching experience). Further, are these findings a function of ideal practice or an effort to maintain status quo?

Methodology Issues:

The authors followed approved practices for determining the trustworthiness of the data collection instrument. Several efforts were extended to maximize the response rate. For the purposes of clarity, why did the authors elect to control non-response error by comparing response groups? While this technique for controlling non-response error is identified by Miller and Smith (1983), they also identify a more effect manner for controlling this type of error.

Results and/or conclusions and recommendations:

Pathwise certification needs clarification. What is it and why was it included? The conclusions and recommendations are consistent with the results. However, would the results and conclusions differ if the authors this evaluative study made value judgments based upon a set of criteria? Because the evaluative nature of this study, I question whether other stakeholders (e.g., Department Chair and State Staff) would agree with the conclusions. Further, the authors state that student teaching be limited to 12 weeks. I would argue a different interpretation might be that the 12 weeks be a "minimum". The authors note that Pathwise certification will be required of all cooperating teachers. However, the authors identified that cooperating teachers are less than interested in this certification process. This issue will pose a unique challenge to Ohio teacher preparation programs. How will Ohio agricultural education deal with this issue? More importantly, will Pathwise certification make a "significant" difference in the quality of experience student teachers receive? Before certification requirement become mandated, should there be empirical evidence to suggest this is desirable?

Overall comments:

Overall, I found this research study to be thought stimulating and well constructed. It raises several questions for the profession to consider. I congratulate the authors for pursuing this line of inquiry in attempts to justify practices and to explore alternatives as they pertain to the student teaching experience.

SAE and FFA Policy for Two-Way Interactive Distance Learning

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Abstract

The purpose of this research was to determine policy recommendations for the supervision and instruction of supervised agricultural experience (SAE) and FFA in a distance learning environment. 62 principals and 53 teachers from schools offering, and having taught distance by two-way interactive technology, respectively, responded on a survey to twenty policy statements regarding SAE and FFA supervision. A provision for "no opinion" response demonstrated policy uncertainty by both principals and teachers. Uncertainty was most pronounced on policy issues related to SAE supervision, by both principals and teachers. It was recommended that a distinction should be made between "extending" an agricultural education program compared to offering "stand-alone" agricultural education course work in a distance learning environment. Respondents supported voluntary student participation in both SAE and FFA, and recommended encouragement of student participation through a policy provision of preparatory instruction. Even though there was agreement by teachers and principals that distance students should have an opportunity to participate in local FFA chapter governance, there was considerable uncertainty of how to address chapter membership.

Theoretical Framework

> The time is ripe for state boards of education and other state education leaders to think through the various policy questions, consider the implications, and adopt policies that will drive the technology in directions that effectively maximize student achievement – for all students (National Association of State Boards of Education, 2001).

This quote is reflective of the adhoc approach that has driven policy development necessary to direct and support distance learning delivery through it's associated technologies. Before pursuing a discussion of distance learning policy, it is necessary to define the terminology. For the purpose of this paper, distance learning is defined as:

> A class of methods of instruction, either formal or informal, that place the learner apart in time and/or space from the teacher, or place the learning and practice apart by space and/or time from the teaching and the instruction. To bridge the time and distance factors, learners and instructors use technology-based communication channels and media, such as computers and associated networks, print, audio, cable, satellite, or videotape, or combinations of these technologies (King, Nugent, Eich, Mlinek & Russell, 2000).

Policy is defined as, "a written course of action (e.g., statues, institutional mission, procedures, guidelines, or regulations) adopted to facilitate program development and delivery. Policies are not courses or syllabi (King, et. al., 2000)."

As a result of the distance learning policy research of the last decade (Berge, 1998; Gellman-Danley & Fetzler, 1998; King, Nugent, Russell, Eich & Lacy, 2000), several policy categories have been defined and cited as an adequate framework for related discussion. They are: academic (calendar, course integrity, transferability, transcripts, student/course evaluation, admission standards, accreditation); governance/administration/fiscal (tuition rate, technology fee, administrative cost, fiscal regulations, tuition , space, staffing); faculty (compensation, workload, incentives, training, monitoring, support, evaluation); legal (intellectual property, liability issues of faculty, students, or institution); student support services (advisement, counseling, library access, materials delivery, testing, registration, laboratory); technical (system reliability, connectivity, hardware/software, setup concern, technical support staffing, scheduling, costs); and cultural (adoptions of innovations, acceptance of distance delivery, organizational values).

These categories have been found to be useful not only for post-secondary discussions, but secondary as well. In 2002, at the Nebraska Educational Research Conference, King reported his findings on a comparison of selected post secondary institutions and eleven Nebraska secondary distance learning consortiums with regard to the seven policy areas. He concluded that secondary consortiums were directing their policy attention primarily at governance/administration/fiscal considerations, and secondarily at the areas of academic, faculty, and student guideline considerations. Post-secondary institutions were focused primarily on academic and faculty considerations, and secondarily on student support, technical, and governance/administration/fiscal considerations (King, 2002). It is noted that King found it necessary to divide the original student category by distinguishing support and guidelines separately.

"Regardless of delivery system ... the technology often precedes planning and policy development" (C.E.T.U.S., 1997, p.7 as cited in 1997, Gellman-Danley et.al.) Distance learning in Nebraska at the secondary level, in the form of two-way interactive fiber optic technology, grew rapidly during the latter half of the '90s. The availability of the technology and financial grant opportunities (through the Nebraska Lottery-Education Innovation Fund) to fund equipment and engineering to develop the systems stimulated the rapid growth (Tri-Valley, 2003). As the movement proceeded, based on connectivity limitations, schools organized themselves into geographical distance learning consortiums (pods). Currently, eleven such consortiums exist in Nebraska. As stated in the goals of the Tri-Valley Consortium, "member schools view distance learning as a way to: enhance learning opportunities, invigorate current curricular programs, increase educational opportunities for adult members of the community, and further involve Nebraska citizens in their schools."

During his tenure as Director of Agricultural Education for the State of Nebraska, Richard Katt (personal communication, October, 2001) reported that when member schools of distance learning consortiums met to plan semester distance offerings, agricultural education courses were one of the most often requested. Student participation in agricultural education courses offered via distance lead to unique policy considerations related to state agricultural education program standards (Program standards agricultural education, 2001). Nebraska

minimum program standards for agricultural education require "all students conduct entrepreneurial, placement, agribusiness or experiential SAE's, supervised by the agricultural education instructor, and an FFA chapter is required as an integral part of the instructional program."

> In today's rapidly changing world, agricultural education must be prepared to change constantly and make adjustments to meet new challenges and opportunities (Local Program Success, pg. 6, 2003). The National Council for Agricultural Education (The Council) is charged with the responsibility of developing policy and providing leadership for agricultural education at the national level; state leaders have that responsibility at the state level; and local teachers and administrators provide leadership at the local level.

Educational policy development and implementation in the United States, aside from state and federal mandates, ultimately rests with local boards of education. There is no authority in the United States Constitution for federal intervention in education. Education is a matter reserved for the states (Boaz, 2001). Likewise, policy for the administration of agricultural education is a local matter determined by the local board of education. It has been through national and state leadership initiatives that the "policy" of agricultural education as a programmatic educational delivery (complementary classroom instruction, supervised agricultural experience, and leadership development) has been accepted by local boards of education. Now, a challenge to national and state leadership is to clarify to local educational leaders how distance learning should integrate the components of supervised agricultural experience and leadership development.

Purpose

The purpose of this research project was to determine policy recommendations for the supervision and instruction of supervised agricultural experience and FFA in a distance learning environment. Specific objectives were to: (1) assess the attitudes of principals toward selected policy issues related to supervision and instruction of SAE and FFA at distance learning sites; (2) assess the attitudes of teachers toward selected policy issues related to supervision and instruction of SAE and FFA at distance learning sites; and (3) through a comparison of principal and teacher attitudes; assemble policy recommendations for supervision and instruction of SAE and FFA at distance learning sites.

Methodology

Based upon a review of the relevant literature and professional dialogue with Nebraska Department of Education agricultural education consultants, 20 questions related to SAE and FFA were developed. These questions were part of as a portion of a larger survey addressing policy issues regarding: general perception of distance learning, distance learning delivery, support and management considerations, and fiscal considerations. A four-point Likert-type response scale was used, (1 strongly agree to 4 strongly disagree, and a 5 response was reserved for no opinion). The survey was designed specifically to allow respondents not having an

opinion on policy issues to express that position. Spradlin (1997) purports that support on policy is related to personal value formulation. In this reality, a forced response was deemed inappropriate. The researchers felt that a measure of "no opinion" would provide insight to policy issues for which there was uncertainty. Face and content validity were established through an instrument review by a panel of experts including faculty from the Department of Agricultural Leadership, Education, and Communication, University of Nebraska-Lincoln (UNL), and the Director of Agricultural Education, Nebraska Department of Education. In addition, 12 schools were selected randomly to serve as a field test group. Upon receipt of the panel's feedback and consideration of field test comments, modifications were made. The research protocol was approved by the UNL Institutional Review Board. The proposal was approved and assigned the identification number of 2001-12-109 EX. The established reliability coefficient for the instrument was .81.

Packets containing a cover letter, informed consent, and three surveys were mailed to principals of all schools identified by the Nebraska Education Telecommunications Center (Gwen Nugent, personal communication, November 7, 2001) as members in two-way interactive fiber optic distance learning consortiums. The principal was asked to complete one survey, and ask two teachers teaching or having taught through distance technology to complete the others. Preference was indicated for the instructor of agricultural education if the instructor qualified. The total population of schools was 231. A second and third mailing was made to non-respondents. Representatives from 87 (38 %) schools responded. The response was composed of 120 principals nd 128 teachers, of that total population, 62 principals represented schools offering agricultural education and 53 teachers of agricultural education courses. Descriptive statistics and ANOVA comparisons were processed using SPSS-PC, and significance was set at .05.

Findings/Conclusions

Agreement was expressed by all responding principals and teachers, offering opinions, to policy questions addressing SAE (see Table 1). The only significant difference between the groups was on the statement, "all students should have an opportunity to have a viable SAE." Teachers expressed a stronger agreement with the statement than did principals. In fact, this statement received the strongest agreement by teachers of any SAE related statement on the survey, and the least amount of "no opinion" response from both groups.

All other SAE policy issues received a relatively high percentage of "no opinion" responses (see Table 2). This may be interpreted as acceptance of the philosophy, but a lack in understanding and/or consideration of how to develop the curriculum and resource support in a distance learning environment. As was previously cited in the literature (Tri-Valley, 2003), the rapid introduction of distance learning equipment, and political pressure to integrate technology into the curriculum, may have influenced agricultural education to not have been considered programmatically, but rather as stand-alone course work.

Table 1.
ANOVA Comparison of Principal and Teacher Opinions on SAE Policy Issues

Statement		NO	n	M	SD	F	Sigf.
All distance students have a viable SAE	P	18	44	2.41	.62	.294	.589
	T	16	37	2.32	.78		
All students should have an opportunity to have a viable SAE	P	10	52	2.10	.49	8.20	.005*
	T	8	45	1.78	.59		
SAEs of all distance students should be supervised by the distance host instructor	P	10	50	2.36	.63	.063	.803
	T	12	40	2.33	.69		
Remote schools should provide travel reimbursement to host site instructor for SAE visitations	P	11	50	2.12	.62	3.67	.058
	T	9	44	1.86	.66		
All distance students receive instruction in SAE	P	16	45	2.09	.41	1.22	.272
	T	14	39	1.95	.72		
All distance students maintain SAE record books	P	14	47	2.09	.40	.005	.943
	T	13	40	2.08	.85		
All distance students receive career education instruction	P	15	46	1.98	.39	1.91	.170
	T	14	39	1.82	.64		
All distance students receive financial management instruction	P	14	46	2.00	.36	1.322	.254
	T	15	38	1.87	.66		
Remote school should contract a facilitator to supervise SAE	P	16	45	2.24	.48	.961	.330
	T	14	39	2.10	.82		

Note. P = principals (n = 62), T = teachers (n = 53). NO = no opinion. (*p < .05).
1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree

Table 2.
Percentage Comparison of Principal and Teacher Opinion on SAE Policy Issues

Statement		NO	SD	D	A	SA
All distance students have a viable SAE	P	24	3	20	42	2
	T	30	6	19	38	8
All students should have an opportunity to have a viable SAE	P	16	0	15	63	6
	T	15	2	2	57	25
SAEs of all distance students should be supervised by the distance host instructor	P	17	3	27	50	3
	T	23	4	23	43	6
Remote schools should provide travel reimbursement to host site instructor for SAE visitations	P	18	2	16	54	10
	T	17	2	8	51	23
All distance students receive instruction in SAE	P	26	0	10	61	3
	T	26	4	6	47	17
All distance students maintain SAE record books	P	23	0	10	64	3
	T	25	8	8	43	17
All distance students receive career education instruction	P	25	0	5	64	7
	T	26	2	4	47	21
All distance students receive financial management instruction	P	23	0	5	67	5
	T	28	2	6	45	19

Remote school should contract a facilitator to supervise SAE	P	26	0	20	52	2
	T	26	4	17	36	17

Note. P = principals, T = teachers. NO = no opinion, SD = strongly disagree, D = disagree, A= agree, and SA = strongly agree.

Teachers and principals expressed disagreement in consideration of the policy issue, "requiring all distance students to be FFA members" (see table 3). This issue elicited the strongest disagreement response of the entire survey. However, both groups of respondents agreed that students should receive instruction on the FFA, and be provided the opportunity to participate. These responses are consistent with similar SAE participation items. Participation should be voluntary and encouraged through preparatory instruction.

When analyzing the FFA policy issues, it becomes apparent that respondent opinion on the format delivery of FFA participation is mixed. The greatest amount of indecision exists with issues related to FFA chapter affiliation. On those issues, the most expressed opinion supports the format of attending FFA meetings via distance delivery. Even though there is some indecision, especially by teachers, regarding the policy of the distance school contracting a facilitator to supervise FFA activities. It would seem that if this policy was pursued, a reasonable number of student members would be necessary to justify the expense of the facilitator.

Table 3.
ANOVA Comparison of Principal and Teacher Opinions on FFA Policy Issues

Statement		NO	n	M	SD	F	Sigf.
All distance students should be FFA members	P	12	49	2.90	.65	1.34	.249
	T	12	41	2.71	.90		
All distance students should have the opportunity to participate in FFA	P	9	52	1.96	.39	.975	.326
	T	4	49	1.86	.64		
All distance students should attend FFA meetings at the host site school	P	14	47	2.57	.68	1.55	.215
	T	13	40	2.38	.80		
All distance students should attend FFA meetings via distance delivery	P	10	51	2.24	.61	.118	.732
	T	5	48	2.19	.76		
Receiving school should provide transportation for FFA members to attend district, state, national conferences and activities	P	10	51	2.22	.64	6.05	.016*
	T	9	43	1.88	.66		
Distance schools should have their own FFA chapter	P	16	45	2.42	.62	3.43	.068
	T	16	37	2.16	.64		

Students should receive instruction on the FFA	P	13	48	2.04	.41	.607	.438
	T	7	46	1.96	.63		
Remote school should contract a facilitator to supervise FFA activities	P	12	49	2.16	.47	3.38	.069
	T	14	39	1.97	.48		
Remote students should have an opportunity to advance in FFA degrees	P	11	50	2.00	.40	2.13	.148
	T	6	47	1.85	.58		
Remote students should have an opportunity to participate in competitive events	P	9	52	2.00	.39	3.68	.058
	T	5	48	1.81	.57		
Remote students should have an opportunity to participate in local chapter governance	P	10	51	2.16	.54	2.62	.108
	T	7	45	1.96	.67		

Note. P = principals (n = 62), T = teachers (n = 53). NO = no opinion. (*p < .05).
1 = strongly agree, 2 = agree, 3 = disagree, and 4 = strongly disagree.

Table 4.
Percentage Comparison of Principal and Teacher Opinions on FFA Policy Issues

Statement		NO	SD	D	A	SA
All distance students should be FFA members	P	20	13	46	21	0
	T	23	13	38	17	9
All distance students should have the opportunity to participate in FFA	P	15	0	5	72	8
	T	8	2	8	58	25
All distance students should attend FFA meetings at the host site school	P	23	7	33	36	2
	T	25	4	32	28	11
All distance students should attend FFA meetings via distance delivery	P	16	3	18	57	5
	T	9	6	19	53	13
Receiving school should provide transportation for FFA members to attend district, state, national conferences and activities	P	16	3	18	56	7
	T	17	2	8	52	21

Distance schools should have their own FFA chapter	P	26	2	31	38	3
	T	30	2	15	45	8
Students should receive instruction on the FFA	P	21	0	8	66	5
	T	13	0	15	53	19
Remote school should contract a facilitator to supervise FFA activities	P	20	0	16	61	3
	T	26	0	8	57	9
Remote students should have an opportunity to advance in FFA degrees	P	18	0	7	69	7
	T	11	2	4	62	21
Remote students should have an opportunity to participate in competitive events	P	15	0	7	72	7
	T	9	2	2	64	23
Remote students should have an opportunity to participate in local chapter governance	P	16	2	15	62	5
	T	13	4	6	60	17

Note. P = principals, T = teachers. NO = no opinion, SD = strongly disagree, D = disagree, A= agree, and SA = strongly agree

Recommendations

The findings of this study may only be generalized to agricultural education in Nebraska; however, the issues and related commentary can serve as meaningful contribution to the profession at large.

Based on principal and teacher responses to the academic issues of distance students maintaining a viable SAE and FFA membership, it is recommended that a distinction should be made between agricultural education program and agricultural education courses. In the rush to integrate two-way distance learning technology by invigorating current curricular programs, it appears that schools have shared courses rather than extending programs. This contention is supported by the uncertainty (no opinion) expressed by both teachers and principals on student issues related to recordkeeping, career education, and financial management instruction. These elements are commonly in a unit of instruction addressing SAE.

Inservice on programmatic considerations should be provided by agricultural education state consultants to schools entering into distance learning transmission agreements of agricultural education. The inservice could occur one on one, or through annual inservice to schools involved in distance learning. Emphasis should be directed toward explaining the learning effectiveness of the program, and assistance in curriculum development to more fully

exploit that effectiveness. Teacher preparation programs in agricultural education should development and promote methodologies to deliver SAE and FFA instruction via distance in both preservice and inservice practitioner programs.

Both teachers and principals agreed students should be provided opportunities for instruction in SAE and FFA. Given the logistical complexities of distance learning, modifications to the traditional expectations of student engagement should be explored. Motivation for receiving agricultural education may be tied to the descriptive terminology of the subject matter e.g. animal science or food science. If each course contained an introductory element explaining the importance of experiential learning and leadership involvement to the subject matter, this could begin to link the programmatic aspects of SAE and FFA. Curricular planning could reinforce the introductory discussion by assigning a significant percentage of course grading (15 to 20%) to applied experiential and leadership learning activities. Such activities would require students to follow up on in-class interests by pursuing independent experiences outside of the classroom. Through taking initiative to arrange learning appointments, invite guest speakers for the class, or arrange field trips, leadership incentive points could be awarded (Foster, 1985). This type of curricular modification may not only address logistical complexities, but it could enhance student engagement in traditional SAE.

Even though there is agreement by teachers and principals that distance students should have an opportunity to participate in local FFA chapter governance, there is considerable uncertainty of how to address chapter membership. Principals disagree that students should attend FFA meetings at the host site, and tend toward that opinion on the question of the distance location having it's own FFA chapter. Both sets of respondents show most agreement and certainty for student attendance via distance delivery. Such arrangements would put distance students at a distinct social disadvantage for participation in chapter activities. It is recommended that further research be pursued on this academic issue by contacting schools delivering agricultural education via distance and compiling their "best practices."

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Discussant's Comments, 2003 NAERC Professional Papers

Session: II H. **Discussant's Name:** Greg Miller

Paper Title: SAE and FFA Policy for Two-Way Interactive Distance Learning

Author(s): Lloyd C. Bell, Linda Moody, James King

The authors should be commended for addressing a key issue surrounding the application of distance learning to secondary agricultural education. Offering an agricultural education "program" that requires SAE and FFA as integral components by distance education clearly raises logistical issues. This paper gives us some idea as to how such issues are viewed by administrators and teachers. As a study should, it also raises lots of questions that are worthy of discussion and perhaps future research.

We need some additional information to aide us in understanding the context of this study. To what extent are agriculture teachers involved in offering courses and/or programs via two-way interactive technology in Nebraska? If agricultural educators are extensively involved in distance education, who or what provided the stimulus? Regarding methodology, did the principals collect and return the three surveys sent to them? If so, can we be sure that the responses represent the independent opinions of the respondents? Were any steps taken to control nonresponse error? How representative were respondents of those who actually offered agricultural courses and/or programs at a distance? Was a definition of SAE given on the questionnaire? If not, would principals know what SAE was about?

A fundamental question that I have about this study is whether most of the policy issues raised by the authors should be treated any differently for interactive distance learning versus a traditional setting for agricultural education? If you removed the word distance from most of the policy issue statements and asked principals and teachers associated with traditional agricultural education programs to indicate their level of agreement with each statement, I am willing to speculate that the results would be very similar. Unfortunately, there is not universal agreement among teachers and administrators that "all students have a viable SAE" or that "all students should be FFA members". So is the variability in opinion that you observed a result of the uniqueness of the interactive distance learning environment or perhaps is it the result of a more fundamental difference of opinion on FFA and SAE.

The recommendation to pursue further research into best practices used by agricultural education programs delivered at a distance is right on target. We should be able to figure out creative ways of delivering a complete agricultural education program by distance learning if we so desire. This is an interesting and thought provoking paper.

A Case Study of Interaction and Student Learning in Distance Education

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Abstract

The case study evaluated a distance education program offered by a land-grant university agricultural college. The study aimed at finding the importance of interaction on the efficacy of learning at a distance using Holmberg's and Moore's theoretical frameworks of didactic conversation and multiple interactions. The study employed a mixed methods approach using an original survey instrument and long faculty interviews. While students found the technology manageable, the faculty perceived technology as a barrier to effective instruction. Both, students and faculty were satisfied with the nature of interactions between them, although the faculty had individual preferences and faced some barriers to interaction. The study supported Holmberg's and Moore's contention that interaction may be a predicating factor for the success of distance education courses. The study also found that student-student interaction was not considered critical to learning. More research is necessary in the direction of curriculum modification to suit distance student needs.

Introduction

Offering distance education courses is consistent with the mission of the land-grant university and has been said to be a critical endeavor for the survival of a modern educational institution (Kambutu, 2002). Keegan (1990) defined distance education as a system characterized by 1) the separation of instructor and student during most of the instructional process, 2) the influence of an educational organization, 3) provision of student assessment, 4) use of educational media to deliver course content, and 5) two-way communication between instructor and student.

With a purpose of making university courses more accessible, an agricultural college situated in a southwestern land-grant university delivered a series of graduate level courses that would lead to a Master of Science in Agricultural Education or a Master of Agriculture degree. Distance delivery began in the spring of 2001 and continues today. Five faculty volunteered to teach via distance modes and used a variety of technologies including 1) Interactive Video Conferencing (IVC), 2) Streaming Video, 3) videotaping the live course and sending a copy of the videotape or a CD-ROM to distance students, and 4) Blackboard.com®. In the case of IVC courses, students had the option to attend the weekly three-hour lectures live at a remote IVC download site or to view the Streaming Video of the same lecture on the Internet. Blackboard.com®, videotape, and CD-ROM courses were asynchronous only.

An important aspect of any distance education program is evaluation for continuous improvement. Unfortunately, there has been a lack of systematic evaluation research focusing on distance education courses (Roberts, Irani, Lundy, & Telg, 2003). Only 19 states have developed systematic evaluation programs to assure the quality of distance education (National Governors Association, 2003).

Purpose Statement

The purpose of this study was to evaluate the overall distance education program offered by the college, specifically focusing on the impact of the distance education context on learning using Holmberg's (1995) and Moore's (1989) theoretical frameworks for distance education.

The main research questions that guided this study were:

1. Did the student-content and student-interface interactions motivate the learners to favorable learning outcomes?
2. Did the learner-learner interactions motivate learners to favorable learning outcomes?

Theoretical Framework

Holmberg (1983) believed that within the context of formal education, students learn by engaging in guided didactic conversations with their instructors. The students express their ideas, and then the instructor guides the student in elaborating, correcting, or redirecting those ideas. Public and direct student-instructor conversations are essential characteristics of learning. Guided didactic conversation promotes a personal relationship between the instructor and the student, thus creating greater motivation in the student and increased learning outcomes.

Holmberg's theory of distance education was based on seven postulates guided by characteristics of didactic conversation (Holmberg, 1995, p. 47). They included 1) feelings of personal relation between the instructor and student to promote study pleasure and motivation; 2) that such feelings would be supported by well-developed instructional materials and two-way communications; 3) that study motivation was important for the attainment of study goals; 4) that the atmosphere of friendly conversation favors feelings of personal relation according to postulate 1; 5) that communications within natural conversation are easily understood and remembered; 6) that the conversation concept can be successfully translated for use by the media available to distance students; and that 7) planning and guiding the curriculum were necessary for organized study at a distance.

Moore (1989) wanted distance educators to include all members of the learning community in educative interactions, not only the instructor and students. He suggested that when designing effective distance education courses one should include interactions between the student and their instructor, students and students, and students and the content. Reciprocity is necessarily built into Moore's theory in that interaction is both unidirectional and bi-directional in distance education.

Learner-content interaction occurs when a student reads a book, views pre-recorded videotape, or in some way interacts with inanimate learning resources. It is hoped that in order to master the content, the learner will engage in an internal didactic conversation (Holmberg, 1983). Learner-instructor interaction is what differentiates self-study from distance education. The instructor provides the learner with an organized plan, or curriculum, for mastering the content and communicates with the learner throughout the process as Holmberg (1995) stated in Postulate 7.

Learner-learner interactions take the form of group projects, discussion group members, etc. The role of learner-learner interactions to the overall effectiveness of distance education in the literature was mixed. Some students reported that other learners were essential to their success in a course, while others suggested that fellow learners actually detracted from their success (Biner, Welsh, Barone, Summers, & Dean, 1997).

Hillman, Willis, and Gunawardena (1994) added learner-interface interaction, the concept of interaction that occurs between the learner and the technologies used to deliver instruction to Moore's (1989) framework. Hillman, Willis, and Gunawardena (1994) argued that a student's skill with the communication medium necessary to participate in a distance education course is positively correlated with success in that course. In order to gain any meaning from the course content, the student must be literate in the communication medium's rules of interaction.

Opportunities for guided didactic conversations in the college's distance education courses came from the use of IVC technology, email, telephone conversations, and face-to-face meetings between students and their instructors. Students had opportunities for learner-instructor, learner-content, and in the case of IVC courses, learner-learner interactions. Students were also required to engage in learner-interface interaction.

Methods

The research design was a case study, the case being the agricultural college distance education program in its entirety (Stake, 1995; Yin, 1994). The methods used for collecting data included the university student information system, an original student questionnaire, and long, semi-structured, face-to-face interviews with faculty who taught at a distance (Patton, 2002). The questionnaire included a variety of response sets such as Yes-No, multiple-choice, fill-in the blank, Likert-type, demographic, and open-ended questions that were designed to satisfy the research questions. One of the multiple-choice items listed the frequency of interaction of never, rarely, frequently, and always. The Likert-type ratings included strongly agree, agree, disagree, and strongly disagree and were scored 4-1 respectively. Not sure/not applicable was coded 0 for the analysis. Survey data were analyzed using SPSS v. 8.0. The statistics used were mean and frequency.

The Cronbach alpha for reliability of the survey instrument was calculated at 0.72. The instrument was found to be valid. Validity of qualitative data was sought by Merrian's (1995) strategy of triangulation, peer examination, and an audit trail.

A panel of experts consisting of two faculty members with expertise in distance education confirmed content, construct, and face validity of the survey. To expedite data collection and increase response rate, the students were telephoned and guided through the survey with the researcher. Due to the small population size (*N*=88) pilot testing was conducted during the first 5 telephone interviews with students. After each telephone interview slight modifications were made to the instrument to increase validity, clarity, and the quality of the data collected.

The qualitative data set (faculty long interviews) were analyzed and reported following Creswell's (1998) procedures:

1. *Organization of data.* The interviews were tape recorded, transcribed, and cleaned by a research assistant. The transcript was then sent back to the subjects to confirm accuracy. After confirmation of accuracy the text was loaded into the qualitative data program ATLAS.ti® for analysis.
2. *Categorization of data.* The data were clustered into meaningful groups (coded) using ATLAS.ti® as an organizational tool.
3. *Interpretation of the data.* Statements that fell into like codes were examined for specific meanings in relationship to the purpose of the study.
4. *Identification of patterns.* The data and their interpretations were examined for themes and patterns that characterized the program and allowed the researchers to draw conclusions.
5. *Synthesis.* An overall representation of participants' responses was created where conclusions and recommendations were drawn based on the data presented.

Findings and Conclusions

Eighty-eight graduate students (Masters and Ph.D.) had successfully completed course work at a distance from fall 2000 to fall 2002. Thirty-one students completed the telephone questionnaire for a 61% response rate. Demographic data were downloaded from the student information system for all 38 students. The mean age of the distance education students was 39.27 years (*sd*=11.03) and most were male (*n*=62, female *n*=26). Seventy-eight percent of the students were white, 15.2% were Native American, 4.4% were African American and the remaining 2.2% were mixed. Seventy-four percent of the students were part-time students and the remaining were full-time (17.4%) or returning students (8.6%). The mean number of courses taken by the students was 1.22 (*sd*=0.75). Students lived a mean distance of 119 miles (*sd*=88) from the university.

Research Question 1: Did the student-content and student-interface interactions lead to favorable learning outcomes?

The survey addressed the student-interface interaction construct at several levels. First, the respondents were asked a series of questions about website support for the course they had taken. Most students (*n*=29) indicated that their course had a website to support the course and felt that it provided them all the information they needed to be successful during the course. Twenty-eight students (90.3%) also indicated that they got all the course documents and handouts necessary from the course websites. It is concluded that course websites were successful in delivering course materials to students, and students were able to access websites without difficulty.

The participants were asked about downloading location, and whether they had problems downloading content from the Internet (Table 1). The majority of problems students faced with the technology in the distance education context were associated with the IVC and Streaming Video technology. In one class, students were only able to download eight of 14 lessons because of Streaming Video technology failures. It is concluded that the majority of students downloaded course content from a work computer and the most had difficulty downloading the Streaming Video from the Internet.

Table 1: Location Used for Downloading Distance Education Course Content

Question	Frequency	Percent
Location where Streaming Video lectures were downloaded		
Home	4	22.2
Work Place	13	72.2
Work Place & Home	1	5.6
Total	18	100.0
I had problems downloading the Streaming Video lectures from the Internet		
Yes	15	48.4
No	16	51.6
Total	31	100.0

Respondents indicated the kinds of technology problems they faced at the remote ICV site they attended. Most complained that either the picture or the sound or both were missing during the broadcast. Many students faced problems connecting with the university via IVC equipment at the scheduled time of the lecture. One student indicated that the problems were acute during the first two weeks of the course, but were resolved subsequently. One respondent indicated that when the transmission was not working, the instructor would inform them with an email so that they got a warning. In spite of IVC failures, the respondents indicated that technology failures were not a barrier to learning. It is concluded that students were satisfied with the IVC download sites if they chose to attend the lecture live. The sites were well supported with technical assistance and were conveniently located.

Faculty were asked to discuss the technological problems they faced, the conflict between serving the needs of local and distance students simultaneously, the training they received for teaching at a distance, and the type of technology support they would prefer.

Faculty were disappointed and frustrated with the technology, specifically IVC and Streaming Video, used to offer courses at a distance. They felt that either new technology should be adopted, or they should be provided additional technical support to deal with the constant onslaught of crisis caused by technology failures during lectures.

The faculty perceived technological problems as two fold: those that affected the students exclusively, and those that affected both the students and faculty. Among those that affected the students were IVC transmission failures from campus to the remote site. One faculty stated "students make an effort to show up to this site and then they get nothing; they get no audio and no video. They try to ask a question and they get cut off." Some faculty members also considered Streaming Video problematic as no sound or image or both were recorded during the lectures on numerous occasions.

As far as the problems faced by both the faculty and students were concerned, the faculty felt that the time involved in getting the technology to work was a detractor from teaching and learning. "I spent more time and effort fighting with the technology than teaching," said one faculty. She felt that "technology failures were extremely frustrating…and I can only imagine what students were going through trying to participate in the class." Another faculty pointed out the time lost in communicating through the IVC system. Voice transmission was choppy and delayed, for example, if a student asked a question it would take two seconds for the sound to reach the instructor. Thus, people were constantly talking over each other causing further delays in communication. The outcome was a loss of student involvement as students learned that it was not worth the effort to ask a question.

Four faculty members declared that the IVC and Streaming Video technology was a major problem in serving distance education students. One faculty affirmed that the technology was certainly not appropriate to teach his courses, while another found Streaming Video unimpressive. One faculty member clearly stated that the technology "did not work. It failed. The technology was a failure overall."

Faculty received training to teach at a distance by educational technology services staff. The training consisted of how to switch on and off the system, and how the faculty member could control the display on the screen and communicate with other sites. Faculty reported that the training was adequate and they were satisfied with the training.

All five faculty who taught at a distance were supported by a graduate assistant who worked 20 hours per week. The faculty considered the role of the assistant important; however, felt that the assistant was not appointed specifically to serve as a distance education assistant.

The assistant had no training regarding trouble-shooting technology problems. So the faculty expected additional technical support besides a TA for the distance education courses.

It can be concluded that 1) most faculty members were dissatisfied with the technology used to offer courses at a distance, 2) faculty felt that they could not balance the distance and local students simultaneously, 3) faculty received adequate training for teaching at a distance, and 4) faculty required, but did not receive, qualified technical support for teaching at a distance.

Research Question 2: Did the student-instructor and student-student interactions lead to favorable learning outcomes?

Instructor-student interactions were provided via IVC during the lecture, and by using email, telephone, and face-to-face meetings. Students chose to use email and telephone as the primary modes of communication between themselves and faculty (Table 2). Distance students reported that interactions between themselves and faculty were helpful, frequent, and consistent. Distance students attending IVC classes reported that the instructor interacted with them frequently during the class as well (Table 3).

Table 2: *Student Modes of Interaction with Faculty*

Mode	Frequency	Percent
Email	25	89.3
Telephone	25	89.3
Letters	5	17.9
Meetings	20	71.4

Student-student interactions were not formally provided in the majority of the courses. One instructor eliminated team project requirements for distance students because of the logistical difficulty in coordinating meetings. The same instructor, however, published students' email addresses, and encouraged students to interact with each other as needed. If distance students attended an IVC site they may have shared that site with others, but most often the students were alone. The need for interaction among students, both local and remote, was mixed, indicating a personal taste for interactions between students.

Table 3: *Nature of Interactions between Students and Faculty*

Question	Frequency	Percent
I contacted the instructor/professor regularly during the course		
Rarely	5	16.1
Frequently	21	67.8
Always	5	16.1
Total	31	100.0
I received regular feedback from the instructor/professor		
Frequently	13	41.9

Always	18	58.1
Total	31	100.0
The instructor interacted with the distance education students during the IVC lectures		
Never	1	4.3
Rarely	1	4.3
Frequently	9	39.1
Always	12	52.3
Total	23	100.0
Interactions between my instructor and I were helpful		
Agree	2	6.5
Strongly Agree	29	93.5
Total	31	100.0

The faculty interviews revealed three issues concerning interactions with distance students: 1) the mode of communication, 2) the frequency of communication, and 3) problems associated with communication.

Mode of communication: All of the faculty members said that they used several modes of communication to establish contact with their distance students. The most common modes were email, telephone, and personal meetings. Faculty used each mode of communication according to the purpose of the communication. "Simple and short communication could be accomplished through email. If I felt like I wanted to have a dialogue, I called them or asked them to call me" said one faculty member. Faculty members found email easy to deal with. One faculty member corresponded primarily through email. Email was preferred "due to the flexibility that the person can check it at leisure."

Phone calls were the next most important mode of communication for faculty. One faculty member reported that he preferred to talk with students and cited an example of how he prevented a student from dropping the course via conversation. Another member expressed his dissatisfaction with not being able to talk to all his students via telephone.

Three faculty members held personal meetings with the distance students as necessary when students came to campus. One member made a point of inviting students to lunch when they came to campus to get better acquainted with them.

Frequency of communication: Faculty were satisfied with the frequency of communication between themselves and their distance students. Email was the most frequently cited form of communication among faculty and ranged from daily to weekly contacts with distance students. Personal meetings and telephone contacts were more sporadic.

Problems associated with communication. Frequency of communication was a problem for two members, who wanted more communication with their students. However, one member

felt that distance students did not appreciate frequent communication. “To be honest, my feeling was distance students really didn’t want contact… and were not interested in communicating.”

Another critical issue that arose was that distance education students were at a disadvantage as they could not be in the on-campus class. One member said, “the dynamics of a classroom cannot be replicated in a distance education scenario.” Another felt that the college and faculty members should “make a commitment to do it well, or we should stop doing it.” The faculty members considered poor interaction a major stumbling block for teaching at a distance.

Anther barrier to instructor-student interaction was the fact that the instructor had to include two separated groups of students, local and remote, when teaching using IVC. One faculty member stated, “a local student asks a question and we are going on for five minutes, and then I click to the remote people and they are eating pizza, totally disengaged because we haven’t been focusing on them.”

While discussing the use of technology used for delivering distance education, two faculty members felt that the technology became a barrier to interaction with the local students. “You are bringing in this whole other dimension in the classroom, and you are brining in a whole new team of people, the technologists and the distance students. It was intimidating for my local students; they didn’t want to talk on camera or they realized that asking a question would take forever because of the delays in the system so they were extremely reticent to interact with me or the other students.” One instructor felt that the technology was very distracting to his students and it took a lot of time away from student learning. Another member had a similar experience. “All students were disappointed, the students at a distance were not happy and the students in class, I know, weren’t happy.” The faculty members felt that bothered by having to ignore the on-campus students’ needs while meeting remote students’ needs, or vice-versa, or dealing with technology failures. “I don’t want to sacrifice the education of students in class. I don’t think it is fair to them,” said one faculty member.

It can be concluded that 1) email was the most frequently used mode of communication between distance education students and their instructors, 2) faculty were regular and consistent when communicating with distance education students, 3) faculty members and students had individual preferences regarding mode and frequency of communications, 4) there were several barriers to communicating with students using distance education technologies.

Implications and Recommendations

Although the results of this evaluation study cannot be generalized past the students and instructors involved, some implications and recommendations are warranted for further practice in distance education.

As Holmberg (1995) postulated, distance students enjoyed and benefited from interactions with their instructors. Students communicated with instructors most often through

email, using asynchronous guided didactic conversation strategies. Faculty should continue this form of communication using telephone and meetings as needed by students.

As Moore (1989) hypothesized student-instructor interaction was very important to both students and instructors. Both unidirectional (websites, email, Streaming Video, Blackboard.com®) and bi-directional (email, telephone, meetings, IVC) interactions with the content and with instructors were used by students in synchronous and asynchronous modes throughout the semester. IVC and Streaming Video technologies have shown mixed success in facilitating student-instructor interactions in this case study and should be supplanted with more functional technologies in the future.

In regard to student-content interactions, students were successful in navigating their way through the technologies to meet their learning needs. Student-technology interactions were meaningful when using course websites, email, videotapes, CD-ROMS, and Blackboard.com®, but were at times dysfunctional when using Streaming Video and IVC technologies. It was encouraging to discover that the lower-cost technologies of email, telephone, videotape, and CD-ROM were satisfying to students and facilitated all types of learning, including student-content learning; thus, faculty should further develop these options when delivering courses at a distance and discontinue use of IVC and Streaming Video as they proved to be unsatisfying for both students and instructors.

Student-student interactions were not critical to the success of students in this case study and were the least important form of interaction for students. Faculty did not emphasize student-student interaction and students did not demand it. If Moore (1989) is correct in his theory, faculty should do more to encourage this form of interaction by assigning team projects to all members of the course. Chat-rooms, discussion boards, and list serves can also be used to facilitate student-student interactions.

The case study pointed to several questions for future research. Are distance education students really interested in interacting with other students enrolled in the same course? Do faculty members have enough training and expertise to modify the curriculum and methods of instructions to suit distance education needs? Does evaluation of such programs lead to an improvement in the program? Follow-up studies are warranted to document improvements in offering courses at a distance.

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Discussant's Comments, 2003 NAERC Professional Papers

Session: II H. **Discussant's Name:** Greg Miller

Paper Title: A Case Study of Interaction and Student Learning in Distance Education

Author(s): Alan D'souza, Kathleen D. Kelsey

I enjoyed reading this paper as it was well written, demonstrated appropriate use of research methods and offered appropriate implications, recommendations and questions for future research. I believe that evaluations such as this can be very helpful to faculty and administrators who are interested in program improvement. I encourage the authors to build upon this study by carrying out their own recommendations for future research.

Some details concerning the setting were not included. These details might be valuable to the reader in interpreting the results. Which southwestern land-grant university was the site of this study? Were the Master of Science in Agricultural Education and Master of Agriculture degree programs administered by the same department? Are there any other distance learning degree programs offered by this agricultural college? What were the characteristics of the faculty who were interviewed? Were the distance learners allowed to choose the technology they used to take a class? Did courses apply more than one technology? For example, did some courses feature IVC and Blackboard?

I would like to offer two suggestions. First, an overall measure of internal consistency for a questionnaire with the range of question types that you used was not appropriate. Secondly, check the research questions for consistency and make sure that each aspect of the question is addressed. For example, I found no data on student-content interaction and noticed that research question two was not consistently stated throughout the document.

I was struck by how similar the experience of this southwestern land-grant university agricultural college has been to our own at Iowa State University. Our faculty has expressed similar technological and quality concerns while distance learners express more tolerance of the shortcomings of distance education. I wonder what type of IVC technology was used by the university in question. In Iowa our IVC system is not immune to problems, but when it works, the quality of the audio and video is outstanding. I wonder if others here today have had similar experiences with distance learning programs at their own institutions. If so, has the time come to develop standards, guidelines, and or best practices for distance learning in agriculture? Is our knowledge base sufficient to offer such recommendations with the aim of providing higher quality, more reliable, and in some ways more uniform learning experiences across departments, programs, and universities?

Patterns of Engagement and Performance for Female and Male Students in an Online Course

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Abstract

The purpose of this study was to compare female and male students as they progressed through an asynchronously delivered Web-based course. Content analysis techniques were used to describe student behavior in a graduate course delivered using WebCT™. Students had 114 days to complete and submit all materials. No time constraints were placed on students as to when assignments should be submitted. Findings showed that female students engaged earlier, male students remained engaged longer, and female students completed the course sooner than male students. Male and female students' overall performance in the course as measured by accumulation of points on assignments was similar. Major recommendations include: (1) establishing early engagement activities for both females and males; (2) establishing time-goals and minimal engagement times for all students; and (3) evaluating the appropriateness and effectiveness of feedback provided by faculty on assignments.

Introduction/Theoretical Framework

Distance education offers many benefits for students and faculty. One of the touted benefits for faculty is the opportunity to develop individualized instructional sequences for students based on students' unique competencies (Dooley & Lindner, 2002). Another benefit for students is a greater opportunity to draw upon a variety of academic fields and knowledge bases to achieve personal and professional goals (Lindner & Dooley, 2002). Some literature indicates that distance education offers even more important opportunities for female students. For example, May (1994) found that women viewed distance education as a means to remove impediments to their education. She also noted that for women, access to education was more important to them than was the format of the educational opportunities.

The literature has thus far failed to identify significant differences in the nature or personality of distance learners and learners in a traditional setting. For example, in a comparison of Web-based and traditional classroom courses student temperament, or how students react to the use of

a computer as a substitute for the classroom, was not shown to affect the outcome of learning or satisfaction with the course (Stokes, 2001). Human temperament theory has been recognized as a subject for study since the time of Plato (Stokes, 2001).

On the other hand, the literature is unclear about the role that gender may play in distance learners' performance. Spronk (1990) proposed that distance learning might be a gendered activity. Instead of concern with programs for learners, she suggested that we examine how programs address the different life experiences of men and women. She speculated that the technologies of instruction might not be equally accessible to both groups. She also asked whether men and women require different levels of support while undertaking distance education courses. Sullivan (2001) justified those concerns when he found significant differences between male and female students in the way they identified an online environment strengths and weaknesses. He particularly noted the value of online learning for nontraditional students especially female adult learners who had children and family responsibilities. Additional literature indicates that gender may also be a factor in these various expectations among distance learners. Burge and Lenksyj (1990) noted that women participating in distant learning experiences required content that validated the events and happenings of their lives infused into the instructional and learning process. They noted that women living in small towns and rural environments (where distance education opportunities may be particularly important) have diverse life experiences that should be taken into consideration in distance education environments. They suggested that women are best served when the educational approach is both woman- and learner-centered.

According to Kirkup and von Prummer (1990) men and women require different levels of interaction and support during distance education classes. Women need to interact more with the instructor and other students. The authors attributed this need to differences in intellectual development between women and men. They recommend that this difference between the genders be accounted for in distance education courses.

Distance learners struggle with a unique set of challenges that often lead to non-completion of courses. High attrition rates of students enrolled in distance education courses are a concern of distance educators (Wickersham & Dooley, 2001). The literature identifies more steps that instructors can take to lower attrition in distance education courses. Instructors in Web-based courses should have a methodology to determine the level of involvement of students in the learning process (Pappas, Lederman, & Broadbent, 2001). The facilitator should look toward the initial engagement, continuous engagement, the completion of the course and the students' performance in the course as indicators of satisfaction with the method of instruction, whether the course is offered in a traditional classroom or Web-based setting. But in order to improve the completion rate, we must first understand the challenges that distance learners face and the coping behaviors that they adopt.

Online learning provides the responsible learner with both the tools and the environment for a quality learning experience (Weinstein, 2002). As researchers, we ascribed to the philosophy that self-direction and responsibility for learning are required attributes for graduate students in any

course regardless if it is taught online or in the traditional setting (Howland, & Moore, 2002). If students are not willing to make the commitment of managing their time and motivation, online learning will present them with additional problems to the ones they already have (Weinstein, 2002). Closer looks at student behaviors in distance education have shown, for instance, that distance students are less likely to constructively communicate with other students and teachers (Lindner & Murphy, 2001; Miller & Pilcher, 2000). Further, distance students have varying levels of motivation, different life experiences, and require different levels of direction from instructors (Merriam, 2001).

Educators have tried a variety of strategies in an attempt to help distance learners overcome their unique challenges successfully. Indeed, Cookson (1989) asserted that it is the responsibility of all educational institutions to provide a range of tools and experiences in order to maximize the learning of diverse student populations. While the academic rigor of courses delivered at a distance must remain similar to those offered on campus, instructional direction requirements can and should range from continuous input from instructors to self-directed learning by the students.

Distance education students requiring help may receive it in a different format than students in classroom settings (Taplin, Yum, Jegede, Fan, & Chan, 2001). It is necessary for the instructor to maintain a sense of community regardless of where the learning takes place. While this is readily accomplished in a classroom setting, it requires a little more planning and effort for Web-based courses (Brown, 2001). In short, effective learning seems to require student engagement (Kearsley & Shneiderman, 1999). Instructor behaviors alone cannot determine student success rate, however.

Another important factor to study in distance education is course design. In particular, the unique challenges faced by distance learners may be exacerbated when the course is offered asynchronously. This method of instruction and education is the result of an attempt to provide flexibility for work time and place. It usually involves the use of learning materials, discussions, written assignments, and grading results at a distance and over the Internet. For asynchronous courses, there may be definite start and completion dates or there may be a flexible beginning and end. While asynchronous courses may seem to conform to the principles of andragogy and thus have wide appeal for adult learners, the literature has not yet shown that distance learners are more successful in any particular format.

Purpose

The purpose of this study was to compare female and male students' progress through an asynchronously delivered Web-based course.

Several key questions guided the analysis of each student's progress and performance in the course:

1. When will males and females begin and end engagement in the course?

2. How long will males and females remain engaged in the course?
3. How will the males and females perform in an entirely asynchronously delivered course?

Methods

For this descriptive and historical research, content analysis techniques were used by the researchers to analyze students' engagement and achievement in a graduate course delivered asynchronously to both female and male students. "Content analysis is a technique that enables researchers to study human behavior in an indirect way, through an analysis of their communications" (Fraenkel & Wallen, 1999, p. 405). The content analysis for this study consisted of both qualitative and descriptive techniques as described by Fraenkel and Wallen.

As with any study, it is important for the researcher to establish internal validity, external validity, reliability, and objectivity. However, in the qualitative paradigm these terms are referred to as credibility, transferability, dependability, and confirmability. Credibility and dependability were established using the technique of triangulation. "Perhaps the best way to elicit the various and divergent constructions of reality that exist within the context of a study is to collect information about different events and relationships from different points of view. Different questions, different sources, and different methods should be used to focus on equivalent sets of data" (Erlandson, Harris, Skipper, & Allen, 1993, p. 31). For this study, both content analysis and semi-structured interviews provided triangulation. Generalizability attempts to apply the findings of a study to other contexts. The naturalistic researcher "does not maintain that knowledge gained from one context will have no relevance for other contexts or for the same context in another time frame. 'Transferability' across contexts may occur because of shared characteristics (Erlandson, et al., 1993, p. 32). In this study, the researchers collected engagement patterns and interview transcripts and provided sufficient detail to allow the reader to decide transferability. And finally, confirmability was established by conducting an audit trail which can be found in Table 2.

The naturalistic setting for this study was students enrolled in a graduate course entitled *Principles of Adult Education* during the Spring 2002 semester. This course was a departure from our usual design for graduate-level distance education courses. Unlike our other distance-delivered graduate course offerings that have included and even emphasized the use of synchronous delivery strategies (face to face meetings, audio and videoconferencing), this course employed only the asynchronous technologies and delivery strategies available through WebCT. WebCT is a commercial software set of Web course-development tools for creating instructional environments at a distance (WebCT, 2001). No synchronous interaction was planned or conducted.

There were 24 students enrolled in the course (16 male students and 8 female students). Students had 114 days to complete and submit all materials. January 14, 2002, was the first day students could submit assignments and May 7, 2002, was the last day. No time constraints were placed on students as to when assignments should be submitted during this time frame. The instructor

worked under the assumption that as graduate students they would take responsibility for their learning.

Students were provided the following written instructions:

> Welcome to Agricultural Education 610 “Principles of Adult Education”. This course is designed to be asynchronously delivered...meaning you can work on meeting the course objectives at any time or location. You can also work on most assignments out of sequence. For example, you may wish to work on Module 1 and 4 before working on Module 2 and 3.
>
> There are 14 course modules that you will work through over the semester. You will complete 12 assignments along the way (ALL ASSIGNMENTS MUST BE SUBMITTED THROUGH WEBCT'S ASSIGNMENT FEATURE): Four reaction papers; four argument papers; twenty online discussion postings; one student lead instruction; one learning contract; and one application project.
>
> ALL ASSIGNMENTS ARE DUE MAY 7, 2002.

The data collection instrument was based on the research questions. Four categories were used initially to classify the data: initial engagement, continuous engagement, completion of course, and performance in course. Initial engagement was defined operationally as the first day students submitted an assignment. Continuous engagement was defined operationally as the number of days between the submission of the first and last assignment, or the length of time from Initial Engagement to Course Completion. Completion of course was defined operationally as the last day students submitted an assignment. Any students who started early and finished late were still classified as continuous engagers. This was verified by our triangulation using follow-up interviews. We discovered that students were often thinking about the course even when otherwise occupied. Performance in the course was defined operationally as the percentage of points earned on each assignment and overall. Students also were grouped by one of three patterns of engagement: starts early and finishes early; starts early and finishes late; starts late and finishes late.

Additionally, nine students were interviewed by telephone or face-to-face to help the researchers gain a more thorough description of why the students engaged and performed as they did. Interviewees were selected to include at least one of each gender by level of engagement. Students were coded by gender (**M**ale or **F**emale), location (**D**istance or **C**ampus), and a number based upon when they were interviewed (1 through 9) to ensure confidentiality.

The researchers recognize the design limitations of using intact classes. Caution is warranted against transferring these findings beyond this class. Additional research is needed to support and prove the transferability of findings and recommendations to other naturalistic settings. This study is a part of a larger study examining how students engage and perform in asynchronously delivered courses.

Findings

The findings of this study were reported in four areas: initial engagement, continuous engagement, completion of course, and performance in course.

Initial Engagement

Overall students' initial engagement in the course varied widely (Min=4 days to engage; Max=113 days to engage). Students, on average, initially engaged in the course approximately 43 days (SD=39.5) after the beginning of the course. The first quartile of the students began submitting materials online within 8 days of the start of the course. The second quartile of students began submitting materials online between 12 and 21 days from the start of the course. The third quartile of students began submitting materials online between 25 and 83 days from the start of the course. The fourth quartile of students began submitting materials online between 83 and 113 days from the start of the course.

On average, female students (M=39 days to engage) tended to engage in the asynchronously delivered course more than six days sooner than male students (M=45 days to engage).

Continuous Engagement

Overall students' continuous engagement in the course varied widely (Min=1 day engaged; Max=110 days engaged). Students, on average, engaged in the course approximately 58 days (SD=32.2) after initial engagement. The first quartile of the students engaged in the course for 79 to 110 days. The second quartile of students engaged in the course for 69 and 77 days. The third quartile engaged in the course between 30 and 67 days. The fourth quartile engaged in the course between 1 and 27 days. On average, female students (M=55 days engaged) tended to engage in the asynchronously delivered course over 5 days less than male students (M=60 days engaged).

Based upon the qualitative findings, three patterns emerged in terms of continuous engagement: (1) start early and finish early; (2) start early and finish late; and (3) start late and finish late. Starting early is defined as submitting the first assignment within the first month of the course. Starting late is defined as submitting the first assignment in April of the spring semester. Finishing early is defined as submitting the last assignment by the first week in April. Finishing late is defined as submitting the last assignment by the last class day, which was May 7, 2002.

The researchers were interested in looking at gender and location in terms of engagement in an asynchronous course. Of the total students enrolled in the course, there were 11 males at a distance, 5 males on campus, 6 females at a distance, and 2 females on campus. Percentages were calculated based upon the number in each category divided by the total number of students who fit into that category (Table 1). The percentages are provided as a snapshot of the patterns of engagement. Although the number of respondents is small, in the qualitative paradigm the researchers seek a deeper understanding of phenomena in lieu of an attempt at generalization. These patterns of engagement pose interesting findings in need of further investigation.

More females started early and finished early (63% compared with 19%). All of the females on campus started early and finished early. In the category of starting early and finishing late, it is interesting that there were no females. In terms of percentages, there were more males on campus in this category than at a distance. None of the on campus students (male or female) fell into the category of starting late and finishing late. The percentage of students falling in this category was essentially the same regardless of gender.

Table 1
Patterns of Continuous Engagement (*N* = 24)

Students		#/Total	%
Start Early, Finish Early			
Males			
Distance		1/11	9.09
Campus		2/5	40.00
	Total	3/16	18.75
Females			
Distance		3/6	50.00
Campus		2/2	100.00
	Total	5/8	62.50
Start Early, Finish Late			
Males			
Distance		4/11	36.36
Campus		3/5	60.00
	Total	7/16	43.75
Females			
Distance		0/6	0.00
Campus		0/2	0.00
	Total	0/8	0.00
Start Late, Finish Late			
Males			
Distance		6/11	54.54
Campus		0/5	0.00
	Total	6/16	37.50
Females			
Distance		3/6	50.00
Campus		0/2	0.00
	Total	3/8	37.50

After establishing these three categories of continuous engagement, students were chosen by purposive sampling and interviewed to help the researchers understand more thoroughly why these students engaged as they did. Based upon these student interviews, five themes emerged: content relevancy, interaction/feedback, initial engagement, continuous engagement, and course completion (Table 2).

Table 2
Audit Trail of Themes of Engagement

Theme	Category		
	Start Early, Finish Early	Start Early, Finish Late	Start Late, Finish Late
Content Relevancy			
Usefulness & Applicability	FC5, FD6, MD8	MD1, MC2, MC3	FD4, FD7, MD9
Enhanced Self-Directedness	FC5, MD8	MD1, MC2, MC3	None
Peaked Interest in Subject	None	MC2, MC3	None
Interaction/Feedback			
Not Necessary	None	MD1	None
With Instructor	FC5, FD6, MD8	MC2, MC3	FD7
With Other Students	FC5, FD6, MD8	MC2, MC3	FD4, FD7
Initial Engagement			
Effect of Deadlines	None	MD1, MC2, MC3	FD4
Planning	FC5, FD6, MD8	MD1, MC2	FD7, MD9
Technology Challenges	FC5	MC3	None
Continuous Engagement			
Need to Finish/Goal-Oriented	MD8	MD1	MD9
Plan Time for Class	FD6, MD8	MD1	FD4
Catch Time for Class (Sporadic)	FC5	MC2, MC3	FD7
Course Completion			
Other Classes/Factors	FC5, MD8	MD1, MC2	FD4, FD7, MD9
Interaction With Other Students	FD6, MD8	MC2	None
Usefulness/Applicability	FC5	MC2	None
Deadlines	MD8	MC3	FD4, MD9

Note. F=female, M=male, C=campus, D=distance, 1 through 9=when the student was interviewed

According to Burge and Lenksyj (1990), women need course content to be relevant to events and happenings in their lives. Therefore, the first theme explored was content relevancy. Both males and females found the course content to be relevant. They specifically addressed its usefulness, applicability, enhancement of self-directedness, and ability to pique their interest in the subject matter. None of the late starters mentioned an increase in their self-directedness. Perhaps their lack of self-directedness led to their procrastination in engaging in the course. Kirkup and von Prummer (1990) contend that women tend to need to interact more with the instructor and other students. All students in our sample, except one male (MD1), found interaction with other students and interaction with the instructor to be a critical component of course engagement. In particular, student responses noted that peer accountability helped them to complete assignments and to continue to engage in the course.

Kearsley and Shneiderman (1999) indicate that effective learning requires student engagement, i.e. initial engagement, continuous engagement, and course completion. Our findings support this notion but provide interesting patterns based upon gender and location. Some mention of unfamiliarity with the technology features of this course surfaced, but this unfamiliarity did not seem to have an effect on the initial engagement of the student. A substantial finding within the theme of initial engagement is the student's perception of deadlines. None of the students who started and finished early found the deadlines to have an impact on their initial engagement. An intrinsic self-motivation, rather than an imposed external deadline, might have compelled these students to engage early. When planning time for working on course assignments, competing courses with multiple deadlines tended to have precedence, thus affecting some student's initial and continuous engagement in the course. In terms of completing the course, respondents brought up several previously mentioned themes that had an impact on their completion of the final assignment: other classes competing for time, interaction with other students, and the usefulness and applicability of the material. Although the students who started and finished late pointed out that student interaction and course usefulness/applicability were important factors in their course satisfaction, they did not state this as a motivator for course completion.

Completion of Course

Overall students' completion date in the course varied (Min= day 61; Max=day 114). Students, on average, completed the course on approximately the 101st day (SD=17.7) of the course. The first quartile of the students completed the course by the 80th day. The second quartile completed the course between the 85th and 105th day. The third quartile completed the course between the 111th and 112th day. The fourth quartile was completed on the last day (114th day). On average, female students (M=93 end date) tended to complete the asynchronously delivered course almost 12 days sooner than male students (M=105 end date).

Performance in Course

Overall student achievement for female and male students was similar. The average overall score for all students was 92.8%. Female students averaged 93.3% and male students averaged 92.6% overall in the course.

Discussion, Conclusions, and Implications

As methods of delivering courses using asynchronous delivery strategies are implemented and tested, the findings from this study may provide useful information to those teachers delivering such courses. The basic premise of self-direction allows students to engage and progress at their own chosen pace. Our study provides support for a self-paced assignment structure, at least for all asynchronously delivered courses. Further study of traditional, expository-based courses, is necessary to determine if self-paced assignments would be effective in other formats.

Furthermore, this study has implications for considering gender as a factor when establishing teaching techniques and structures. For example, we found several differences between how females and males engaged in the course. On average, females tended to engage 6 days sooner in the course than males. Females also tended to complete the course 12 days sooner than males. Procrastination, however, has yet to be clearly identified as a gender-specific personality tendency. Nevertheless, an implication exists that by not structuring early engagement activities for both females and males, differences between these groups will be magnified. It is recommended that early engagement activities for all students be established.

Students' continuous engagement in the course varied. Female students tended to engage in the course for five fewer days than males. Previous research has shown that length of engagement in an asynchronously delivered course was positively related to a student's perception of learning (Lindner, Hynes, Murphy, Dooley, & Buford, 2002). An implication exists that female students will "learn" less in an asynchronously delivered course than male students. That is, if we accurately measure learning. The qualitative research presented here reveals that while the students engaged differently in terms of length of engagement, all of the students (both male and female) mentioned the usefulness and applicability of the concepts they learned in the course.

Male students were more likely than female students to wait until near the 114th day to complete their engagement in the course. While all the students were able to complete the course in 114 days, male students tended to "back-load" submission of assignments. This resulted in male students receiving less feedback than female students. An implication exists that in asynchronously delivered courses, an instructor's traditional role of providing feedback is less important than other roles such as motivator, coach, or delegator (Grow, 1991). The qualitative research presented here refutes Grow's idea (1991). The interviewed students noted the importance of the feedback from not only the instructor but also from their peers. It is recommended that methods for instructor feedback and student interaction be provided in an asynchronously delivered course.

Male and female students performed equally well on assignments. This finding is consistent with the literature on gender as a factor in learning in traditional settings. In a traditional classroom setting, Justice and Dornan (2001), found achievement to be the same for males and females.

The authors recognize the limitations of the study and advise caution in the application of these results. Our research did not examine the potential impact of such factors as academic load, involvement in non-academic activities, family responsibilities, and/or work obligations, any and all of which, could affect our results. It is recommended future research examine the factors

affecting success in distance education. Our study found that male and female students approach and engage in distance education differently. Nevertheless, their performance does not appear to be affected by these differences in behavior. The reasons for gender's lack of impact on performance have not been determined. One may speculate, as did Carr, Fullerton, Severino, and McHugh (1996), that women who successfully completed distance education courses develop resilience in the face of adversity. On the other hand, women's strategies for learning in distance education courses may be more appropriate than men's, and thus, female students have an advantage over their male counterparts in such nontraditional environments. These are questions we will continue to explore and welcome those willing to work with us.

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Discussant's Comments, 2003 NAERC Professional Papers

Session: II H. **Discussant's Name:** Greg Miller

Paper Title: Patterns of Engagement and Performance for Female and Male Students in an Online Course

Author(s): James W. Hynes, James R. Lindner, Kim E. Dooley, Jackie E. Price

I assume that this study was conducted at Texas A&M University and perhaps involved a course taught by one or more of the authors. If my assumption is correct, I applaud the authors for engaging in research that may help them to improve their own course. I also believe that we can use this study to help us decide what should or should not be included on a list of best practices for online courses. This paper raises many questions for me. Perhaps others will have similar questions. In any case, I am confident that the authors can answer the questions and as a result help us to better understand this study.

What is this study really about? Your research questions focus on male and female students' engagement patterns, but it seems to be more of an experiment to determine what happens when faculty do not motivate students to become engaged in a course. Not surprisingly students procrastinate without such motivation and one student waited until the day before everything was due to become engaged. Some aspects of the paper are particularly confusing. What is the value of online discussion postings and student led instruction in a course that allows postponing engagement until the last day of class? About 25% of students had already completed the course before another 25% had even started. Why was the course set up in this manner? You cite related literature that attributes effective learning to engagement? Interestingly, your findings show high levels of achievement in the course and you note that this "study provides support for a self-paced assignment structure". In the very next paragraph, however, you recommend "that early engagement activities for all students be established".

You defined continuous engagement "as the number of days between the submission of the first and last assignment". You say that your findings support Kearsley and Shneiderman's (1999) assertion that "effective learning requires student engagement" including continuous engagement. How can this be? Kearsley and Shneiderman's concept of engagement is very different from your own. They write that "the fundamental idea underlying engagement theory is that students must be meaningfully engaged in learning activities through interaction with others and worthwhile tasks." Your definition makes no provision for meaningful engagement and interaction with others.

Can you tell us whether performance differences were observed by engagement pattern? How did the student who was engaged for one day perform?

Practices, Capacity, Motivation, and Barriers in Distance Education in Agricultural Education Departments

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Abstract

Distance education has become commonplace on many university campuses throughout the United States. Anecdotal evidence would suggest that distance education has also become commonplace in a few agricultural education departments as well. However, little is empirically known about the use of distance education within agricultural education departments. The purpose of this study was to obtain baseline data for distance education activities in agricultural education departments and programs at higher education institutions. A census of the department chairs or programs leaders was used to gather data using a bimodal data collection method. An 82% response rate was achieved. Results indicated that over two-thirds of the agricultural education departments offered distance education courses. Course management software was the technology used most by the departments to deliver courses, closely followed by the Internet. The most frequent academic level of distance education courses offered from agricultural education departments was graduate courses. The average department had just over three faculty members who taught distance education courses. The biggest motivating factor for agricultural education faculty to teach distance education courses was to provide better service to their clientele. The overwhelming barrier to distance education in agricultural education departments was time constraints of faculty members.

Introduction and Theoretical Framework

Department chairs, program leaders, and other administrators are routinely asked to make decisions regarding the curriculum of their respective programs. One such decision is the format in which to deliver courses. Two of the most popular options include traditional on-campus face-to-face courses and off-campus distance education courses. Although administrators have a great deal of knowledge about their respective programs, learning about distance education practices from other agricultural education departments or programs is often more of a challenge. With a clear perspective of the national picture of distance education within agricultural education programs, more informed decisions could be made. Moreover, this national picture also has implications toward better meeting the needs of constituents including the credentialing of teachers.

Distance education has become commonplace on many university campuses. In 1998, over 54% of all higher education institutions either offered, or planned to offer, distance education courses (Lewis, Snow, Farris, Levin, & Greene, 2000). Additionally, nearly 10% of all college students in the United States have taken off-campus distance education courses (Sikora, 2002). Countless more students have taken near-distance or hybrid distance courses.

Anecdotal evidence would suggest that distance delivery of courses has also become commonplace in several agricultural education departments as well. The Doc @ Distance program jointly offered by Texas A & M University and Texas Tech University, and the

consortium of agricultural education departments that jointly offer online courses and programs through North Carolina State University are examples of cooperative distance education programs. In addition to these, several other agricultural education departments are offering students the opportunity to complete courses via distance education technology.

A considerable amount of research has been conducted in the many aspects of distance education. For example, we know that students who enroll in distance education courses are typically older than students who enroll in traditional on-campus courses (Miller, 1992; Miller & Honeyman, 1993), and that age is a significant determinant of success (Berg, 2001; Brouard, 1996). Likewise, it has been reported that there is no difference in student achievement between on-campus and off-campus courses (Russell, 1999). It has also been established in the literature base that students in distance education courses usually have higher academic standing (i.e., graduate students) (Miller & Honeyman, 1993), but that academic standing does not affect student perceptions of web-based instruction (Lim, 2001). However, Miller (1992) reported that academic standing does affect student motivational factors.

The effects of gender are inconclusive on student achievement in distance delivered courses. Oxford, Park-Oh, Ito, and Sumrall (1993) reported that gender was influential in predicting student success in a distance course. Blum (1999) found that male students had fewer barriers to achievement in a web-based course, which led to an inequitable learning environment in favor of male students. However, Lim (2001) and Ory (1997) reported that gender was not a significant variable in their studies.

The effects of learning styles on student achievement in distance education courses are also inconclusive. Several studies have reported no differences in achievement in distance-delivered courses (Day, Raven, & Newman, 1998; Freeman, 1995; Shih & Gamon, 2001). Miller (1997) reported very similar strategies used by all learning styles. However, other studies have reported differences (Daniel, 1999; Kranc, 1997; Loomis, 2000; Oxford et al., 1993).

Several studies point to student characteristics as indicators of success in a distance-delivered course. Student efficacy and motivation to succeed have been identified by several researchers as key to success in distance courses (Berg, 2001; Lim 2001; Mauldin, 2001; B.E. Miller, 1992; G. Miller, 1995; Miller & Honeyman, 1993; Shih & Gamon, 2001; Oxford et al., 1993; Zalenski, 2001).

In examining distance education within agricultural education departments, four components are of interest. These include the distance education practices of these departments, faculty related variables, motivating factors for teaching distance education courses, and barriers to distance education. The research base is deficient in studies that examined agricultural education departments specifically. As such, studies of other academic disciplines were consulted to build a theoretical framework for this study.

In a study of department chairs perceptions throughout colleges of agriculture, Bowen and Thompson (1995) reported that department chairs were interested in proving better service to their students by subscribing to distance courses offered by nationally renowned experts, or by subscribing to courses that they would have been unable to offer due to low enrollment.

Department chairs were least interested in offering multi-course programs by distance education. Responses also indicated a relatively high amount of support from their respective colleges towards distance education; however, additional funding from the colleges did not accompany that support for most of the departments. Most of the department chairs also supported faculty receiving promotion and tenure credit for teaching distance education courses. A concern indicated by the department chairs was that faculty members needed additional training to teach distance education courses.

Murphy and Terry (1998) concluded that substantial support was needed for faculty members to adopt distance education technologies. This study also indicated that faculty members generally perceived that they had a lack of competence in using distance education technologies, and that they did not have access to training or assistance. Faculty members also felt that they did not have access to the necessary equipment and facilities. Additionally, faculty members did not feel that the time and effort required to develop a distance education course was valued.

In a study of American Distance Education Consortium (ADEC) members, Roberts, Irani, Lundy, and Telg (2003) reported that the majority of the institutions were delivering distance education courses to both undergraduate and graduate students. The technology used most frequently to deliver distance education courses was course management software, followed by interactive video conferencing, and then the Internet. The least used technology was videotapes.

Jackson and Bowen (1993) identified six incentives that would motivate faculty members to teach distance education courses. These included recognition, additional funding, provide a better service by reaching more people, widespread demand, adequate staff support, and enough time. Inadequate funding and lack of faculty time were identified as barriers.

Murphrey and Dooley (2000) conducted a qualitative study to determine the strengths, weaknesses, opportunities, and threats to the diffusion of distance education in a college of agriculture. As strengths, the researchers reported the ability to reach new audiences and administrative support. Reaching non-traditional students was identified as an opportunity. Weaknesses were identified as limited incentives to develop and teach distance education courses and lack of skill or expertise related to distance education. Based on the findings of this study, the researchers recommended that administrative support, faculty training, and incentives be provided to help diffuse distance education within this college.

The limited literature base provides some understanding of distance education practices, faculty related variables, motivating factors for teaching distance education courses, and barriers to distance education within colleges of agriculture. However, little is known about distance education within agricultural education departments or programs.

Purpose/Objectives

The purpose of this study was to obtain baseline data for distance education activities in agricultural education departments and programs at higher education institutions. In doing so, four objectives guided this study.

1. *Describe the current distance education practices of agricultural education departments.*
2. Describe the capacity of agricultural education faculty related to distance education.
3. Describe motivational factors for faculty to teach distance courses in agricultural education departments
4. Describe the barriers to distance education in agricultural education departments.

Methods/Procedures

Data was collected for this study using a researcher-developed instrument. The instrument contained 19 descriptive items, two rating scale items (1 = Low…5 = High), and two open-ended questions. The instrument was checked for face and content validity by a panel of experts from the Department of Agricultural Education and Communication at a southern land grant institution. Reliability was not an issue on this instrument due to the nature of questions that comprised the instrument. Because questions had "an accurate, ready-made answer", the questions did not elicit demands for considerable time, thought, nor variation and therefore posed no reliability risks (Dillman, 2000).

The questionnaire was administered using a mixed mode method that consisted of a web-based form, and then followed by a paper version. Both methods followed procedures outlined by Dillman (2000). Brashears, Bullock, and Akers (2003) reported that using a bimodal data collection method has proven to be an effective, cost-controlling alternative to traditional mailed surveys.

The population for this study was all university agricultural education departments and/or programs as listed in the *AAAE Directory of University Faculty in Agricultural Education* (Dyer, 2002). The contact person chosen for each department was the department chair or program leader (n = 88), as identified in the AAAE directory. Given the small number of departments, a census of the population was used. Six participants responded that their university no longer has an agricultural education program and were dropped from the study, which adjusted the number of departments to 82. Usable responses were received from 67 departments for an 82% response rate. This study was descriptive in nature, so inferences were not attempted. Therefore, non-response error was not deemed to be an issue.

Quantitative data was analyzed using SPSS. Frequencies and percentages were reported for nominal data. Rating scale items were treated as interval data and reported using means and standard deviations. Qualitative data was analyzed using a constant comparative method to group similar items (Glaser & Strauss, 1967). Each response was compared with the others and either placed into a category with similar responses or used to begin a new category.

Results/Findings

The first objective of this study sought to describe the current distance education practices of agricultural education departments. In doing so, an appropriate starting point was to examine the number of courses offered by each department. Twenty-five departments (37%) offered no distance education courses during the twelve months preceding this study (see Table 1).

Table 1
Distance Education Courses Offered in the Previous 12 Months

Number of Courses	Number of Departments	%
0	25	37.3
1 to 5	24	35.8
6 to 10	13	19.4
11 or greater	5	7.5

Twenty-four departments (35%) offered between one and five courses, 13 departments (19%) offered 6 to 10 courses, and five offered 11 or more courses. Of the departments that offered distance education courses, the number of students enrolled in distance education courses ranged from 4 to 260, with a mean of 62 students.

Department chairs and program leaders generally have considerable impact on the course offerings within their departments or programs. As such, to further examine the distance education practices of agricultural education departments, the perceptions of department chairs concerning the needs and support for distance education were studied. Of the departments that offered distance education courses, the perceived need or demand for distance education courses was moderately high (M = 3.83, SD = .95) (see Table 2). The overall perceived need or demand for distance education was slightly lower (M = 3.32, SD = 1.32). Similarly, of the departments that offered distance education courses, the perceived support from their college was average (M = 3.24, SD = 1.02), while the overall perceived support for distance education was lower (M = 3.08, SD = 1.14). Another aspect of support for distance education is funding distance education course and programs. A total of 26% of the department chairs (n = 11) indicated that they received additional funding for these courses and programs.

Table 2
Department Chair Perceptions of Need and Support for Distance Education

	Departments Offering Distance Courses		All Departments	
Item	*M*	*SD*	*M*	*SD*
The Need or Demand for Distance Education	3.83	.95	3.32	1.32
Support for Distance Education From College	3.24	1.02	3.08	1.14

Note. A five point Likert-type scale was used (1 = Low…5 = High).

To gain a better understanding the audiences of agricultural education distance education courses, the academic levels of the courses offered were examined (see Table 3). Of the departments who offered distance courses, 66% (n = 28) offered courses at the undergraduate level, 83% (n = 35) offered courses at the graduate level, and 28% (n = 12) offered in-service training programs.

Table 3
Academic Level of Distance Courses Offered by Agricultural Education Departments

Academic Level	Number of Departments	%
Undergraduate	28	66.67
Graduate	35	83.33
Inservice Training	12	28.57

Further data were collected to determine the occupation of the primary audience of students who enrolled in distance education courses offered by agricultural education departments. Of the departments that offered distance education courses, 23% (n = 10) indicated that their students were primarily agriculture teachers (see Table 4). Another 10 department chairs indicated that their students were primarily full time students. Sixteen percent (n = 7) specified that extension agents were their primary students and another three department chairs (7%) indicated that their students were primarily from business and industry. Six department chairs (14%) indicated that their distance student population was varied enough to prohibit clearly indicating which of the previous occupations represented the majority of their students.

Table 4
Primary Occupations of Students Enrolled in Distance Courses

Occupation	Number of Departments	%
Agriculture Teachers	10	23.81
Full Time Students (Undergraduate and Graduate)	10	23.81
Extension Agents	7	16.67
Business and Industry	3	7.14
A Combination of the Above	6	14.29

Describing the distance education practices of agricultural education departments also necessitated examining the types of technology used to deliver distance education courses. Of the departments that offered distance education courses, the technology most utilized was course management software (such as WebCT and Blackboard). Twenty-nine departments (69%) used some type of course management software (see Table 5). Twenty-three departments (54%) used the Internet or World Wide Web and 20 (47%) used interactive video conferencing. Videotapes and compact discs were the least used technology, utilized by only eleven departments (26%).

The second objective of this study was to describe the capacity of agricultural education faculty related to distance education. Of the departments that offered distance education courses, the number of faculty that taught distance courses ranged from 1 to 12 (M = 3.62, SD = 2.56). Of these departments, seven (16%) had faculty that were dedicated strictly to distance education.

This included five departments with one faculty member, one department with two faculty members, and one department with five faculty members.

Table 5
Distance Technologies Used in Courses Delivered by Agricultural Education Departments

Type of Technology	Number of Departments	%
Course Management Software (e.g. WebCT)	29	69.05
Internet/World Wide Web	23	54.76
Interactive Video Conferencing	20	47.62
Videotapes or CDs	11	26.19

The support given to faculty members that teach distance education courses is also a component of faculty capacity. Of the departments that offered distance education courses, 85% of the department chairs (n = 36) responded that their faculty members have access to training related to distance education (see Table 6).

Table 6
Support to Individual Faculty for Developing and Teaching Distance Courses

Support Item	Number of Departments	%
Access to Training	36	85.71
TA/Graduate Assistants	14	33.33
Additional Compensation for Teaching Courses	11	26.19
Staff Support	9	21.43
Additional Compensation for Developing Courses	7	16.67

Fourteen departments (33%) had faculty members that received either teaching or graduate assistants to help with distance education courses. Eleven department chairs (26%) indicated that faculty members receive additional compensation for teaching distance courses, while only seven departments (16%) compensated faculty for developing courses. Nine departments (21%) provided additional staff support to faculty members that teach distance education courses.

Faculty members in agricultural education departments serve several roles in relation to distance education (Table 7). Of the departments that offered distance education courses, 93% (n = 39) have faculty members that serve as distance education instructors, 36% (n = 15) serve as researchers, 30% (n = 13) train other faculty on distance education issues, and 30% (n = 13) serve as consultants.

Teaching, researching, training, and consulting require time from faculty members. Nineteen department chairs (45%) indicated that distance education activities were part of the normal workload for faculty members (see Table 8). Seven departments (17%) consider distance education activities as an additional workload for faculty members. Fifteen departments (36%) have distance education activities that are both part of a regular and an additional workload.

Table 7
Distance Education Roles of Agricultural Education Faculty

Role	Number of Departments	%
Instructor	39	92.86
Researcher	15	35.71
Faculty Training	13	30.95
Consultants	13	30.95

Table 8
Agricultural Education Faculty Workload for Distance Education Activities

Faculty Workload	Number of Departments	%
Regular Workload	19	45.24
Additional Workload	7	16.67
Both Normal and Additional Workload	15	35.71

The third objective of the study sought to describe motivational factors for faculty to teach distance courses in agricultural education departments (see Table 9). Of the departments that offered distance education courses, 13 department chairs (30%) indicated that faculty are motivated by the ability to provide better service to their students. Increasing student enrollment was a motivating factor for faculty in an additional three departments (7%).

Table 9
Factors that Motivate Agricultural Education Faculty to Teach Distance Education Courses

Factor	*f*	%
Provide Better Service	13	30.95
Financial Compensation (Individual or Departmental)	10	23.81
Involvement in a Future/Innovative Educational Experience	6	14.29
Intrinsic	4	9.52
Recognition	4	9.52
Distance Education is a Normal/Routine Activity	4	9.52
Increase Enrollment	3	7.14
Favorable on Faculty Evaluations	2	4.76
Extra Support to Faculty	2	4.76

In ten departments (23%) chairs indicated that financial incentives, either to the individual faculty member or the department, were a motivating factor. Six department chairs (14%) reported that faculty members are motivated by the opportunity to be involved in a futuristic or innovative educational practice. Four department chairs (9%) indicated that faculty members are motivated intrinsically to teach distance courses, while another four said that faculty teach distance courses for recognition. An additional two department chairs (4%) indicated that faculty members who teach distance courses are looked upon favorably during faculty evaluations. Two department chairs (4%) reported that receiving additional support staff was a motivating factor for faculty members to teach distance education courses. In four

departments (9%) teaching courses via distance delivery was described as part of the normal duties and thus extra motivation was unneeded.

The fourth objective of this study sought to describe the barriers to distance education in agricultural education departments. Of the 67 department chairs that contributed to this study, 34 (50%) conveyed that time constraints of faculty members is a barrier to distance education (see Table 10). Nineteen department chairs (28%) indicated that the costs of implementing distance education or the lack of funding was a barrier. Similarly, equipment limitations were reported as a barrier in 13 departments (19%). Eleven department chairs (16%) listed a deficiency in technical knowledge about distance education or a lack of technical support as a limitation. Four department chairs (5%) indicated that lack of sufficient demand for distance education was a hindrance, while four chairs (5%) also conveyed that a lack of faculty recognition was also an obstacle for distance education. Pedagogical concerns were an impediment to distance education for three departments (4%). Additionally, administrative issues were a barrier for three departments.

Table 10
Barriers to Distance Education in Agricultural Education Departments

Barrier	*f*	*%*
Time Constraints of Faculty	34	50.75
Costs/Lack of Funding	19	28.36
Equipment Limitations	13	19.40
Technical Knowledge/Technical Support	11	16.42
Demand for Distance Education	4	5.97
Lack of Recognition for Faculty	4	5.97
Pedagogical Concerns	3	4.48
Administrative Issues	3	4.48

Conclusions

Based on the objectives of this study, the following conclusions were drawn. Demand for distance education courses is moderately high; however, support from colleges in the form of monetary assistance, time allotments for developing and teaching distance-delivered courses, and technical support appear to be lower. This conclusion stands in contrast with that of Bowen and Thompson (1995), which conveyed a higher degree of support from the college administration. Over two-thirds of the agricultural education departments offered distance education courses, with an average of 62 distance students at each department, although the range varied from four to 260 students. The majority of the departments offering distance education courses had less than five courses taught via distance delivery. This was consistent with the findings of Bowen and Thompson (1995), who reported that department chairs were not interested in offering extensive distance education programs. In this study, only five departments offered 11 or more distance education courses.

Course management software is the technology used most often by departments to deliver courses, closely followed by the Internet. This finding concurs with the results reported by

Roberts et al. (2003). Other lesser-used technologies included video conferencing and videotapes or compact discs.

The most frequent academic level of distance education courses offered from agricultural education departments was graduate courses. To a lesser extent, courses were offered to undergraduate students. Some were also used for delivering inservice training. This finding differs slightly from the audiences reported by Roberts et al. (2003). Agriculture teachers and full time students were the primary occupations of distance education students. However, extension agents and business and industry professionals were also enrolled in agricultural education distance education courses.

The typical agricultural education department offering distance education courses has just over three faculty members who teach less than five distance education courses per year. Very few departments have faculty members that are solely dedicated to distance education. The most common role of agricultural education faculty related to distance education is that of instructor. To a lesser extent, faculty members served as researchers, faculty trainers, and consultants.

Distance education activities are often considered to be a part of the normal workload of faculty members. However, some departments consider distance education activities as additional workload and compensate faculty extra for developing and/or teaching these courses. The distance education support item most often available to faculty members was access to training. This finding contrasts the findings of Murphy and Terry (1998), who reported only limited training access. To a much lesser extent, faculty members had graduate assistants, staff support, and additional compensation.

Faculty are motivated to teach distance education courses for a variety of reasons, including to provide better service to their clientele, financial compensation for either the individual faculty member or the department, being involved in an innovative/futuristic educational practice, intrinsic motivation, recognition, part of the normal duties, increase enrollment, favorable on faculty evaluations, and extra staff support. These findings are consistent with those of Murphrey and Dooley (2000) and Jackson and Bowen (1993).

The largest barrier to distance education in agricultural education departments appears to be the time constraints of faculty members. This finding supports a decade-old study by Jackson and Bowen (1993), indicating that this problem still remains unsolved. Additional barriers included costs and equipment limitations, lack of technical knowledge or support, lack of demand, lack of recognition for faculty, pedagogical concerns, and administrative issues. Murphrey and Dooley (2000) also identified several of these barriers.

Implications/Recommendations

Distance delivery of courses has become commonplace in almost every agricultural education department in the United States, although not to the same level in all departments. Given that the moderately high demand for these courses indicated by department chairs or program leader, it is recommended that departments that do not currently offer distance education courses explore the possibility of doing so – or the possibility of collaborating with

other departments that do. This should enable better service to clients and enhance the ability to reach more students. The very nature of distance education creates enhanced potential for joint efforts among agricultural education departments. This concept may be particularly valuable to smaller departments that do not have sufficient resources to offer a complete distance education program. Cooperative distance education programs can serve as models for other departments that wish to offer similar programs.

Providing additional compensation and recognizing faculty for distance education activities are motivating factors for faculty. It seems appropriate that faculty members teach distance education courses, and that a reward system be devised. However, it is also recognized that time demands on faculty are a limiting factor and thus a barrier to all faculty having an opportunity to participate. Additionally, lack of faculty expertise and insufficient knowledge about distance education are also barriers. Therefore, if adequate time and training are not available, departments may resist offering distance education courses. Distance delivery tends to make average instructors look poor. Proper training and assistance must be provided if distance delivery of courses is to be successful and beneficial to both the institution and the clients served.

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Discussant's Comments, 2003 NAERC Professional Papers

Session: II H. **Discussant's Name:** Greg Miller

Paper Title: Practices, Capacity, Motivation, and Barriers in Distance Education in Agricultural Education Departments

Author(s): T. Grady Roberts, James E. Dyer

This study was very nicely done. The authors had a clear purpose, utilized appropriate methods, and presented the paper in a highly organized manner. This paper is valuable to the profession because it will allow individual programs of agricultural education to compare themselves with national norms related to key distance education issues.

I have a couple of questions for the authors even though they extend beyond the focus of this study. First, was participation in distance education by agricultural education programs a function of program size? Twenty five departments offered no courses. Did these departments tend to be smaller than those who did offer distance education courses? Secondly, do you have any data on the extent to which departments were offering degree programs in addition to courses?

For me, this study raises several questions. Is it important that all agricultural education programs offer distance education courses or collaborate with those who do? Are we sure that this will lead to better service for our clientele? Collaboration seems like a reasonable thing to do with distance education technologies, but what should be the purpose of our collaborative efforts? Should we focus primarily on graduate, undergraduate, or inservice education? Are there any limits to the types of courses or programs that we would be willing to offer through distance education? For example, would it be appropriate to develop an undergraduate teacher education program delivered entirely on-line? At what level (e.g. national, regional, state) should we be collaborating? What administrative, technological, and pedagogical issues must be addressed in order for our collaboration to be worthwhile?

This study clearly shows that agricultural education programs are extensively involved in distance education. As we move forward, I believe that the most important questions that we must address are philosophical rather than logistical and technological in nature.

Agricultural Literacy Assessment of Selected Oklahoma High School Seniors

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Abstract

In 1988, the National Research Council recognized agricultural literacy as a need for every K-12 student (NRC, 1988). The Food and Fiber Systems Literacy (FFSL) Framework was designed to provide themes, standards, and benchmarks to guide the assessment of agricultural literacy at every grade level. The purpose of this criterion group ex-post facto study was to assess the agricultural literacy of selected agricultural education and general education high school seniors in Oklahoma. An instrument based on the FFSL Framework was developed to assess agricultural literacy of students in grades 9-12. Six schools, two in each of three locations (urban, suburban, and rural) were selected for inclusion in the study. Comparisons were made between general education students and agricultural education students, between the three types of schools according to overall mean scores and between the five FFSL agricultural themes. Agricultural education students and general education students did not differ in their overall mean agricultural knowledge scores. However, when themes were analyzed general education students did score significantly lower than agricultural education students in theme four, Business & Economics. Students in rural schools obtained lower overall mean agricultural knowledge scores than did students in urban and suburban schools. Rural schools scored lowest in three of the five thematic areas of agriculture: Science & Environment; Business & Economics; and Food, Nutrition & Health. Using the FFSL-based instrument for grades 9-12 as a diagnostic tool for assessing agricultural literacy in high schools, and given the overall low agricultural knowledge scores, it was determined that program completers (high school seniors) who participated in the study were not agriculturally literate, and students enrolled in rural schools less knowledgeable about agriculture than those attending urban or suburban schools.

Introduction

In a democratic society whose people must elect officials to enact policy which will guide the many aspects of their lives, literacy of various forms has been of concern to the American public. The very first law on public education in America addressed the need for reading literacy among the common people (The Code of 1650) in order to provide the "citizen-run" republic with an informed citizenry. In recent years, an emphasis on cultural literacy (Hirsch, 1988) and political literacy (Osler, 1999) further supported the concept that to hold a participatory role in society a knowledgeable electorate was needed to ensure that legitimate lawmakers are in place and appropriate laws enacted.

The National Research Council (NRC, 1988) indicated that agriculture was also "…too important a topic to be taught only to a relatively small percentage of students" (p. 1). The committee recommended "…all students should receive at least some systematic instruction

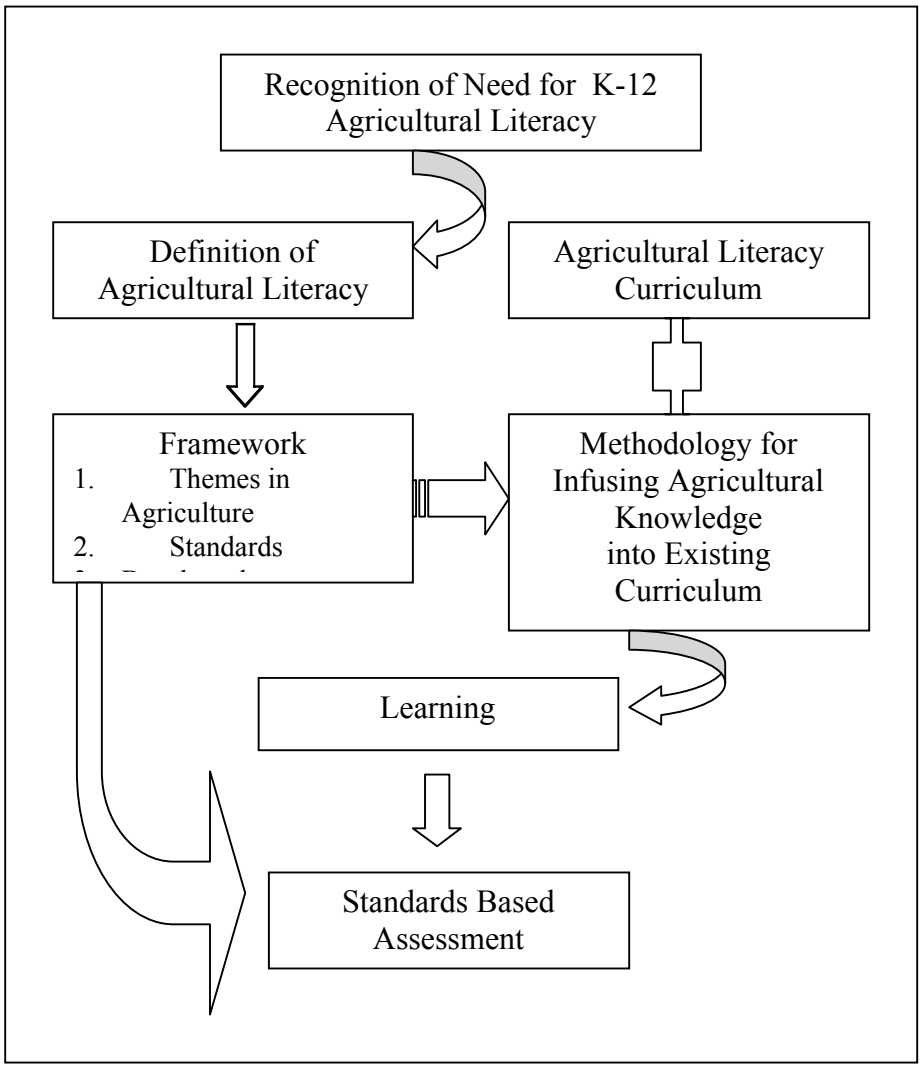
about agriculture beginning in kindergarten or first grade and continuing through twelfth grade" (p.10).

Fourteen years after the NRC report (1988) first called for efforts in K-12 agricultural literacy, the following questions still needed to be addressed: Are senior high school students, having completed the K-12 public school curriculum, agriculturally literate? Have the literacy efforts in agricultural education been successful?

Theoretical/Conceptual Framework

Laying a foundation for a conceptual model (Figure 1), the Committee on Agricultural Education in Secondary Schools (NRC, 1988) began to develop the idea of "agricultural literacy" and proposed that an agriculturally literate person would understand the food and fiber system in relation to its history, economic, social, and environmental significance. Later, Frick (1990) reported one of the first conclusive agricultural literacy definitions: "Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system... An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p.52).

Figure 1. Conceptual Model of the Food & Fiber Systems Literacy Framework role in the development of agricultural literacy curriculum and assessment. (Leising, Pense and Portillo, 2003, p. 4).



Nunnery (1996) later proposed the development of a literacy framework for understanding agriculture's perspectives and viewpoints. Leising and Zilbert (1994) approached agricultural literacy from the same angle and developed a systematic curriculum framework identifying what students should know or be able to do. The

Food and Fiber Systems Literacy (FFSL) Framework outlined what an agriculturally literate high school graduate should comprehend. By providing progressive standards in five thematic areas of agriculture, the FFSL framework delineated the necessary components of a theoretical framework for understanding the way food and fiber systems relate to daily life. Breaking the standards into grade-grouped benchmarks (K-1, 2-3, 4-5, 6-8, 9-12), the framework provided a systematic means of addressing agricultural literacy.

Case studies by Igo, Leising and Frick (1999) found that K-8 education about agriculture could be infused into core academic learning. They also found that the FFSL Framework's standards and benchmarks were effective for assessing elementary students' knowledge about agriculture.

This study employed the FFSL Framework standards and benchmarks to develop an instrument for assessing grades 9-12 agricultural literacy. An ex-post facto design was used in assessing the agricultural literacy of 12th grade students in Oklahoma high schools in order to understand whether literacy efforts in agriculture for this population were effective over the course of each student's 12 years in public school.

Purpose and Objectives

The purpose of this study was to assess the food and fiber systems knowledge of twelfth grade students in Oklahoma prior to graduation. The specific objectives were:

1. Assess whether the *General Education student population* and the *Agricultural Education student population* are agriculturally literate in twelfth grade.

2. Determine strengths and weaknesses of agricultural knowledge for the *General Education student population* and the *Agricultural Education student population* using the five thematic areas of food and fiber identified in the FFSL Framework.

3. Compare/contrast *agricultural education students* and *general education students* by agricultural knowledge scores.

Methods and Procedures

The methodology for this study was a criterion group ex post facto research design. This method is appropriate when the variables being studied are not manipulated; but rather, studied as they exist in the situation (Wiersma, 1995). Babbie (1986) states that ex post facto is appropriate when attempting to determine cause and effect relationships between events that have already occurred. Wiersma (1995) further explains that ex post facto designs are appropriate for attempting to explain relationships and effects occurring between the variables.

Population

To determine similarities and differences, two student groups were studied: students majoring in General Education (defined as those students who had not taken any agricultural education courses) and students majoring in Agricultural Education (those students who had taken three or more semesters of coursework in agricultural education).

The population of the study included agricultural education students and general education students from six high schools in the state of Oklahoma who expected to graduate in spring, 2002 (public school program completers). The population size was 300; fifty students from each of the six schools. As random sampling was not feasible given the unique characteristics of each school, the availability of subjects in intact groups, and the large number of classes and schools; the study employed a purposive sample (Wiersma, 1995). Worthen, Sanders and Fitzpatrick (1997) employ the term "judgement sampling" (p.359), the strength of which is found in describing a subgroup, thus permitting a better understanding of the program as a whole.

The purposive sample also incorporated a cross-section of senior students in three different types of secondary schools in Oklahoma; urban, suburban and rural. Two schools of each type were selected in order to provide an adequate number of Agricultural Education students in the population. The population included approximately 40 General Education seniors and all Agricultural Education seniors at each site. Intact groups of students representing diverse academic ability, both genders, and all present ethnicities were selected. The final population totaled 330 students.

Instrumentation

A review of the literature revealed that there were no instruments based on an agricultural literacy framework that could be used to assess grades 9-12. Therefore, the researcher, in collaboration with others, developed an instrument based on the grades 9-12 benchmarks of the FFSL Framework. Instruments based on the FFSL Framework used to measure student knowledge about agriculture in grades K-8 provided guidance for the instrument development process.

To ensure questions were valid, the researcher employed three methods to generate and validate the test questions used to assess agricultural knowledge. First, each item was referenced to one of five thematic areas of agriculture in the Food and Fiber Systems Literacy Framework, and the grade level grouping 9-12 standards and benchmarks of the Framework. By employing a method of criterion referencing, a "representative sample of items was established from a well defined domain of behavior in order to be valid" (Center for the Study of Evaluation, 1979, p. 10).

Second, a panel of six credentialed Agricultural Education teachers agreed to serve on the test development panel to write the items. Adkins-Wood (1960) underscores the need for item writers to possess several important qualities to increase content validity, including a thorough

knowledge of the subject matter, an intimate understanding of specific teaching objectives, and a facility in the clear and economical use of language.

Third, the questions were validated by a panel of secondary school teachers of various disciplines to ensure that each item addressed its corresponding FFSL benchmark content, the content was grade-level appropriate, and each item was language appropriate.

The instrument underwent considerable revision and was written in a format that would be consistent with a criterion-referenced knowledge achievement test. Gronlund (1998) points out that multiple-choice items are most widely used for measuring knowledge, comprehension and application outcomes. In addition, a broad sample of achievement could be measured, incorrect alternatives could provide diagnostic information, and scoring would be easy, objective and reliable. The test was also scrutinized to ensure that each item was written according to rules established for multiple-choice items (Gronlund, 1998).

Pilot Testing and Item Revision

Two pilot tests were undertaken, the first conducted on May 15, 2001 with 17 senior students in an intact English IV class at Yale Senior High School, in Yale, Oklahoma. The instrument was then reviewed again a second and third time, deleting or revising questions based upon the input from the students and the indices indicating difficulty and discrimination from an item analysis of the pilot test (Wiersma & Jurs, 1990). The second and final pilot test with twenty senior high school students was conducted in the U.S. Government class at Glencoe High School on September 4, 2001.

Reliability of the Criterion-Referenced Test

Acknowledging that the instrument was criterion-referenced with five thematic areas in agriculture and that the instrument was less homogenous, a reliability coefficient of 0.846 was computed for the first pilot test using the Kuder/Richardson-20 (KR-20) Method, while the second and final pilot test yielded a reliability coefficient of .933 (see Table 1).

Table 1.
Reliability Coefficients and Indices of Difficulty and Discrimination for Each of the Two Pilot Tests

Test Site	Reliability	Difficulty	Discrimination
Yale H.S.	0.846	72.511	0.200
Glencoe H.S.	0.933	58.200	0.325

While a computed estimate of the reliability is deemed by some as better estimates of the test's adequacy than a researcher's subjective impressions, there is clear disagreement in the literature as to whether reliability coefficients should be computed for criterion-referenced tests. Wiersma & Jurs (1990) provide eight general factors through which a researcher may enhance the reliability of an instrument and the researchers sought to address each of the following during

instrument development: homogeneous items, discriminating items, enough items, high-quality copying and format, clear directions to the student, a controlled setting, motivating introduction, and clear directions to the scorer.

Data Collection

In order to obtain the broadest cross-section of students in Oklahoma, test sites were selected according to three geographic locations (urban – a city with a population of 90,000 or more; suburban – a community adjacent to an urban area; and rural – a town with a population of 5,000 or less, and/or a town with a school district with less than 2500 students). Two schools in each location were purposively selected for study, giving a total of six study sites. The two urban schools were selected from the same school district because of access constraints in the other urban areas of Oklahoma. Since each school differed in organization and scheduling, administrators were asked to select intact classes that would give the best cross section of students according to academic ability, gender and race. In addition, a census of all twelfth grade Agricultural Education students at each site was included.

The completed instrument was administered at each test site by the same researcher. Each instrument was numbered in an effort to keep scores separate and school identity clear, but care was taken not to identify individual students with their corresponding test number; thus ensuring anonymity. Prior to each testing session, an introduction to the study was given and test instructions read to the respondents. Each student worked quietly and independently, marking answers on a general purpose NCS® answer sheet.

Profile data on the schools used in the research study was obtained through the assistance of school administrators. Demographic information of each school was based on copies of documents the schools submit for state and federal funding and qualitative observations made by the researcher. Student demographic information was obtained from students in a ten item questionnaire attached at the end of the testing instrument.

Testing time required by students ranged from 25 to 50 minutes. It was assumed that respondents would provide honest expressions of their knowledge. Therefore, it was determined that incomplete exams and those exams completed in less than ten minutes would not be included in the sample as they were not deemed to be "honest expressions" of the students' knowledge. By so doing, skewed results were less likely to occur.

Analysis of Data

The answer sheets were scanned and entered into an SPSS® 8.0 version data file. In cases where marks on the answer sheets were not readable by the scanning machine, corrections were entered by hand to assure completeness and accuracy of the data.

Descriptive statistics were used to report frequencies, percentages, means and standard deviations as calculated by SPSS® version 8.0. Inferential statistics (One-way ANOVA) were employed as a guide to understand the relationships between and among variables. Analysis of variance (ANOVA) procedures, including the General Linear Models procedure, was performed

Table 2.
Summary of Selected Oklahoma High School 12th Grade Students' Mean Agricultural Knowledge Scores by School Type and Total Aggregate Mean Scores

School type	N	Mean	S.D.	Mean %	S.D.
Urban	99	23.40	7.45	46.81	14.90
Suburban	130	24.58	7.38	49.15	14.76
Rural	101	20.69	6.32	41.39	12.64
Total	330	23.07	7.25	46.13	14.50

Table 3.
Analyses of Variance Between Selected Oklahoma 12th Grade Agricultural Education and General Education Students' Mean Agricultural Knowledge Scores by Agricultural Theme and School Type

Source and Themes 1-5	df	F	p	^{2}	Power
(1) Understanding Agriculture					
Student Major (S)	1	.815	.367	.003	.147
School Type (T)	2	2.142	.119	.013	.438
T x S	2	.846	.430	.005	
Error	321	(329.060)			
(2) History, Geography & Culture					
Student Major (S)	1	.004	.950	.000	.050
School Type (T)	2	5.547	.004*	.033	.852
T x S	2	.551	.577	.003	
Error	321	(548.326)			
(3) Science & Environment					
Student Major (S)	1	.986	.322	.003	.168
School Type (T)	2	4.677	.010*	.028	.783
T x S	2	.051	.950	.000	
Error	321	(383.385)			
(4) Business & Economics					
Student Major (S)	1	5.391	.021*	.017	.639
School Type (T)	2	5.654	.004*	.034	.859
T x S	2	.103	.902	.001	
Error	321	(435.136)			
(5) Food, Nutrition & Health					
Student Major (S)	1	.603	.438	.002	.121
School Type (T)	2	3.513	.031*	.021	.653
T x S	2	.906	.405	.006	
Error	321	(307.743)			

using SPSS® version 8.0. The three assumptions required for an ANOVA design were met establishing *independence* through the unrelated scores obtained in the study's overall design, *normality* implied by employing a large sample (population), and *homogeneity of variance* shown through a Levene Test that established equal sized groups and ensuring homogeneity was equally spread across the groups (Keppel, 1991). A Tukey's Post-hoc strategy was employed to make pair-wise comparisons in order to understand where the groups differ. Eta squared (η^2) was calculated to ascertain the practical significance of the test.

Results and Findings

Table 2 summarizes the frequencies, means, standard deviations, and mean percentage scores of student agricultural knowledge by school type. Table 2 also provides overall aggregate mean scores of all the students participating in the study. Student mean agricultural knowledge scores for each school type were below 50 percent. Students in rural schools scored lower than their urban and suburban counterparts; nearly eight percentage points lower than suburban students and over 5 percentage points lower than urban students.

A series of Two-way ANOVA (2x3 designs) procedures were run for each of the five agricultural themes of the FFSL Framework to determine whether differences existed between mean agricultural knowledge scores of agricultural and general education students, and differences between the students at the three types of schools included in the study. A significant difference ($p=.021$) between the mean agricultural knowledge scores of agricultural education students and general education students existed only in theme four, Business & Economics (Table 3), where agricultural education students' mean percentage score was more than six points higher than that of general education students (Tables 3 and 4).

Student mean agricultural knowledge scores differed significantly among school type (Table 3) in the following themes: Theme 2 – History, Culture, & Geography ($p = .004$); Theme 3 – Science & Environment ($p = .010$); Theme 4 – Business & Economics ($p = .004$); and

Table 4.
Summary of Oklahoma 12th Grade Agricultural Education & General Education Students' Mean Percent Agricultural Knowledge Scores by Agricultural Theme, Total Aggregate Scores and Type Student

Agricultural Themes 1-5	Ag. Ed.		Gen. Ed.	
	Mean	SD	Mean	SD
(1) Understanding Agriculture	52.99	17.23	50.78	18.83
(2) History, Geography & Culture	49.23	23.82	48.67	23.88
(3) Science & Environment	47.47	21.56	44.46	18.72
(4) Business & Economics	45.91 [a]	22.65	39.66 [b]	20.36
(5) Food, Nutrition & Health	43.28	20.87	40.52	15.56
Total Aggregate Scores	47.90	15.59	45.15	13.80

Note. Means in the same row that do not share the same subscript differ at p<.05 calculated using ANOVA procedures.

Theme 5 - Food, Nutrition & Health (p = .031). Only Theme 1, Understanding Agriculture, showed no significant differences among type of students or type of schools, as represented in Table 3.

Two degrees of freedom existed for the School Type variable in each of Themes 2-5 and a Tukey HSD post hoc analysis was conducted. Results of the post hoc test were summarized in Table 5. Themes 2-5 did not differ significantly between students attending urban and suburban schools, but differences did exist in Themes 2, 3 and 4 between students attending urban and rural schools, and students attending suburban and rural schools (Table 5). In each of the three themes, the mean agricultural knowledge scores of rural schools were significantly lower than the urban or suburban mean scores, registering an 11 percentage point spread between urban and rural schools in Theme 4, and a nearly 12 percentage point difference between suburban and rural schools in Theme 2.

Table 5.
Composite Summary of Oklahoma 12th Grade Agricultural Education & General Education Students' Mean Agricultural Knowledge Percent Scores by Agricultural Theme and School Type

	Urban		Suburban		Rural	
Agricultural Themes 1-5	M ean	D	M ean	D	M ean	D
(1) Undstding. Agriculture	52.58	19.47	53.99	17.56	47.45	17.46
(2) Hist., Geog., & Culture	50.62 $_a$	25.61	53.31 $_a$	23.01	41.40 $_b$	21.42
(3) Science & Environment	46.67 $_a$	21.06	48.81 $_a$	20.32	40.18 $_b$	16.71
(4) Business & Economics	46.69 $_a$	20.36	43.41 $_a$	21.15	35.29 $_b$	21.24
(5) Food, Nutrition & Health	39.46 $_a$	16.33	44.55 $_a$	20.53	39.55 $_a$	14.12

Note. Means in the same row that do not share the same subscript differ at p<.05 in the Tukey HSD post hoc analysis.

Although the ANOVA test indicated significant difference in Theme 5, the post hoc results indicated no significant differences between the three types of schools (Table 5).

Conclusions

The conclusions in this study were not to be generalized beyond the 330 selected twelfth grade students of the six Oklahoma high schools who participated in this study. The major findings presented in the study support the following conclusions:

1. Both Agricultural Education students and General Education students, regardless of school type, possessed some agricultural knowledge.

2. Agricultural Education students did not differ from General Education students in their level of overall knowledge about agriculture.

3. Students enrolled in rural schools were less knowledgeable about agriculture than students attending urban or suburban schools.

4. Student agricultural knowledge scores differed significantly according to school type in three of the Food and Fiber Systems Literacy Framework themes: History, Culture, & Geography; Science & Environment; and Business & Economics.

5. All students in the study possessed similar levels of knowledge for the theme, Understanding Agriculture; a foundational subject area of the Food and Fiber Systems Literacy Curriculum Framework.

6. Students attending rural schools possessed lower levels of agricultural knowledge than those in urban or suburban schools on three of the FFSL themes: History, Culture, & Geography; Science & Environment; and Business & Economics.

7. The overall agricultural knowledge of 12th grade students at the six Oklahoma high schools that participated in this study did not demonstrate that they were agriculturally literate, as defined by the FFSL Framework. This lack of agricultural literacy was demonstrated by overall mean agricultural knowledge scores, for each school type, at or below 49.15%.

Recommendations

Based upon the conclusions and major findings of this research, the following recommendations were made:

1. The instrument developed in this study based upon the Food and Fiber Systems Literacy standards and benchmarks for grades 9-12 should be used by teachers and curriculum specialists in order to identify where gaps exist in student knowledge about agriculture.

2. The current agricultural education curriculum for students preparing for careers in agriculture may assume students enrolled will also become agriculturally literate. Results of this study suggest that further study of the agricultural education career preparation curriculum should be conducted.

3. Further research is warranted in order to understand why rural students were deficient in three of the five Food and Fiber Systems Literacy thematic areas.

4. Urban and suburban students scored similarly in most themes and higher overall than their rural counterparts. Further study is needed to understand what commonalties exist in urban and suburban curricula that might facilitate acquisition of agricultural knowledge and better guide curriculum development.

5. Overall low agricultural knowledge scores indicated that students participating in the study were not agriculturally literate. In an already overloaded curriculum, materials need to be developed for every discipline that will integrate applicable agricultural concepts at both the elementary and secondary school levels and build on existing instructional activities.

Implications

Based on the conclusions from this study, agricultural education programs across the nation may be too narrow in scope. There exists a need to review agricultural education curriculum and programs, teacher preparation programs, and uses of cooperative extension. With the right modifications, it may be possible to develop agricultural education programs that not only give students a career skill, but a broader understanding of agriculture and its impact on society. And perhaps, students who have completed agricultural education programs will, themselves, become a reservoir of agricultural knowledge for others.

Agricultural educators, industry, and extension educators may also help expand the agricultural knowledge of educators in other disciplines, resulting in greater use of agriculture as a context for teaching other subject matter. This may contribute to increased agricultural literacy among all K-12 students. Given time, this may extend agricultural literacy to the adult population - an electorate that should be well informed when it selects those who determine state and national policy in agriculture.

Agricultural literacy has been studied for nearly 15 years. During this time, programs and curriculum have been designed to promote agricultural literacy for grades K-8. And yet, this study revealed that students who have just completed 12 years of schooling through the current system have failed to become agriculturally literate. It is time for agricultural literacy programs and materials to be scrutinized – diagnostic tools, like this instrument based on themes, standards and benchmarks, need to be employed to evaluate and modify the methods, materials and strategies that are currently being utilized.

Further discussion among agricultural educators and agricultural literacy specialists is clearly needed to better understand societal needs for agricultural literacy. An opportunity exists for continued discussion on how best to infuse agricultural knowledge into the overloaded, compartmentalized educational system in high schools and how standards and benchmarks can be used to advantage in assessing agricultural literacy levels.

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Agricultural Literacy Assessment of Oklahoma
High School Seniors

Discussant Comments
Robert J. Birkenholz
The Ohio State University

The purpose of this research was to assess the agricultural literacy knowledge of Oklahoma twelfth grade students, based on the Food and Fiber systems Literacy (FFSL) framework. Group comparisons were made between agricultural education students and general education students from six Oklahoma high schools representing urban, suburban, and rural areas. The agricultural knowledge test was developed by the researcher in collaboration with other colleagues.

The results of this study revealed that rural students were less knowledgeable than their urban and suburban counterparts in the three of five FFSL thematic areas. However, the combined group of seniors at each locale scored below 50% on the agricultural knowledge test.

Further analysis revealed that agricultural education students scored higher on the fourth FFSL theme (Business and Economics). Rural students scored lower than their urban and suburban counterparts on FFSL themes two, three, and four (History, Geography, & Culture; Science & Environment; and Business & Economics, respectively).

In the Conclusions section, greater attention should be directed toward differentiating between conclusion statements and re-stating findings. Conclusions should be based on a synthesis of the results reported, whereas findings are statements of fact with direct linkages to the data presented. APA style also recommends that conclusions be written in the present tense, while findings should be written in past tense.

Recommendations should direct the reader toward actions that involve application of new knowledge to improve practice. Most of the recommendations offered in the research paper focused on suggestions for further research, rather than actions that would have implications for increasing agricultural literacy among Oklahoma high school seniors.

The research paper presented a relatively sophisticated analysis of the data collected. However, it is important to recognize that the level of analysis should coincide with the quality and generalizability of the data collected. Sophisticated analysis is not a substitute, nor does it compensate for the inability of the researcher to generalize beyond the respondents.

1. Did your literature review not identify any other studies (instruments) related to assessing the agricultural literacy of high school students?

2. Is reliability an estimate of a test's "adequacy" or a measure of consistency? Is it appropriate to measure overall instrument reliability, and subsequently report subscale (theme area) means? How many items were included in the instrument?

3. How many agricultural education student respondents were included in your study?

4. What was the effect of selecting two urban schools from the same district?

5. How should the reader interpret inferential statistics when the results can only be generalized to the respondents?

6. Would MANOVA be appropriate to control for error when analyzing five dependent variables?

An Agricultural Knowledge Assessment of AITC Trained Teachers and Non-trained Teachers

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South Dakota State University

James G. Leising
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Abstract

The purpose of this study was to assess the agricultural knowledge of selected Agriculture in the Classroom (AITC) trained teachers and non-trained teachers in four states. Objectives of this study were to: (1) Describe teacher characteristics of AITC trained teachers and non-trained teachers; (2) Determine teacher agricultural knowledge across the five thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework; and (3) Compare agricultural knowledge score differences between AITC trained teachers and non-trained teachers across the five thematic areas of the FFSL Framework. The population of this study included selected AITC trained teachers and non-trained teachers of kindergarten through sixth grade in the states of Arizona, Montana, Oklahoma, and Utah during the 2001-2002 school year. Data were analyzed using descriptive statistics to describe and summarize observations.

It was concluded teachers with AITC training scored higher overall and across the five thematic areas of the FFSL Framework than teachers with no training. It was further concluded that all teachers scored higher in theme two (History, Geography, and Culture) followed by theme three (Science, Technology, and Environment) and theme one (Understanding Food and Fiber Systems). AITC trained teachers scored the lowest on theme four (Business and Economics) and non-trained teachers scored the lowest on theme five (Food, Nutrition, and Health).

Theoretical Framework

In 1790, the total population of colonial America was approximately 17 million people, whereby farmers made up 90% of the labor force. The total population of the United States in 1990 was about 246 million people. The estimated farm population was 4.5 million people, whereby farmers made up 2.6% of the labor force (United States Department of Agriculture, 2002a). Data for the year, 2000, indicated farming, fishing, and forestry, accounted for just 1% of the total employment by occupational group in the United States. Estimated projections for 2010 indicated farming, fishing, and forestry would decrease to 0.9% of the total employment by occupational group in the United States (United States Department of Labor, 2002).

In 1984, the W. K. Kellogg Foundation reported that adequate food supplies, proper food use, and knowledge of the agricultural sector were important issues that effect the entire world community (as cited in Brown & Stewart, 1993). As a follow-up, the Committee on Agricultural Education in Secondary Schools reported, "Most Americans know very little about agriculture, its social and economic significance in the

United States, and particularly, its links to human health and environmental quality" (National Research Council, 1988, p. 9). With more families and workers removed from the farm and the agricultural sector, Frick, Kahler, and Miller (1991) reported a need exists for an informed and agriculturally knowledgeable citizenry. Therefore, who will address these needs and future trends in agriculture?

At present, agricultural projections reflect trends toward fewer but larger farms, greater risk of income volatility for farmers, consumer food (retail) prices rising less than the general inflation rate, and expenditures for meals eaten away from home reaching almost half of total food spending by 2005 (United States Department of Agriculture, 2002b). Wright, Stewart, and Birkenholz (1994) stated if voters were to elect representatives whose function was to create farm policy, while possessing no agricultural knowledge, the future for the agricultural sector looked dim (as cited in Hamlin 1962).

Of the 51 members in the United States House of Representatives who made up the House Committee on Agriculture in 2002, 33 representatives (65%) stated no experience or background in agriculture on their official web sites (United States House of Representatives, 2002). Of the 21 senators who made up the United States Senate Committee on Agriculture, Nutrition, and Forestry in 2002, 15 senators (71%) stated no experience or background in agriculture on their official web sites (United States Senate, 2002). This was astonishing because legislative jurisdiction covers subjects related to almost 15% of the United States gross domestic product (Commission on 21st Century Production Agriculture, 2001). Wright, Stewart, and Birkenholz (1994) stated, "Public policy affecting agriculture and society is directly affected by societal goals. These goals have been decided by people who have little knowledge about agriculture, how it relates to society, and its economic and global significance to our nation" (p. 55). Given the importance of agriculture to the general economy and our personal lives, how much agricultural knowledge should each person possess so that the fundamental needs of society are being met?

Research findings from Frick, Birkenholz, Gardner, and Machtmes (1994) supported the need for elementary and secondary education about agriculture. Also, research findings from Elliot (1999) supported the need for adult education about agriculture. Since research findings indicated the need for elementary, secondary, and adult education about agriculture in order to meet the fundamental needs of society, what were the levels of agricultural knowledge of classroom teachers?

Cox (1994) found that the majority of Oklahoma fourth grade teachers failed to select the correct response in an agricultural knowledge assessment. Drake (1990) stated the success of any program with the goal of teaching children about agriculture depends ultimately upon the ability of that teacher. This was important especially considering Swan and Donaldson (1970) and Bowers and Kohl (1986) found low levels of agricultural knowledge possessed by elementary school teachers (as cited in Terry, Herring, & Larke, 1992). Therefore, how will future generations make wise choices about food, agriculture and the environment?

Leising, Igo, Heald, Hubert, and Yamamoto (1998) developed the Food and Fiber Systems Literacy (FFSL) Framework which included kindergarten through twelfth grade standards and benchmarks across five thematic areas. Since future decision-makers will learn primarily from their formal education teachers, society needs kindergarten through twelfth grade teachers who are agriculturally literate. In addition, a need exists to educate teachers about agriculture so future generations can make wise choices about food, agriculture and the environment. Therefore, Pense and Leising (2003) developed a conceptual model for addressing agricultural literacy (see Figure I).

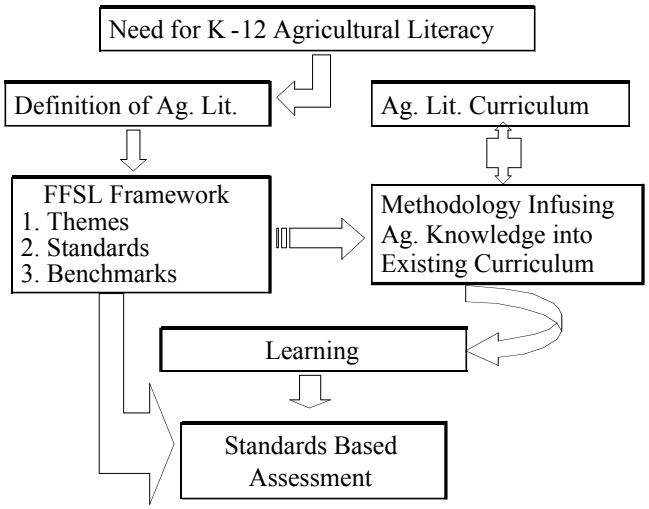

Figure I. Conceptual model for addressing agricultural literacy.

Purpose/Objectives

The purpose of this study was to assess the agricultural knowledge of selected Agriculture in the Classroom (AITC) teachers and non-trained teachers in four states. Objectives of this study were to: (1) Describe teacher characteristics of AITC trained teachers and non- trained teachers; (2) Determine teacher agricultural knowledge across the five thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework; and (3) Compare agricultural knowledge differences between AITC trained teachers and non-trained teachers across the five thematic areas of the FFSL Framework.

Methods

This research study was a descriptive research design that described teacher characteristics and agricultural knowledge of selected kindergarten through sixth grade teachers. According to Ary, Jacobs, and Razavieh (1985), "Descriptive research studies are designed to obtain information concerning the current status of phenomena. They are directed toward determining the nature of a situation as it exists at the time of the study" (p. 322). Since prediction was not the intent of this study, care should be used not to extend the results of the associations among variables beyond this study population from whom data were collected.

The population consisted of selected kindergarten through sixth grade teachers from the states of Arizona, Montana, Oklahoma, and Utah during the 2001-2002 school year. The first group consisted of 44 teachers with Agriculture in the Classroom (AITC) training. The second group consisted of 46 teachers with no AITC training.

State AITC coordinators from the selected states identified strong AITC public elementary school programs. Specific schools were selected because teachers were identified as having demonstrated strong AITC classroom programs. In each state, two AITC trained teachers at each grade level (K-6) were selected for participation in this study. The selected population included 44 teachers (see Table 1).

Table 1
A Distribution of AITC Trained Teachers by State and Grade

	State				
Grade	AZ	OK	MT	UT	Total
K-1	2	4	3	2	11
2-3	2	4	4	3	13
4-5	3	4	4	3	14
6	1	2	2	1	6
Total	8	14	13	9	44

In addition, state AITC coordinators selected schools (including their teachers) that had no exposure to any AITC program. These schools were selected due to similar geographical location, family income levels, school lunch program, average daily attendance and size of school as schools with AITC trained teachers. In each state, two non-trained teachers at each grade level (K-6) were selected in this study. The selected population included 46 teachers (see Table 2).

Table 2
A Distribution of Non-AITC Trained Teachers by State and Grade

	State				
Grade	AZ	OK	MT	UT	Total
K-1	3	3	4	1	11
2-3	4	4	4	2	14
4-5	4	4	4	2	14
6	2	2	2	1	7
Total	13	13	14	6	46

A total of 90 teachers participated in this study.

Since no instrument was readily available, a criterion-referenced test instrument was developed (see Portillo, 2002) to assess the agricultural knowledge of teachers across five thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework (see Leising, Igo, Heald, Hubert, & Yamamoto, 1998). The development of this instrument

began with a review and evaluation of the test instruments used by Igo (1998). This instrument was based on the FFSL Framework's benchmarks and standards within the five FFSL theme areas (Understanding Food and Fiber Systems; History, Geography, and Culture; Science, Technology, and Environment; Business and Economics; and Food, Nutrition, and Health). Specifically, this instrument was based on the standards and benchmarks of the ninth grade through twelfth grade grouping in the FFSL Framework. The purpose of this instrument was to ascertain the domain of agricultural knowledge which kindergarten through sixth grade teachers possessed.

The final instrument contained 50 multiple-choice test items. There were 11 test items associated with the first FFSL theme, 'Understanding Food and Fiber Systems'. There were 10 test items associated with the second FFSL theme, 'History, Geography, and Culture'. There were 11 test items associated with the third FFSL theme, 'Science, Technology, and Environment'. There were seven test items associated with the fourth FFSL theme, 'Business and Economics'. Lastly, there were 11 test items associated with the fifth FFSL theme, 'Food, Nutrition, and Health'.

Test validity of this criterion-referenced test instrument was addressed by examining content validity, criterion validity, and construct validity according to Wiersma and Jurs (1990) and pilot testing (see Portillo, 2002). In summer 2001, two pilot tests were administered to further test and statistically analyze the test items. These pilot tests were administered to teachers participating in Oklahoma Agriculture in the Classroom Summer Institutes. The first training program occurred in June and the second in August. Means, medians, standard deviations, reliability, mean difficulties and mean discriminations were determined for the two pilot test groups. The same descriptive statistics were calculated for the teacher group to be studied (see Table 3).

Table 3

A Distribution of Statistical Analyses by Pilot Tests and Study Group

Pilot Tests	*N*	*M*[a]	*Mdn*	*SD*	*K-R* 20	*M* Difficulty	*M* Discrimination
First	16	31.75	33.00	3.40	0.70	63.50	0.17
Second	27	33.59	33.00	4.54	0.74	67.19	0.23
Study Group	90	34.72	36.00	7.32	0.69	69.44	0.35

[a] Scores are reported as raw scores.

Norm-referenced tests were designed to measure differences between individuals, not performance on a domain (Ary, Jacobs, & Razavieh, 1996). In contrast, criterion-referenced tests were designed to determine a subject's status with respect to a well-defined domain, criterion, or objective. "Reliability of this type of test is concerned with the consistency with which this status is estimated" (p. 289). Correlations or reliability coefficients on these tests are not considered appropriate. "…An individual's performance is not compared to others but rather to the range of possible scores. Thus, the two kinds of tests serve different purposes and therefore what it means to be reliable will also differ" (Wiersma & Jurs, 1990, p. 262). Therefore, to increase test reliability, this

researcher made every effort to control the sources of unreliability addressed by Wiersma and Jurs (1990): homogeneous items; discriminating items; enough items; clear directions to the individual; a controlled setting; motivating introduction; and clear directions to the scorer.

In addition, a standard error of measurement (0.07) was calculated to quantify variation among the scores from the study group (see Table 4). This measure provided the researcher with an estimate of the error, which may be involved in each teachers' agricultural knowledge score by taking into consideration the unreliability of the test. "The standard error of measurement is different from most of the other numerical values that indicate how reliable a test is … A value near 0 for the standard error of measurement would mean that the measure is very reliable; there is little error" (Wiersma & Jurs, 1990, p. 262).

Table 4
A Distribution of Teacher Agricultural Knowledge by Standard Error of Measurement

Score	Number of Questions	Proportion Answered Correctly	*SEM*
Overall Average Score	50	.69	0.07

A demographic instrument was developed to collect background information and selected characteristics of teachers. Specific variables identified as important in previous research studies included: gender; ethnicity; experience in agriculture; academic preparation; teacher preparation; experience in teaching; place of residency; agricultural literacy training; type of school; resources used to teach about agriculture; and benefits from integrating agriculture into core academic subjects.

Data were collected from 44 kindergarten through sixth grade teachers with AITC training and from 46 kindergarten through sixth grade teachers with no training in the fall of 2001. Directions and procedures for collecting the data from each site were developed and mailed to each state AITC coordinator and teacher. The AITC coordinator for each state visited the school and administered the instruments to the teachers. Completed instruments were collected by each state AITC coordinator and returned via the United States Postal Service.

The data from the test and demographic instruments were entered into spreadsheets for further analysis using the Statistical Package for Social Science (SPSS) for Windows, version 8.0. Data were analyzed using descriptive statistics to describe and summarize observations. Glass' delta was also calculated as effect sizes to determine agricultural knowledge improvement. Conventions for Glass' delta were based on Cohen's *d* (1988): small, less than 0.49; medium, 0.50-0.79; large, greater than 0.80.

Findings

Objective 1: Describe teacher characteristics of Agriculture in the Classroom (AITC) trained teachers and non-trained teachers.

Objective one was to describe teacher characteristics of AITC trained and non-trained teachers. Findings showed similarities between both groups of teachers. The demographic characteristics used to profile AITC trained teachers and non-AITC trained teachers were summarized in Table 5.

Table 5
A Profile of Teachers by AITC Training and Non-Training

Demographic	Training	*P*	No training	*P*
Gender	Female	88.4	Female	88.6
Ethnicity	Caucasian	97.4	Caucasian	100.0
Grew Up on a Farm	No	86.0	No	79.5
4-H Member	No	62.8	No	77.3
FFA Member	No	100.0	No	100.0
Ag Courses Taken in H.S.	No	100.0	No	97.7
Level of Education	Bachelor's	69.8	Bachelor's	70.5
Undergraduate Major	Elem. Ed.	50.0	Elem. Ed.	52.4
Teaching Certification	Elementary	68.9	Elementary	69.5
Ag Course Taken in College	1-3 Hours	87.1	1-3 Hours	92.9
Residence	Suburban	64.3	Urban	36.4
Work Experience in Ag	No	69.8	No	68.2
Teaching Experience	19-24	26.2	13-18	27.3
Type of School	Rural	40.0	Urban	26.8
Size of School	201-500	48.6	201-500	58.6

Objective 2: Determine teacher agricultural knowledge across the five thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework

Data in Table 6 described the distribution of teacher scores for agricultural knowledge by FFSL thematic areas. The mean of correctly answered questions for theme one (Understanding Food and Fiber Systems) was 68.69%. An estimate of the error that may be involved with this theme was 0.15. Therefore, it was estimated that teachers could correctly answer 53.69% to 83.69% of the items in theme one correctly. The mean of correctly answered questions for theme two (History, Geography, and Culture) was 80.56%. An estimate of the error that may be involved with this theme was 0.13. Therefore, it was estimated that teachers could correctly answer 67.56% to 93.56% of the items in theme two correctly. The mean of correctly answered questions for theme three (Science, Technology, and Environment) was 73.03%. An estimate of the error that may be involved with this theme was 0.14. Therefore, it was estimated that teachers could correctly answer 59.03% to 87.03% of the items in theme three correctly. The mean of correctly answered questions for theme four (Business and Economics) was 61.9%. An estimate of the error that may be involved with this theme was 0.20. Therefore, it was

estimated that teachers could correctly answer 41.9% to 81.9% of the items in theme four correctly. The mean of correctly answered questions for theme five (Food, Nutrition, and Health) was 61.41%. An estimate of the error that may be involved with this theme was 0.15. Therefore, it was estimated that teachers could correctly answer 46.41% to 76.41% of the items in theme five correctly. The mean of correctly answered questions for all 50 questions was 69.47%. An estimate of the error that may be involved with this score was 0.07. Therefore, it was estimated that teachers could correctly answer 62.47% to 76.47% of the items correctly.

Table 6
A Distribution of Teacher Scores for Agricultural Knowledge by FFSL Thematic Areas

Theme	Percent Correctly Answered	Number of Test Items	*SEM*	Interval Estimate
Theme 1	68.69	11	0.15	53.69-83.69
Theme 2	80.56	10	0.13	67.56-93.56
Theme 3	73.03	11	0.14	59.03-87.03
Theme 4	61.90	7	0.20	41.90-81.90
Theme 5	61.41	10	0.15	46.41-76.41
Overall Average Score	69.47	50	0.07	62.47-76.47

Objective 3: Compare agricultural knowledge differences between AITC trained teachers and non-trained teachers across the five thematic areas of the FFSL Framework.

Data in Table 7 described the distribution of AITC teacher training on agricultural knowledge by FFSL theme scores. The mean of correctly answered questions for theme one (Understanding Food and Fiber Systems) by AITC trained teachers was 72.73% and 64.82% by non-trained teachers. A small effect size of 0.45 indicated that the mean of the AITC trained teachers was at the 67.5th percentile of the non-trained teachers. The mean of correctly answered questions for theme two (History, Geography, and Culture) by AITC trained teachers was 84.77% and 76.52% by non-trained teachers. A small effect size of 0.43 indicated that the mean of the AITC trained teachers was at the 66.5th percentile of the non-trained teachers. The mean of correctly answered questions for theme three (Science, Technology, and Environment) by AITC trained teachers was 79.55% and 66.80% by non-trained teachers. A medium effect size of 0.56 indicated that the mean of the AITC trained teachers was at the 71.5th percentile of the non-trained teachers. The mean of correctly answered questions for theme four (Business and Economics) by AITC trained teachers was 64.29% and 59.63% by non-trained teachers. A small effect size of 0.25 indicated that the mean of the AITC trained teachers was at the 60th percentile of the non-trained teachers. The mean of correctly answered questions for theme five (Food, Nutrition, and Health) by AITC trained teachers was 64.70% and 58.30% by non-trained teachers. A small effect size of 0.29 indicated that the mean of the AITC trained teachers was at the 61.5th percentile of the non-trained teachers. The mean of correctly answered questions for the overall average by AITC trained teachers was 73.68% and 65.43% by non-trained teachers. A medium effect size of 0.51 indicated that

the mean of the AITC trained teachers was at the 69.5th percentile of the non-trained teachers.

Table 7
A Distribution of AITC Teacher Training for Agricultural Knowledge by FFSL Theme Mean Scores

	AITC Training[a]					
Theme	$M_{Trained}$	$SD_{Untrained}$	$M_{Untrained}$	$SD_{Untrained}$	Effect Size	Percentile Standing
Theme 1	72.73	16.75	64.82	17.73	0.45	67.5
Theme 2	84.77	15.32	76.52	19.00	0.43	66.5
Theme 3	79.55	15.08	66.80	22.86	0.56	71.5
Theme 4	64.29	18.10	59.63	18.64	0.25	60.0
Theme 5	64.70	16.07	58.30	22.07	0.29	61.5
Overall Average	73.68	11.89	65.43	16.07	0.51	69.5

[a] Means were reported as percent scores.

Conclusions/ Recommendations

Since prediction was not the intent of this study, care should be used not to extend the results beyond this study population from whom data were collected. Examination, analysis, and interpretation of the findings provided the opportunity for the author to draw the following conclusions:

1) AITC trained teachers and non-trained teachers were homogeneous in almost all demographic areas. These teachers were overwhelmingly Caucasian females who did not grow up on a farm or participate in a 4-H youth program, FFA, or high school Agricultural Education. These teachers typically had a bachelor's degree in elementary education with an elementary teaching credential, took at least one agriculture course in college and had no work experience in agriculture. Furthermore, it was concluded that these teachers were experienced classroom teachers in small schools.

2) It was concluded that AITC trained teachers scored higher than non-trained teachers overall and across the five thematic areas of the FFSL Framework. Furthermore, AITC trained and non-trained teachers scored the highest on theme two (History, Geography, and Culture), theme three (Science, Technology, and Environment), and theme one (Understanding Food & Fiber Systems). AITC trained teachers scored the lowest on theme four (Business and Economics) and non-trained teachers scored the lowest on theme five (Food, Nutrition, and Health). It was also concluded non-trained teachers had a greater spread of scores across all the themes than did AITC trained teachers.

The following recommendations for Agricultural Education were made from the conclusions drawn from the data analysis:

1) Based on the major findings and conclusions that agricultural knowledge scores were relatively low except for theme two (History, Geography, and Culture), it was recommended to examine professionals in agriculture and other occupations to determine a range of occupational score differences relative to a larger teacher population sampled.

2) Based on the major findings and conclusions of this study and by Igo (1998) and Leising, Pense, and Igo (2001), it was recommended that in-service education for elementary teachers emphasize theme four (Business and Economics) and theme five (Food, Nutrition, and Health).

3) It is imperative that we make the connection between the ways in which teachers learn about agriculture and the ways in which the individual uses agriculture. It was recommended that AITC learning activities be developed that can be applied to real-life scenarios. This would support Schuster's (1989) recommendations that learners apply their knowledge and that teachers provide more out-of-school experiences for learners. This would also support Frick, Kahler, and Miller's (1991) recommendation that individuals to able to synthesize, analyze, and communicate basic information about agriculture.

4) It was also recommended to replicate this study with a larger sample of AITC trained teachers and a comparison group.

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An Agricultural Knowledge Assessment of AITC Trained Teachers and Non-Trained Teachers

Discussant Comments
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The purpose of this study was to assess the agricultural knowledge of selected elementary teachers in four states, comparing those who had Agriculture in the Classroom (AITC) training with teachers who did not have the training. Three objectives were specified to guide the study. Based on the stated purpose and objectives outlined in the study, it was surmised that the implied hypothesis was that AITC-trained teachers would be more agriculturally literate than teachers without AITC training. The demographic characteristics reported in the paper revealed little distinction between the two groups.

Collectively, teacher respondents were most knowledgeable of History, Geography, & Culture and less knowledgeable of Business & Economics and Food, Nutrition, & Health. In each of the five thematic areas, the AITC-trained teachers produced higher mean knowledge scores than did the comparison group of teachers who had not received AITC training. Although the greatest difference between the teacher groups was for the Science, Technology, & Environment theme.

As a result of this study it would be reasonable to conclude that AITC training contributed to higher knowledge scores in each of the five themes (comprising the Food and Fiber Systems Literacy (FFSL) framework. Even so, the conclusions presented in the paper appeared to be limited to a re-statement of the findings. The authors appropriately recommended that future teacher in-service programs emphasize themes four and five. However, the first and third recommendations do not appear to have a direct link to the data collected and reported in this paper.

This research paper described a study to assess the agricultural knowledge of two groups of elementary teachers. The questions below are offered to address issues relative to certain elements of the study for the benefit of future research in Agricultural Education and related fields.

1. Do you consider a test that measures the construct of "Agricultural Literacy" to be "norm-referenced" or "criterion-referenced"? What are the implications for assessing reliability? What minimum score is needed to be considered 'literate'?

2. Can you explain how two teachers were selected from each grade level in each state when four cells only had one teacher in the population (see tables 1 & 2)?

3. Is it appropriate (or useful) to calculate a "standard error of measurement" (and therefore an underlying confidence intervals), using data that is not generalizeable to a population? How would the results be interpreted?

4. Should reliability estimates be computed for each thematic area, since means are reported on that basis?

Oklahoma Consumers' Knowledge and Perceptions of Ethanol-Blended Gasoline

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Abstract

A study was conducted to assess Oklahoma consumers' knowledge and perception of ethanol. A mail survey was developed for the assessment. A random sample of 2,400 registered voters was selected from the Oklahoma Election Board's database. The mail survey resulted in a 37.6% response rate from valid addresses.

A majority of the respondents indicated that a reduction in foreign oil dependency was the greatest potential benefit from using ethanol-blended gasoline. When asked if they would purchase ethanol-blended gasoline if it were available, 62.3% agreed they would. Cost was the most important variable for consumers choosing ethanol-blended gasoline. The presence of some no opinion responses indicates that a portion of the general public does not have information that would cause them to not form an opinion. It was also concluded that if ethanol-blended gasoline was introduced into the fuel market in Oklahoma, it would be used. However if cost was not competitive with gasoline, use would likely decline. Adults and older students must be targeted with education that teaches about the environmental benefits of ethanol-blended gasoline.

Introduction/Theoretical Framework

Petroleum is a major part of life in America. Transportation is dependent on petroleum-based fuels. The demand for petroleum has continued to increase to the point that the United States imported nine million barrels of crude oil per day in 2000 (U.S. Department of Energy, n.d.). The U.S. government has attempted to decrease dependence on foreign oil. One of the reduction tactics is based on alternative fuels, such as ethanol.

For these attempts to be successful, education must play a critical role by helping the American public to better understand the alternatives to fossil fuels.

> As it becomes more and more obvious that our dependence on fossil fuels is fouling our air, endangering our health and even changing the global climate, the quest for clean and renewable energy sources is underway. Most proponents of alternative energy predict that hydrogen fuel cells will be the primary replacement for today's fossil fuel technologies, but the infrastructure to support a hydrogen economy is going to take decades to put in place. In the meantime, switching to alternative fuels such as compressed natural gas, ethanol, and biodiesel is a step that we can take right now to live more sustainably. Teachers are going to play a critical role during the transition away from fossil fuels, providing education about the need for alternative forms of energy and the options that are available (Lawrence, 2002, pp 13-14).

In 1979, a group of farmers from the Oklahoma panhandle began making plans for an ethanol production facility (Chavez, 1979) signaling the beginning of ethanol production in Oklahoma. Although this plant did not materialize, two plants were constructed. By 1981, both plants were bankrupt. Oklahomans continued to sell gasohol for the next several years. In March 1983, a tax exemption of $0.065 per gallon of gasohol was removed, which resulted in a decline in ethanol sales (Laval, 1983). Gasohol became unavailable in Oklahoma soon after operators of gasoline pumps were required to post notices if a gasoline pump contained alcohol. Two inch letters or larger were required to inform consumers they were purchasing alcohol (Tallent, 1982). Energy officials noted that labeling increased negative perceptions about ethanol-blended gasoline (R.L. Huhnke, personal communication, August 7, 2002).

Ethanol is currently being produced in seventy-two manufacturing plants. Gasohol (10% ethanol, 90% gasoline) is readily available in more than twenty states. Production facilities are generally located in areas that produce large amounts of corn. Corn is not a major crop in Oklahoma, inhibiting the production of ethanol. In 2001, gasohol was rarely a choice given to consumers in Oklahoma and E85 (85% ethanol, 15% gasoline) was not available in the state (ACE, 2001).

Oklahoma House Bill 1217 (2001) contained provisions that encouraged the production of educational and advisory materials regarding ethanol production, and to identify and recommend areas of research needed to better understand and quantify the processes of ethanol production. Oklahoma State University was also working on perfecting a new process of making ethanol that uses biomass instead of corn. One of the objectives of the project was to show that ethanol could be realistically produced from biomass (perennial grasses and crop residues) by a gasification and fermentation process, at a price that is competitive to the corn fermentation processes (Conversion of Low-Cost Biomass to Ethanol, 2000). Oklahoma has large quantities of biomass that could be used in ethanol production, potentially creating a new market. An additional objective to the project was to develop educational materials. The need for education and the lack of alternative fuels in Oklahoma led to this study, conducted to assess Oklahoma consumers' knowledge and perceptions of ethanol.

Although ethanol is not a new product to many states, it is new to Oklahoma. By the definition given by Rogers (1995), ethanol is an innovation in Oklahoma.

> "An innovation is an idea, practice, or object that is perceived as new by an individual or other unit of adoption. It matters little, so far as human behavior is concerned, whether or not an idea is objectively new as measured by the lapse of time since its first use or discovery. The perceived newness of the idea for the individual determines his or her reaction to it. If the idea seems new to the individual, it is an innovation" (Rogers, 1995, pp 11).

Rogers (1995) also defines diffusion as "the process by which an innovation is communicated through certain channels over time among the members of a social system (p.5)." The introduction of ethanol-blended gasoline into Oklahoma created the process

of diffusion of innovation. Diffusion has four elements: innovation, communication channels, time, and a social system.

Communication is the process by which participants create and share information with one another to reach a mutual understanding. In the case of ethanol, the channels were the Cooperative Extension Service and middle schools. The media were also used for information dissemination. Time is an element that varies for each diffusion of innovation. The social system is a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. The U.S. government set a goal to reverse America's growing dependence on foreign oil (The White House, 2003). Ethanol is one way to accomplish this goal.

The innovation-decision process consists of steps through which an individual (or other decision-making unit) passes: 1) first knowledge of an innovation, 2) forming an attitude toward the innovation, 3) a decision to adopt or reject, 4) implementation of the new idea, and 5) confirmation of this decision (Rogers, 1995). The Biomass Conversion Project was still in its infancy when the innovation introduction process began. It was not known at the time what the knowledge and perceptions of the general public were regarding ethanol. This study was designed to measure the knowledge and perceptions and, in the process, measure the first and second steps (knowledge and perceptions) of the innovation-decision making process. The basis of the project was that if positive steps could be made early, the third step of the decision-making process would likely be positive.

Purpose and Objectives

The purpose of this study was to identify Oklahoma consumers' knowledge about ethanol-blended gasoline. This study also sought to identify consumer perceptions on the importance and benefits of ethanol-blended gasoline. To accomplish the purpose of this study, the following objectives were established:

1) To determine Oklahoma consumers' knowledge and perceptions of ethanol-blended gasoline.
2) To identify the importance to Oklahoma consumers of cost, environmental impact, and performance of ethanol-blended gasoline.
3) To determine Oklahoma consumers' perceived benefits of ethanol-blended gasoline.

Methods and Procedures

This was a descriptive study of registered voters in Oklahoma. Quantitative data were collected using Likert-type questions on a mail survey. Descriptive research is used to obtain information concerning the current status of the phenomena to describe "what exists" with respect to variables or conditions in the situation (Key, 1997).

Population

The population for this study was registered voters in Oklahoma. The sample was stratified to assure each county would have proportional representation. The number of

voters in each county was divided by the total voters in the state. Each county was represented in the survey by the proportion calculated. Registered voter information for approximately two million registered voters was acquired from the Oklahoma State Election Board. For a study with the aforementioned population, Dillman (2000) suggests the minimum number of respondents should be 384 to obtain a 95 percent confidence level and a sampling error of +/-5 percent. Assuming a 20 percent response rate and an additional 20 percent for incorrect addresses in the database, the sample for this study was established at 2400 registered voters.

Instrument

The instrument was a mail survey with demographic (gender, educational level, annual income, age, and location of household), perception, and knowledge questions. Perception and knowledge were addressed using Likert-type scale questions. A panel of experts was used to account for face and content validity. Changes were made to the instrument based on suggestions made by the panel. A pilot test was used to measure the reliability of the instrument. Cronbach's alpha conducted on the pilot results showed an alpha of 0.828. After data collection on the survey sample, Cronbach's alpha was recalculated resulting in an alpha of 0.887.

Data Collection

In this study, data were collected by a mail survey, following the Dillman (2000) *Tailored Design Method*, with some modifications to the number of mailings (i.e., four in place of five mailings, and the use of postcards instead of letters). The data collection process was started on September 19, 2002, and continued until November 15, 2002. Following this modified *Tailored Design Method* (Dillman, 2000), 685 people responded for a response rate of 37.6 percent of valid addresses.

Non-response error was calculated using two techniques. The first technique compared the respondents prior to the cutoff date (November 15, 2002) to the 34 individuals who responded after that date. The assumption was that the individuals who responded after the cutoff date represented the same population as non-respondents. The second technique used was comparing early to late respondents. The 34 respondents who responded after November 15 were compared to the first 34 respondents, giving an early to late respondent comparison (Linder, Murphy, and Briers, 2001). After testing these two methods, it was concluded that non-response error was not an issue as both tests indicated minimal differences.

Analysis of Data

Inferential statistics were used in interpreting data. Results of Likert-type questions were reported with percentages or frequencies for each response as well as the median. Statistical significance was tested using Chi-Square analysis.

Chi-Square tests if the observed set of frequencies arose from an expected set (Shavelson, 1996). A Chi-Square value that resulted in a 99% confidence level was determined to be highly significant while a 95% confidence level was significant. According to Steel and Torrie (1960) if a significant level is found between 5% and 1% it

is significant, if a value is found to be 1% or less it is highly significant. Chi-Square values that were significant or highly significant were tested further using the Cramer's V calculation.

Cramer's V was used to measure the strength of relationship. "It is almost always necessary to include some index of effect size or strength of relationship (American Psychological Association, 2001, pp 25-26)" when discussing relationships.

Corbett and Norrander (2003) observed that because survey data produces lower correlations than data based on aggregates, the following guidelines should be used to assess the strength of Cramer's V.

- If V is less than 0.10, the relationship is very weak or nonexistent.
- If V is between 0.10 and 0.25, the relationship is moderate.
- If V is over 0.25, the relationship is strong.

Results

The situational questions (Table 1) were analyzed to find a ranking of three variables: environmental impact, performance, and cost. Six questions were identified for environmental impact and performance, and 12 questions were identified for cost. Eight questions were written in such a way that each could be used to measure two variables. Only questions with a positive or negative response were used for the rankings. It was determined that the neutral condition questions did not measure the desired variable, only the other variable contained in the question. Each question was paired with its sister question (i.e., the same question with the opposite condition for the variable being tested). For example, "cost is equal and performance increases" is paired with "cost is equal and performance decreases." The negative condition question response was subtracted from the positive condition question response. This resulted in three answers for each environmental impact and performance, and six answers for cost. If a respondent did not answer or answered "no opinion" to a question, that question and its sister were removed from the analysis. A mean was calculated for each variable from each respondent. A final mean for each variable was calculated from all respondents.

Ranking Variables

The ranking of the variables environmental impact, vehicle performance, and cost were calculated from the series of sixteen questions involving those variables as described earlier. The variables were placed in order from most to least important. The ranking was conducted for each category in each demographic area. There was no change in ranking for each demographic, only a change in scores. Results show that cost is the most important factor followed by environmental impact and vehicle performance.

Vehicle Performance

Participants were asked to indicate how their vehicle would perform if they switched to ethanol-blended gasoline. Of the 685 respondents, the majority (52.4%) indicated that the performance would "not change" (Table 2). Of the remaining

respondents, 25.7% indicated an increase in performance and 21.8% indicated a decrease. Chi-Square was calculated on each demographic and the question regarding vehicle performance using ethanol-blended gasoline. Income was different from the expected values with a Chi-Square value of 45.989 and 20 degrees of freedom. The Cramer's V calculation (v = 0.156) indicated a moderate relationship.

Table 1

Situational questions for ranking in which the respondents would purchase ethanol-blended gasoline over current gasoline

	Responses, %				
	SA[a]	A	D	SD	NO
Q1. Cost is equal and environmental impact is positive	43.1[+]	41.6	4.8	2.7	7.7
Q2. Cost is equal and environmental impact is negative	3.3	4.3	34.8[+]	48.6	9.0
Q3. Cost is higher and environmental impact is equal	2.0	10.8	41.0[+]	38.2	8.0
Q4. Cost is higher and environmental impact is positive	6.7	30.5	34.2[+]	18.1	9.6
Q5. Cost is higher and environmental impact is negative	1.1	2.6	23.7	62.9[+]	9.7
Q6. Cost is lower and environmental impact is equal	38.4	43.2[+]	7.3	3.8	7.4
Q7. Cost is lower and environmental impact is positive	58.5[+]	27.4	5.0	2.7	6.5
Q8. Cost is lower and environmental impact is negative	3.7	9.0	41.4[+]	35.9	10.0
Q9. Cost is equal and performance is improved	56.4[+]	32.6	2.7	2.2	6.0
Q10. Cost is equal and performance declines	0.3	2.3	38.6	50.1[+]	7.8
Q11. Cost is higher and performance is equal	2.6	14.3	43.7[+]	30.8	8.6
Q12. Cost is higher and performance is improved	8.2	37.0[+]	29.2	15.2	10.5
Q13. Cost is higher and performance declines	1.1	1.1	29.2	64.8[+]	5.9
Q14. Cost is lower and performance is equal	25.8	60.0[+]	5.2	3.3	5.7
Q15. Cost is lower and performance is improved	63.2[+]	29.0	1.3	1.3	5.1
Q16. Cost is lower and performance declines	0.3	3.0	46.1[+]	43.9	6.7

[+]median; [a]SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree, NO = No Opinion.

Table 2

Percent of responses to "The performance of my vehicle will…"

Greatly Increase	Increase	Not Change	Decrease	Greatly Decrease
3.6	22.1	52.4	18.2	3.6

Economy

Participants indicated what effect ethanol will have on Oklahoma's economy. A majority of respondents (60.3%) indicated the effect would be positive or very positive (Table 3). Additionally, 29.3% of respondents indicated ethanol would not change

Oklahoma's economy. The remaining 10.3% responded that it would have a negative effect. Demographics were crosstabulated with ethanol's effect on the economy to identify differences among characteristics. Age had a Chi-Square value of 38.918 and 24 degrees of freedom making it different than expected. The Cramer's V of 0.028 indicates a weak relationship between the question and age.

Table 3

Percent of responses to "Ethanol's effect on Oklahoma's economy will be"

Very Positive	Positive	No Change	Negative	Very Negative
11.0	49.3	29.3	9.1	1.2

Greatest Potential Benefit

A majority of respondents (59.2%) indicated a reduction of foreign oil dependency was the greatest potential benefit. The second and third highest responses were for environmental benefit and improved rural economy, 19.1% and 14.7%, respectively. A small group (1.8%) indicated a decrease in the federal trade deficit was the greatest benefit, and 5.1% indicated the greatest benefit would not be one of the available answers (Table 4). The greatest potential benefit was crosstabulated with the demographics. Each was different from the expected except, "where do you live." Gender had a Chi-Square value of 17.147 and 4 degrees of freedom, education level had a Chi-Square value of 26.610 with 16 degrees of freedom, income level had a Chi-Square value of 34.886 and 20 degrees of freedom, and age had a Chi-Square value of 47.383 and 24 degrees of freedom. All relationships were moderate when Cramer's V calculations were made. Gender had a Cramer's V of 0.169, education level 0.105, annual income 0.126, and age 0.140.

Table 4

Percent of responses "The greatest potential benefit from the use of ethanol-blended gasoline"

Foreign Oil reduction	Environmental Benefit	Rural Agricultural Economy	Decrease Trade Deficit	None of the Above
59.2	19.1	14.7	1.8	5.1

Gasoline

A majority of respondents (82.8%) agreed that gasoline has a negative impact on the environment (Table 5). Respondents who disagreed or had no opinion comprised the remaining 17.2%. Chi-Square values indicated a significant relationship between the gasoline question and gender considering opinion versus no opinion (Table 6). Cramer's V resulted in a weak strength of association. Both males and females tend to answer with an opinion.

Ethanol is Better for Environment

A majority of respondents (57.7%) indicated that ethanol is better for the environment than current gasoline (Table 5). A significant relationship (Table 6) was calculated with educational level when looking at opinions. A moderate relationship was indicated by the Cramer's V with a score of 0.133. Observation of responses shows that individuals without a high school diploma have the lowest rate of agreement. Those with a high school diploma or GED had the highest rate of agreement. Relationships were also calculated with gender and age considering opinion and no opinion. Gender had a significant relationship with a weak association. Males and females had similar rates of opinion with males having a slightly higher rate. A highly significant relationship with a strong association was found with age. The majority of respondents within the range of 26-35 responded with no opinion. All other age ranges had a majority with opinions, with the 18-25 age range having the lowest at 54%.

Table 5

Percent of responses agree/disagree questions

Question	Responses					
	SA[a]	A	D	SD	Total Opinions	No Opinion
Q20. Gasoline Adversely Affects Air Quality	26.2	56.6	6.8	3.0	92.6	7.4
Q21. Ethanol is Better for Environment	13.9	43.8	5.4	2.2	65.3	34.7
Q22. Ethanol Harmful to an Engine	2.9	9.5	24.0	9.3	45.7	54.3
Q23. I Would Buy Ethanol-blended Gasoline	12.8	50.4	7.2	4.5	74.9	25.1

[a]SA = Strongly Agree, A = Agree, D = Disagree, SD = Strongly Disagree

Table 6

Significant relationships between agree/disagree questions and demographics

Opinion	Gender	Education Level	Annual Income	Age	Location of Home
Q20. Gasoline Adversely Affects Air Quality					
Q21. Ethanol is Better for Environment		*			
Q22. Ethanol Harmful to an Engine			*		
Q23. I Would Buy Ethanol-blended Gasoline					
Opinion vs. No Opinion					
Q20. Gasoline Adversely Affects Air Quality	*				
Q21. Ethanol is Better for Environment	*			**	
Q22. Ethanol Harmful to an Engine	**			*	
Q23. I Would Buy Ethanol-blended Gasoline				**	

* $p<0.05$, ** $p<0.01$.

Harmful to an Engine

Respondents were asked if ethanol was harmful to a vehicle's engine. The majority of the individuals responded with "no opinion" (Table 5). A significant relationship (Table 6) exists between the harmful to an engine question and annual income when considering opinions. Those respondents with an income below $15,000 had the lowest rate of disagreement with the question, while the highest rate of disagreement was observed with the $45,001 - $60,000 income level. This relationship was a moderately strong association. When computing relationships within opinion versus no opinion, gender was found to be highly significant with a moderate association. The majority of males indicated they had an opinion and the majority of females indicated they did not have an opinion. A significant relationship was calculated with age using Chi-Square, and Cramer's V indicated a moderate association with a value of 0144. The majority within each of the age ranges answered with no opinion except the 56-65 and 76 and older.

Purchasing Ethanol-Blended Gasoline

Respondents were asked if they would purchase ethanol-blended gasoline if it were available at their local gas station. The majority (63.2%) indicated they would purchase ethanol-blended gasoline if it were available (Table 5). One significant relationship exists with the purchasing question (Table 6). Within opinion versus no opinion, age had a highly significant relationship with a moderate association. The general trend shows the older the respondent, the higher the rate of opinion.

Conclusions/Recommendations/Implications

Conclusions Related To Objective 1: Consumers' knowledge and perceptions

1. The general public is lacking information about ethanol-blended gasoline. The high proportion of respondents indicating no opinion reflects a lack of information or that an individual does not trust their information enough to make an opinion. Rogers (1995) states the first step of the innovation-decision process is to collect knowledge, and the second is to form an attitude toward the innovation. Without knowledge, these groups of people cannot make an opinion.

2. Registered voters perceive ethanol-blended gasoline as better for the environment than current gasoline. Men tend to agree more than women. Argonne National Laboratory's (2001) research indicates that these people are correct.

3. Ethanol-blended gasoline is perceived to not change a vehicles performance. Argonne National Laboratory (2001) indicated that the 52.4% of the respondents answered that the performance of their vehicle would not change.

Conclusion Related To Objective 2: Importance of variables

Cost is the most important factor when the general public makes the decision to purchase ethanol-blended gasoline. Cost is a variable in which education does not directly have a role. The price at the pump has more impact on ethanol-blended gasoline than environmental impact or performance. As long as the price is lower than or equal to current gasoline, residents of Oklahoma will purchase ethanol-blended gasoline.

Conclusions Related To Objective 3: Perceived benefits

1. The public perceives ethanol as a positive potential influence on the Oklahoma economy..

2. A vast majority of registered voters indicate ethanol will not have a negative effect or no effect on the economy of Oklahoma. One possible explanation is related to the petroleum industry. If ethanol is displacing gasoline, then it is displacing oil. Oil imports increased during the past 50 years while oil production in the United States declined (U. S. Department of Energy, 2002). With increasing oil imports, ethanol will not affect domestic oil, it will add an additional energy market to the state.

3. The general public lacks information about the environmental differences between gasoline and ethanol-blended gasoline. Gasoline has been linked to air pollution problems and was addressed by the U.S. government in the Energy Policy Act of 1992. The response to this question shows that this is still a concern for the general public. Argonne National Laboratory (2001) has determined that ethanol-blended gasoline is better for the environment. This brings forward another area that education must address.

4. The general public perceives a reduction of foreign oil dependency as the greatest potential benefit from ethanol-blended gasoline. The media during the past few years has covered the debate about drilling for more domestic oil. Imported oil has been a major portion of the debate. This may be one of the factors making reduction of foreign oil dependency high on the list.

5. All demographic variables are in agreement with the greatest potential benefit of a reduction in foreign oil dependency. This response is uniform across all demographic areas. The second highest response varies among demographic areas, but it is limited to "environmental benefit" and "improved rural agricultural economy."

Conclusions for General Question: Purchasing ethanol-blended gasoline

1. An introduction of ethanol-blended gasoline in Oklahoma will be successful. Participants indicated they would buy ethanol-blended gasoline if it were available.

2. Respondents between 18 and 35 have the highest rate of no opinion, with respondents 75 years and older having the lowest rate of no opinion.

Recommendations

1. Although there was a slightly positive perception of ethanol, the amount of education available in Oklahoma must be increased. The high percentage of "no opinion" answers indicates that education is needed. Adults should be targeted because they are current consumers. Older youth should also be targeted because they are future consumers and a conduit to influence parents.

2. Education materials being developed must inform the public on environmental benefits. The general public does not appear to fully understand the environmental benefits of ethanol-blended gasoline. Most of the research on ethanol-blended gasoline indicates that environmental impact provides some of the greatest benefits of using ethanol-blended gasoline.

3. Facts related to the United States' dependency on foreign oil must be presented to the public. The reduction of foreign oil dependency is a major benefit of ethanol-blended gasoline. For this potential benefit to help the ethanol industry, the public must be continually informed about imported oil displacement.

4. At this time, it appears ethanol-blended gasoline has a slightly positive perception. Therefore, an introduction of ethanol into the fuel markets of Oklahoma should be successful. Prices should be kept at the same price or lower than gasoline until education can assist ethanol use.

5. Research should be expanded to survey individuals who are directly related to the petroleum industry to determine their knowledge and perceptions of ethanol. The petroleum industry is directly related to promotion of fuels at filling stations. If

there is a negative perception toward ethanol-blended gasoline it will be reflected in the promotion.

6. This study should be conducted again in approximately four years to identify additional educational needs.

Implications

Prior to this study, the knowledge and perceptions of ethanol in Oklahoma were not known. It was the assumption of those associated with the Conversion of Low-Cost Biomass to Ethanol project that because ethanol would compete with oil it might not be readily accepted. This study has shown that much of the public would buy ethanol-blended gasoline. Even so, a large portion of the public is still undecided or not in favor of ethanol-blended gasoline. It is implied that an intensive education program is needed to change the perceptions of consumers. This research has shown that educational materials produced must stress the environmental impact of ethanol-blended gasoline compared to gasoline.

Ethanol-blended gasoline may have a successful introduction into the Oklahoma markets, but if prices are not kept lower than gasoline, the market may not be sustained. The public must be informed of the benefits of ethanol-blended gasoline.

Acknowledgements

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Oklahoma Consumer's Knowledge and Perceptions of Ethanol-Blended Gasoline

Discussant Comments

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This research paper describes a study to identify Oklahoma consumers' knowledge and perceptions of ethanol-blended gasoline. The study sought to identify the importance of cost, environmental, and engine performance factors to consumers; and to determine the perceived benefits of using ethanol-blended gasoline.

The focus of the research problem addresses a topic of critical importance to a state with an economy that is heavily dependent on crude oil production and refinement to produce gasoline. Knowledge of consumer perceptions that influence the acceptability and demand for ethanol-blended gasoline will help to guide future public relations, education, and marketing strategies to promote the adoption and use of the hybrid fuel. Therefore, the results of this study may have far-reaching implications for energy use and on the state's economy and environment.

The Introduction/Theoretical Framework section of the paper encompassed a broad cross-section of topics ranging from crude oil production to adoption/diffusion theory. The authors are encouraged to assist readers by presenting and documenting a more focused description of a conceptual framework to provide a context for the research paper. The paragraphs included in this section, seemed to lack continuity and the transitions between paragraphs were difficult to comprehend. In addition, grammar and sentence structure should be carefully reviewed to ensure the intended meaning is appropriately and accurately conveyed to any potential reader. In general, the writing quality was somewhat below the standard that should be established and maintained for scholarly writing in our discipline.

The methodology reported in the paper appeared to be appropriate to fulfill the purpose outlined for the study. However, more information regarding the selection of the sample (e.g., especially with regard to randomness) and development of the instrument (e.g., number of items, etc.) would have been helpful. This reader was confused about the use of Chi-Square analysis for the data collected using Likert-type questions. A more detailed description of the response scale and data analysis procedures would have added clarity to the data analysis procedures. It would also be interesting to learn more about the rationale for including statements combining two concepts (among cost, environment, and performance) into a single response item. This procedure seemed to violate a basic premise of survey research, which recommends limiting individual items to a single concept.

The Results presented in the paper seemed to move well beyond what was needed to fulfill the stated objectives. For example, although it may have been interesting to analyze the relationship between demographic variables and respondent perceptions of ethanol use, this analysis seemed to have confounded the focus of the study. The authors

are encouraged to limit their report to the data and analysis needed to fulfill the stated objectives..
Conclusions/Recommendations/Implications should provide a synthesis of the results of the study and move the reader toward logical action steps, based on the findings and conclusions. Implications should define the anticipated outcomes following implementation of the recommendations. The conclusions presented in the paper were accompanied by statements that detracted from the basic premise of the conclusion itself. The authors are encouraged to carefully review and critique their writing style to ensure that the content is complete, accurate, and provides a smooth transition between concepts (paragraphs).

The following questions are provided as an opportunity reflect on topics that should be examined for improving future research efforts.

1. How does the Introduction/Theoretical Framework lead the reader to a general understanding of the context of the research problem?

2. What variables were tested to assess non-response error?

3. How were rankings for the variables of environment impact, vehicle performance, and cost determined?

4. Why were demographic variables analyzed if the research questions could have been answered without that information?

Comparative Assessment of Student Agricultural Literacy In Selected Agriculture in the Classroom Programs

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Abstract

Agriculture in the Classroom (AITC) was formalized 21 years ago by the United States Department of Agriculture (USDA) and was perhaps the largest effort at meeting a nationally recognized need of agricultural literacy for every K –12 student (NRC, 1988). AITC's purpose was to infuse agricultural concepts into the basic subject areas of the elementary school curriculum (Law, 1990). The purpose of this quasi-experimental study was to assess change in student agricultural knowledge after implementing AITC programs and identify strengths and weaknesses of student knowledge according to the five thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework. The experimental group was comprised of selected classrooms (K-6) with AITC trained teachers in Arizona, Montana, Oklahoma and Utah. The control group was comprised of selected classrooms (K-6) in the same states with teachers who had no exposure to AITC. Pretest and posttest mean score comparisons by grade groupings and the five thematic areas in the FFSL Framework resulted in significant differences of knowledge gains in all four grade groupings between the AITC treatment and control groups. Two thematic areas yielded the greatest knowledge gains in the treatment group: Theme 1 - Understanding Agriculture; and Theme 2 - History, Geography & Culture. The study concluded that AITC training of teachers makes a positive difference in student acquisition of knowledge about agriculture.

Introduction

America's food and fiber systems determine the nations' general welfare and standard of living. Today, nearly ninety percent of the population is two or three generations removed from direct contact with food and fiber production (Leising and Zilbert, 1994). As a result, youth know little about agricultural production, processing, marketing, distribution, regulation or research.

According to the National Research Council ([NRC] 1988) all students, beginning in kindergarten and continuing through twelfth grade, should receive agricultural literacy

instruction. One program designed to address this need was Agriculture in the Classroom (AITC), formalized by the United States Department of Agriculture (USDA) in 1981. In 1982, *The Model State Action Plan* was disseminated by the USDA on how to begin, organize and implement an AITC program. These programs were set up in every state and traditionally organized through state departments of agriculture and/or education and farm organizations such as Farm Bureau (Traxler, 1990).

While states have not been bound by USDA goals for AITC, many states have developed their own goals and objectives, much like those in Illinois. Illinois' state AITC goals are to: "(a) provide for a systematic infusion of agricultural concepts into the basic subject areas of the curriculum, and (b) to provide in-service training to teachers of the basic subject areas in order to provide necessary background information for incorporation of agricultural knowledge into their respective subject areas" (Law, 1990, p. 6).

To accomplish such goals many state AITC programs have developed instructional materials and held teacher-training workshops, but few have conducted on-going assessments to determine what agricultural knowledge students were learning. Therefore, baseline data was needed to ascertain what students were learning about agriculture from AITC trained teachers. Such findings could provide key indicators of progress being made toward the achievement of program goals. By identifying where gaps in student knowledge of agriculture occur, program leaders would be better able to focus efforts in instructional material development and teacher training.

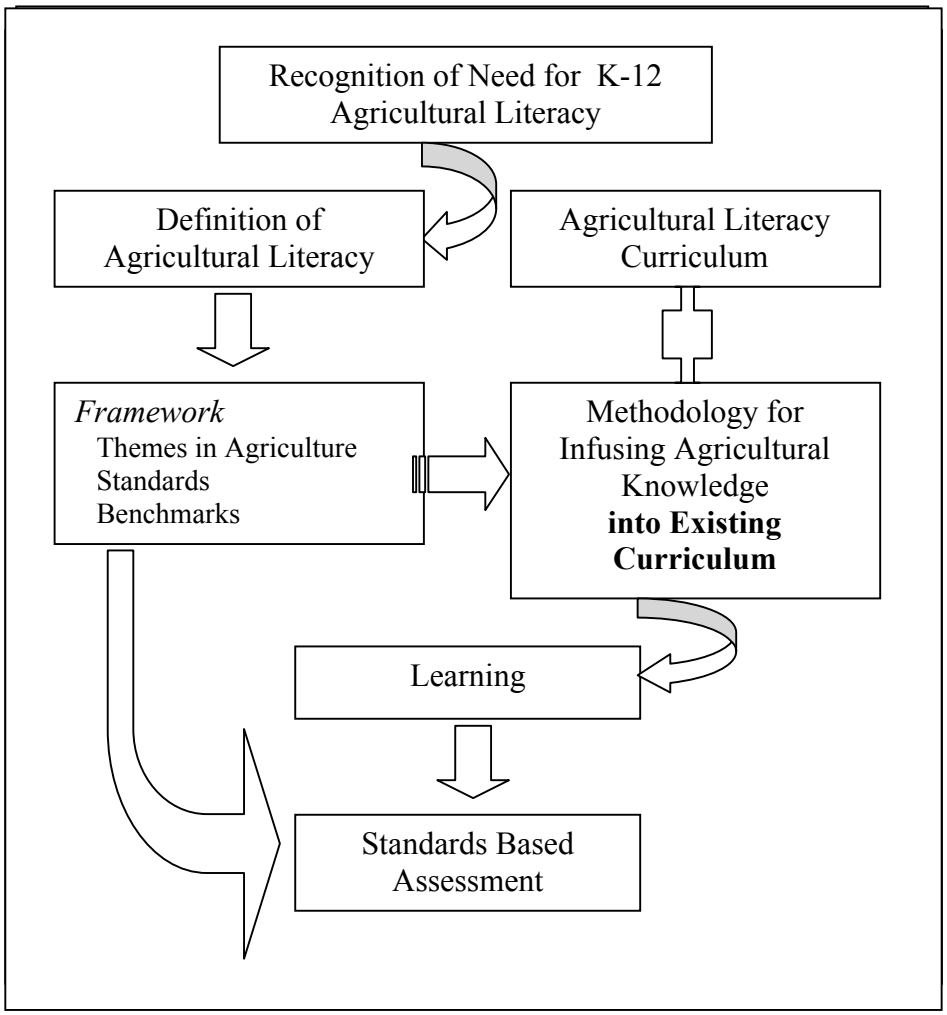
Theoretical Framework

Conceptual Model

Laying a foundation for a conceptual model (Figure 1), the Committee on Agricultural Education in Secondary Schools began to develop the idea of “agricultural literacy” and proposed that an agriculturally literate person would understand the food and fiber system in relation to its history, economic, social, and environmental significance (NRC, 1988). Later, Frick (1990) reported one of the first conclusive agricultural literacy definitions: "Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system… An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p.52).

Nunnery (1996) later proposed the development of a literacy framework for understanding agriculture's perspectives and viewpoints. Leising and Zilbert (1994) approached agricultural literacy from the same angle and developed a systematic curriculum framework identifying what students should know or be able to do. The Food and Fiber Systems Literacy (FFSL) Framework outlined what an agriculturally literate high school graduate should comprehend. By providing standards in five thematic areas of agriculture, the FFSL framework delineated the necessary components of a curriculum

Figure 1. Conceptual Model of the Food & Fiber Systems Literacy Framework role in the development of agricultural literacy (Leising, Pense and Portillo, 2003, p. 4).



framework for understanding the way food and fiber systems relate to daily life. Breaking the standards into grade-grouped benchmarks (K-1, 2-3, 4-5, 6-8, 9-12), the framework provided a systematic means of addressing agricultural literacy.

This study employed the FFSL Framework standards and benchmarks as the basis for assessing student knowledge about agriculture. Figure 1 displays the conceptual model.

Agricultural Literacy Assessment

Much of the agricultural literacy research has focused on teacher perceptions and knowledge of agriculture, assessment of instructional materials, and the defining of agricultural literacy (Elliot & Frick, 1995; Harris & Birkenholz, 1993; Pals, 1998a,b). In evaluating the Georgia Agriculture in the Classroom program, however, Herren and Oakley (1995) developed instruments to assess student agricultural knowledge at the second and fourth grade levels and concluded that Agriculture in the Classroom programs were effective in teaching agricultural concepts in both rural and urban settings. Swortzel (1996) reported an Ohio study assessing fourth-graders' knowledge of animal agriculture. A pretest/posttest design was used and a statistically significant difference was shown between the two test scores with greater gains for students living in urban areas. A standards-based assessment of student agricultural knowledge, however, was yet to be conducted.

Igo (l998) studied three schools (K-8) that used the FFSL Framework for infusing agriculture into the core curriculum. He found that it was possible to use the standards and grade-grouped benchmarks to infuse instruction about agriculture and increase student knowledge of agriculture. Also, Igo reported strong relationships between student agricultural knowledge gains and the number of instructional connections teachers made to the FFSL Framework.

The USDA conducted an evaluation of the AITC program in 1988 at the National AITC Conference in Las Vegas by surveying each of their state directors (USDA, 1988). A series of questions regarding the major facets of the state and national programs provided data about program status and recommendations for program improvement. In addition to identifying strengths and successes of the AITC program, survey respondents called for guidelines that would direct the development and evaluation of educational materials. Their report stressed the need to conduct national and state evaluations of AITC's impact on K-12 students.

Purposes and Objectives

The purpose of this study was to assess student agricultural knowledge of selected public school classrooms in kindergarten through sixth grade that had received instruction from teachers trained by Agriculture in the Classroom (AITC), and to determine whether AITC programs resulted in higher student achievement of agricultural knowledge. The study also sought to determine if differences existed in achievement scores between treatment and control grade-grouped classrooms, and to identify strengths and weaknesses of student agricultural knowledge according to the five thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework. The specific objectives of the study were:

1. Compare differences by grade grouping (K-1, 2-3, 4-5, 6) between the AITC treatment group and control group in student knowledge about agriculture, before and after instruction, based on the FFSL Framework.

2. Compare differences by grade grouping between the AITC treatment group and control group in student knowledge about agriculture, before and after instruction, using the five thematic areas of the FFSL Framework.

3. Develop a profile of student knowledge about agriculture, before and after instruction, for each grade grouping.

Methods and Procedures

This study was a quasi-experimental nonequivalent control group design, using a pretest and posttest, described by Campbell and Stanley (l963). The treatment group was comprised of selected classrooms (K-6) with Agriculture in the Classroom (AITC) trained teachers. The control group was comprised of selected classrooms (K-6) with teachers who had no exposure to AITC and were similar to the treatment groups in geographic location and size of schools. A pretest and posttest were given to students to measure their knowledge about agriculture.

A project external advisory committee of state AITC coordinators and United States Department of Agriculture (USDA) AITC staff recommended states for participation in the study, and four of the recommended states agreed to participate: Arizona, Montana, Oklahoma and Utah. Project staff collaborated with AITC coordinators in the four states to select the teachers/classrooms for inclusion in the study.

The population for this study included 52 treatment classrooms and 48 control classrooms (1,734 students). Each of the treatment and control groups included two classrooms in each grade level (K-1, 1-2, 3-4, and 6).

Instrumentation

To control for existing knowledge of food and fiber systems and to determine similarity, students in the treatment and control groups were administered the same

pretest at the beginning of the school year. The pretest and posttest instruments, the Food and Fiber Systems Literacy (FFSL) Tests, were the same (Leising, Pense & Igo, 2001).

The FFSL tests were developed for measuring food and fiber systems knowledge for each grade grouping in the Food and Fiber Systems Literacy Framework; K-1, 2-3, 4-5 and 6. Questions on each instrument were based on the grade-grouped benchmarks. The K-1 and 2-3 instruments included 16 and 21 items respectively. Both primarily used a format consisting of questions to be read by the teacher followed by a series of illustrations from which the students were to select the correct answer or answers. The K-1 instrument responses were entirely pictures, while the 2-3 instrument used picture and simple text responses. The 4-5 and 6 grade level instruments contained 35 and 30 text-responses respectively. The instruments had been used in earlier studies and had reliability coefficients ranging from 0.7763 to 0.9469 (Leising, Pense & Igo, 2001).

Treatment and Control Groups

The treatment group consisted of teachers/classrooms who had received organized education about agriculture from their state Agriculture in the Classroom (AITC) program. The teachers/classrooms were purposely selected by each state's AITC coordinator because they had demonstrated success in integrating agriculture into their classrooms.

The control group consisted of teachers/classrooms in the same four states from which the treatment group was taken. Criteria for selecting the two teachers/classrooms for each of the seven grade levels in the control group included geographic location and size of schools similar to the treatment group, and no AITC training or integration of agriculture into their classrooms/ school.

Data Collection

The student pretest was administered to the treatment and control groups during September/October, 2001 and prior to any training about agriculture. Teachers at the test sites administered posttests in March/April, 2002 only to those students who had been pretested. Project staff prepared directions/procedures for collecting the data from each site and trained the AITC coordinators in methods for administering the instruments to teachers and students. Completed instruments were collected by the AITC coordinators and returned to the researchers by mail.

Data Analysis

Upon completion of pretesting, tests were scored and coded into a Microsoft™ Excel spreadsheet for analysis. The posttest data were coded in the same manner following the administration and retrieval of those instruments, and SAS version 8.2 and SPSS version 8.0 were used to perform all statistical procedures analyzing data for both pretests and posttests in conjunction with the purpose and objectives of the study.

Means and percentages were computed by grade-level grouping for the test scores from both groups. Analysis of variance procedures were performed to determine

differences in pretest and posttest knowledge scores. The analyses included the General Linear Model's procedure and computation of Least Squares Means. A Pearson's Product Moment Correlation was computed to assess relationships between pre- and posttest differences and demographic variables. Inferential statistics were used only as a guide in understanding the differences of agricultural knowledge between type of student and type of school. The size of the population aided in meeting the three assumptions Keppel (1991) cites for employing inferential statistics.

Findings

Objective 1: Compare differences by grade grouping (K-1, 2-3, 4-5, 6) between the Agriculture in the Classroom (AITC) *treatment group and control group in student knowledge about agriculture, before and after instruction, based on the Food and Fiber Systems Literacy (FFSL) Framework.*

Data in Table 1 summarized grade groupings for *AITC* treatment and control groups by pretest and posttest mean scores, and mean score differences. The pretest mean scores of the treatment and control groups indicated no differences in knowledge about agriculture at each grade grouping. Posttest mean scores for the treatment group were higher than the posttest mean scores of the control group.

Grade 6 of the treatment group demonstrated the largest pre-posttest difference in mean scores (Table 1), while grade 6 in the control group showed the smallest pre-posttest difference in mean scores. The K-1 treatment group had the smallest mean increase in pre-posttest agricultural knowledge score of ten points among the four grade groupings. The largest mean increase in pre-posttest scores was 22 points (grade 6). None of the control group's mean increase in pre-posttest scores at each grade grouping was more than 7 points. Two of the grade groupings had less than a 5-point increase in pre-posttest scores.

Table 1.
Summary of Grade Groupings for AITC Treatment and Control by Pretest and Posttest Mean Scores and Mean Score Differences

	Treatment					Control				
	Pretest		*Posttest*		Diff	Pretest		*Posttest*		*Diff*
Grade	*M*	*SD*	*M*	S		*M*	*SD*	*M*	S	
				D					D	
K-1	53.64	12.44	67.31	9.78	13.67	51.36	13.00	58.26	12.73	6.90
2-3	73.08	13.25	84.55	15.03	11.47	74.39	12.84	78.77	15.90	4.38
4-5	54.84	12.16	68.00	15.47	13.16	51.50	13.44	56.86	13.82	5.36
6	48.16	11.47	66.59	21.78	18.43	47.23	11.74	50.98	11.32	3.75

Note: Difference (Diff) was calculated as posttest minus pretest.

In order to determine if a difference existed between students' agricultural knowledge by AITC trained teachers and non-AITC trained teachers, an analysis of variance procedure was used. Since classroom was the experimental unit in this unbalanced design, students' mean pretest scores for each classroom was determined and held constant as a covariate to estimate a difference in mean gain scores. Therefore, Data in Table 2 compared the difference of mean gain scores between AITC treatment and control groups for grade groupings (K-1, 2-3, 4-5, 6).

Data for each of the four grade levels demonstrated students in the treatment group had a higher overall gain in agricultural knowledge than students in the control group The difference in mean gain scores at each grade level was statistically significant between the AITC treatment and control groups at the .05 level.

Table 2.
Comparison of Mean Gain Scores between AITC Treatment and Control for Grade Groupings K-6

Grade Grouping	Estimate	*SD*	*df*	*t*	*p*	*CI*
K-1st						
Difference	7.20	1.68	20.7	4.30*	0.0003	(3.72,10.69)
2nd-3rd						
Difference	6.11	2.67	24.9	2.29*	0.0307	(0.62,11.61)
4th-5th						
Difference	9.24	2.89	24.4	3.19*	0.0038	(3.28,15.21)
6th						
Difference	16.03	6.79	7.45	2.36*	0.0483	(0.16,31.90)

Note. Gain scores were calculated by posttest minus pretest. Mean pretest scores were used as a covariate in a mixed linear model design. Degrees of freedom were Satterthwaite. *$p < .05$, two-tailed. Values enclosed in parentheses represented the lower and upper bound confidence interval.

Treatment/Control Group Differences and
Student Agricultural Knowledge Profile by Grade Level and Theme

Objective 2: Compare differences by grade grouping between the AITC treatment group and control group in student knowledge about agriculture, before and after instruction, using the five thematic areas of the FFSL Framework.

Objective 3: Develop a profile of student knowledge about agriculture, before and after instruction, for each grade grouping.

Tables 3 & 4 provide a summary of mean test scores, posttest mean percent scores, and comparisons of the pretest and posttest score gains by grade groupings within theme areas for the treatment group and control group. The treatment and control groups in the K-1 grade group were most knowledgeable about Theme 5 (Food, Nutrition, & Health), while the other three grade groupings scored low or lowest in the same thematic area.

The 2-3 treatment group was most knowledgeable about Theme 1 (Understanding Agriculture) followed by Theme 2 (History, Geography, & Culture). They were least knowledgeable about Theme 5 (Food, Nutrition, & Health) followed by Theme 4 (Business & Economics). The control group was most knowledgeable about Theme 1 (Understanding Agriculture) and least knowledgeable about Theme 2 (History, Geography, & Culture).

Table 3.
Summary of Mean Pre/Posttest Scores and *Mean Posttest Percent Scores of AITC Treatment and Control Groups by Grade Level of Themes 1 & 2*

Theme & Grade	Treatment Pretest *M*	Treatment Pretest *SD*	Treatment *Posttest* *M*	Treatment *Posttest* D	Treatment Posttest % Score	Control Pretest *M*	Control Pretest *SD*	Control *Posttest* *M*	Control *Posttest* D	Control Posttest % Score
I. Understanding Agriculture										
K-1	14.16	4.23	17.38	3.77	82.76	12.98	4.49	14.85	3.83	70.71
2-3	21.10	4.95	25.06	3.75	83.52	21.50	4.90	23.51	4.06	78.38
4-5	17.41	4.32	20.87	4.18	71.97	16.82	4.32	18.47	4.61	63.69
6	11.70	3.69	16.58	7.33	63.77	11.24	3.47	11.33	3.24	43.59
II. History, Geography & Culture										
K-1	11.20	5.10	16.27	4.21	81.37	11.41	5.15	13.26	5.23	66.32
2-3	9.69	3.33	12.68	3.54	74.59	9.68	3.01	10.70	3.14	62.94
4-5	10.23	4.74	15.11	5.63	62.97	8.94	4.62	10.42	5.26	43.43
6	12.10	4.49	17.36	6.62	78.93	11.81	4.90	12.67	4.55	57.61

The 4-5 treatment group was most knowledgeable about Theme 3 (Science, Technology, and Environment) followed by Theme 1 (Understanding Agriculture). They were least knowledgeable about Theme 5 (Food, Nutrition, & Health). The 4-5 control group was most knowledgeable about Theme 3 (Science, Technology, & Environment) and least knowledgeable about Theme 5 (Food, Nutrition, & Health).

The sixth grade treatment group was most knowledgeable about Theme 2 (History, Geography, & Culture) followed by Theme 4 (Business & Economics), and was least knowledgeable about Theme 5 (Food, Nutrition, & Health). The control group was most knowledgeable about Theme 2 (History, Geography, & Culture) and least knowledgeable about Theme 1 (Understanding Agriculture).

Table 4.
Summary of Mean Pre/Posttest Scores and Mean Posttest Percent Scores of AITC Treatment and Control Groups by Grade Level of Themes 3, 4 & 5

Theme & Grade	Treatment Pretest *M*	Treatment Pretest *SD*	Treatment *Posttest* *M*	Treatment *Posttest* D	Treatment Posttest % Score	Control Pretest *M*	Control Pretest *SD*	Control *Posttest* *M*	Control *Posttest* D	Control Posttest % Score
III. Science & Environment										
K-1	9.58	2.38	11.35	1.81	87.28	9.08	2.55	10.08	2.44	77.53
2-3	15.83	4.27	18.04	4.22	72.17	16.47	3.56	17.31	4.07	69.24
4-5	11.55	4.11	13.10	4.27	72.80	10.09	4.11	11.74	4.04	65.21
6	6.34	4.04	10.64	4.93	66.47	6.36	3.73	7.95	4.21	49.71
IV. Business & Economics										
K-1	53.64	6.54	7.46	1.67	82.93	6.41	1.74	6.98	1.93	77.53
2-3	12.78	3.75	14.33	3.91	68.23	12.91	3.25	13.30	4.35	63.32
4-5	9.28	3.78	11.61	4.13	61.12	8.92	3.89	9.66	3.81	50.86
6	10.05	3.65	14.19	4.89	70.93	9.58	3.96	10.98	4.10	54.88
V. Food, Nutrition, & Health										
K-1	53.64	12.24	14.63	2.03	91.46	11.49	3.28	13.10	2.79	81.85
2-3	13.68	3.78	14.52	4.45	66.02	13.82	3.02	13.95	4.78	63.40
4-5	6.37	4.00	7.30	4.03	40.53	6.18	4.50	6.70	4.71	37.24
6	7.98	3.31	9.97	3.51	55.40	8.23	3.49	8.05	3.43	44.70

Conclusions

The conclusions were not to be generalized beyond the population within this research study. Examination and analysis of the major findings for each objective led to the following conclusions:

1. AITC training of teachers and teacher utilization of AITC curricular materials makes a positive difference in student acquisition of knowledge about agriculture.

2. Students in K-3 classrooms demonstrated on the posttest a thorough understanding about agriculture, while students in 4-6 classrooms showed a marginal understanding about agriculture. However, it was encouraging to find that students in grades 4-6 classrooms gained equal to or greater knowledge than students in K-3 classrooms over the duration of the study.

3. Students who were taught by AITC trained teachers were most knowledgeable about agriculture in the following thematic areas of the Food and Fiber Systems Literacy (FFSL) Framework:

   K-1 Theme 5 - Food, Nutrition & Health
   2-3 Theme 1 - Understanding Agriculture
   4-5 Theme 3 - Science, Technology & Environment
   6 Theme 2 - History, Geography & Culture

4. Students who were taught by AITC trained teachers were least knowledgeable about agriculture in the following thematic areas of the FFSL Framework:

   K-1 Theme 2 - History, Geography & Culture
   2-3 Theme 5 - Food, Nutrition & Health
   4-5 Theme 5 - Food, Nutrition & Health
   6 Theme 5 - Food, Nutrition & Health

5. Students who were taught by AITC trained teachers gained more knowledge in the following two thematic areas of the FFSL Framework:

   Theme 1 - Understanding Agriculture
   Theme 2 - History, Geography & Culture

6. Students who were taught by AITC trained teachers gained the least knowledge in the following three thematic areas of the FFSL Framework:

   Theme 3 - Science, Technology & Environment
   Theme 4 - Business & Economics
   Theme 5 - Food, Nutrition & Health

Implications and Recommendations

Based upon the conclusions and major findings of this research study, the following recommendations were made:

1. It was recommended that AITC coordinators in these states put more training emphasis on Themes 4 & 5 (Business & Economics; and Food, Nutrition, & Health).

2. It is recommended that research be conducted to determine if the same knowledge gaps exist in other state programs of AITC as those reported in this study.

3. Further research should be conducted to understand the differences that exist among AITC teacher training/in-service programs.

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Comparative Assessment of Student Agricultural Literacy
In Selected Agriculture in the Classroom Programs

Discussant Comments
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This paper presents the results of a study to assess the change in student knowledge of agriculture for selected K-6 grades in four states. The study employed pretest and posttest knowledge measures for students in four grade level groupings. The purpose of the study was to determine whether Ag in the Classroom (AITC) trained teachers produced higher student achievement scores on an agricultural knowledge test than did teachers without AITC training.

The authors should be commended for their efforts in conducting a study employing what was identified as a quasi-experimental design. In this era of accountability and with an increased emphasis on quality and rigor; there is added pressure to conduct more "experimental" research to serve as the basis for decisions affecting teaching and learning at every educational level (vis-a-vis No Child Left Behind). This study provides evidence to support the recommendation to provide AITC training for elementary teachers. It should also be noted that this study focused on the primary outcome measure of student achievement, as the basis for the analysis and subsequent recommendations.

This study appeared to have been planned and conducted on the basis of an implied hypothesis that students of AITC-trained teachers would produce higher knowledge gains than students of non-AITC trained teachers. Fortunately, the data collected and the subsequent analyses provided verifiable evidence in support of the research hypothesis, at least for the defined population. However, the authors appropriately noted that the generalizability of the study was limited. The authors also acknowledged the need to replicate the research in other states, in order to enhance the external validity of the study and its results.

In general, the paper was well-written and contributes to the knowledge base in the contexts of agricultural literacy, teacher training, and student achievement. The following questions are posed to provide an opportunity to reflect upon and discuss the potential for future research that can build upon the results of this study.

1. Since experimental designs are based on the concept of randomness, to what degree were teachers randomly selected or assigned to treatment groups?

2. In what ways did you control (or measure) potential differences between the treatment and control groups?

3. What did you define as the "treatment" variable in your research? (i.e., teacher training, AITC instruction? etc.)

4. How did the size of the population “aid in meeting the assumptions ” (Keppel, 1001) for employing inferential statistics?

5. How did you select the sample from the population of 52 treatment classrooms and 48 control classrooms? How many were selected in each group. [Note: The use of inferential statistics assumes the use of data from a representative sample.]

A Test of a Bimodal Survey Model on the Cooperative Communicators Association: A Case Study

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Abstract

Three hundred twenty-three members of the Cooperative Communicators Association were surveyed on educational preferences using a bimodal survey model recommend by Fraze, Hardin, Brashears, Smith, and Lockaby (2002). This model uses a combination of e-mail and paper contacts to encourage respondents to answer an online or paper questionnaire. Case study analysis was conducted to determine response rates, cost effectiveness, precision, and nonresponse error. An overall response rate of more than 71% resulted from use of the 25-day model. The researchers found that significant differences in item responses existed between respondents who used the World Wide Web and those who responded using traditional paper surveys, however the results of respondents were consistent with a random sample of nonrespondents; therefore, the researchers concluded that the results were an accurate representation of the population. Using the bimodal model was 74% less expensive than traditional methods of survey implementation. The bimodal model proved to be an effective, cost-controlling alternative to traditional survey methods for this population. The researchers suggested trials on other populations to validate the results reported here.

Introduction

Social science research has used surveys as a method of data collection for many years, but with the advent of the Internet, the process of survey implementation for social science research is changing rapidly. In a study of response rates to different modes of surveying, Hardin (2002) found that Texas agriscience teachers prefer answering paper surveys over Web surveys. However, she concluded that a bimodal method could reduce both costs and researcher time. She proposed a five-contact model that would allow respondents to answer the same survey either on the Web or on a traditional paper format. She also recommended that the model be tested on populations that have e-mail addresses to determine if responses would be valid and if response rates would be adequate.

The Cooperative Communicators Association (CCA) represented an excellent population on which to test the bimodal model. All members were computer literate, and a database of e-mail and mailing addresses already existed. The survey dealt with preferences and methods of educational program delivery for the CCA members and was conducted using the bimodal survey model.

Theoretical Framework

Fraze et al. (2002) state that little research has dealt with whether there is a significant difference in people who answer Web surveys and those who answer traditional paper surveys. Research by Lander, Wingenbach, and Raven (2002) found no significant difference in responses based on mode of delivery. Both Fraze et al. and Lander et al.

suggested a mixed mode method of survey delivery and return option. To this point, neither has been thoroughly tested on any population.

Because the use of Web surveys is relatively new, many issues remain unresolved. Dillman, Tortora, and Bowker (1998) listed the disadvantages of Web surveys as variations in such things as computer literacy, processing power of computers, screen configurations, connection speeds, and individual access to computers. In addition to these disadvantages, Baker and Wilson (1998), in a study of Internet use among Florida Farm Bureau county directors, found that age and gender were significant determinates of adoption of Internet use. They concluded that the nonadopters were representative of professionals in the upper age range. While these results were contrary to research by Rogers (1995), they stated that an individual with computer technology education and Internet experience would be more inclined to use the technology. Also to be considered is maintaining the consistency of what the Web designer and the participant see when viewing the surveys. This consistency has not yet been established.

Dillman's (1978) Total Design Method has been a widely accepted format for conducting social science surveys. Dillman states, "Repeated tests of this one-size-fits-all approach showed that response rates of 70% could be produced consistently for general public populations…" (p. 5). The newest edition of this method, the Tailored Design Method (TDM), was introduced in 2000. This method suggests the use of a five-contact model during a five-week period that includes a prenotice letter, questionnaire, postcard, second questionnaire, and invoking special procedures.

Dillman (2000) states that there are four possible sources of error in survey research: coverage error, sampling error, measurement error, and nonresponse error. In a *Journal of Agricultural Education* article, Linder, Murphy, and Briers (2001) evaluated the handling of nonresponse error in social science research and stated, "Nonresponse error should be handled through the systematic application of statistically sound and professionally accepted procedures" (p. 44). The authors propose three methods for addressing nonresponse error as a threat to external validity.

The first method is to compare early and late respondents; however, no consistent method of determining early and late existed. The second method involves using "days to respond" as a regression variable, and then if the regression model fails to provide statistically significant results, it can be assumed that there is no difference between respondents and nonrespondents.

The final method suggested by Linder, Murphy, and Briers (2001) is to actually compare respondents to nonrespondents.

> Perhaps the most acceptable method historically of addressing nonresponse bias has been to sample nonrespondents, work extra diligently to get their responses, and then compare their responses to other (previous) respondents. Comparisons between respondents and nonrespondents and differences found should be handled as described above. We recommend this method be used if a minimum of 20 responses from a random sample of nonrespondents can be received.

> Using fewer than 20 responses threatens the statistical power to detect differences between respondents and nonrespondents. Thus, if fewer than 20 nonrespondents are obtained, their responses could be combined with other respondents and used in conjunction with method 1 or 2. (p.52)

Lander, Wingenbach, and Raven (2001) found that a significant difference in response time did exist in Web responses and traditional paper survey responses. Because of this lag in response times, comparing early to late or using "days to respond" as a regression variable to control for nonresponse error may have limitations using this mode of delivery.

Purpose and Objectives

In a study on response rates of various survey modes, Fraze et al. (2002) recommended a model for conducting bimodal surveys on populations that have e-mail addresses. To date, this model has been untested. If the proposed bimodal survey model is effective, it would lead to greatly reduced time and costs for conducting surveys of homogenous populations with access to e-mail. The specific objectives of this case study were to: (1) determine the response rate for surveys when using the bimodal model, (2) evaluate the cost effectiveness of the bimodal model versus the traditional Tailored Design Method (TDM) (Dillman 2000), (3) compare item response of returned Web surveys versus traditional paper surveys, and (4) calculate and determine if the bimodal model affected nonresponse error.

Methodology

Research Design
This study was a one-shot case study design.

Population
The target of this study was a professional organization of communications specialists who are employed by agricultural cooperatives. This organization, the Cooperative Communicators Association (CCA), developed the instrument to gauge perceptions and beliefs about its internal educational system and to gather opinions about educational topics and delivery formats. The CCA roster of dues-paying members was supplied to the researchers. This data included e-mail and mailing addresses for every member. The CCA Professional Development Committee requested a census study of all 323 members.

Instrumentation
The questionnaire was constructed using two formats. The Web version was developed using Microsoft FrontPage 2002. Each of the 20 multiple-choice questions had drop-down responses or radio buttons that could be checked to mark the respondent's answers. In addition, four of the multiple-choice questions had blanks that the respondent could use to post other information related to the question. A "submit" button was located at the bottom of the Web page for the respondent to send the instrument results to the database.

The second format of the questionnaire was the paper version which had the same multiple choice questions in the same order. Each question had a list of possible answers, and the respondent was instructed to circle the answer that best fit the question. Paper questionnaire were returned using a self-addressed, stamped envelope. Data were added to the Excel spreadsheet manually by the researchers.

Data Collection

The e-mail database supplied by CCA was imported to Microsoft Outlook 2002 and grouped together in one distribution list. Survey implementation followed the bimodal model as recommended by Hardin (2002). Table 1 shows the five-contact process:

Table 1. The Bimodal Survey Model.

Contact Number	Day	Method	Mode
1	1	Prenotice letter	E-mail
2	4	Survey Packet	E-mail/Web
3	7	Thank-you/Reminder	E-mail
4	11	Survey Packet	Mail
5	15	Thank-you/Reminder	E-mail

The 25-day process began on day 1 with an e-mail sent to all members of the population. This e-mail stated that an important questionnaire would soon be arriving and that their participation would be greatly appreciated, because it and would affect the future of CCA's educational programming.

Contact number two was sent to the entire population via e-mail on day 4. The e-mail stated that the predescribed questionnaire was available at the following link. The link was then written out, so it could be cut and pasted into a Web browser. Instructions were provided to assist respondents in accessing the Web site. For users with HTML enabled e-mail clients, the link appeared in blue, and they were instructed simply to click on the link to view the questionnaire online.

Responses from the Web site were automatically saved in an Excel .csv file. This process allowed each respondent to add a single line of data to the spreadsheet. As each respondent submitted their answers, their names were manually deleted from the e-mail distribution list to avoid sending unnecessary e-mails and questionnaire packets to individuals who had already responded. On day 7 of the model, a thank-you/reminder note was sent to the modified distribution list. Even though it did not go to individuals who had already responded, it stated, "If you have already responded to the questionnaire, thank you. If you have not had a chance to complete the questionnaire, please take a few minutes to do so." The link was furnished again with instructions for how to complete the questionnaire.

On day 11, the updated distribution list was imported into Microsoft Word 2002 and converted to mailing labels using the "Mail Merge" function. Mailing labels were printed for 175 nonrespondents and were attached to envelopes. A paper copy of the questionnaire, a self-addressed, stamped envelope, and a cover letter were packaged and mailed to the nonrespondents. The cover letter stated that this copy was provided in the

event that their e-mail was not working properly, or if they felt more comfortable answering the paper version. The importance of the questionnaire was stressed again.

The final contact came on day 15 of the model when an e-mail thank-you reminder was again sent to the nonrespondents. Following this contact, the researchers waited an additional 10 days for late-arriving questionnaires.

Results

Data were collected on the Web in a Microsoft Excel XP file, and paper questionnaire data were added to this database. All data were then transferred to SPSS 10.0 for Windows for analysis. Data were analyzed based on the four objectives of the study: response rates, cost analysis, item response comparison, and nonresponse error.

Response Rates

Survey participants began to respond almost immediately to the initial e-mail requesting their completion of the online questionnaire. The first response came 37 minutes after the e-mail was sent. As shown in Table 2, during the first day the survey was available, over 27% of the

Table 2. Days to Respond Based on Response Mode. (N = 323)

Day	Contact Initiated	Web Responses	%	Paper Responses	%	Cumulative %
1	Prenotice e-mail	-	-	-	-	-
2		-	-	-	-	-
3		-	-	-	-	-
4	Survey via e-mail	88	27.24	0	0	27.24
5		13	4.02	0	0	31.26
6		4	1.23	0	0	32.49
7	Reminder via e-mail	38	11.76	0	0	44.25
8		0	0	0	0	44.25
9		0	0	0	0	44.25
10		1	.31	0	0	44.56
11	Paper Survey Packet	4	1.23	0	0	45.79
12		3	.93	0	0	46.72
13		0	0	2	.62	47.34
14		1	.31	10	3.09	50.74
15	Reminder via e-mail	1	.31	0	0	51.05
16		0	0	0	0	51.05
17		0	0	0	0	51.05
18		0	0	0	0	51.05
19		1	.31	22	6.81	58.17
20		0	0	15	4.64	62.81
21		1	.31	0	0	63.12
22		0	0	15	4.64	67.76
23		0	0	0	0	67.76

24		0	0	0	0	67.76
25	End of Collection	0	0	12	3.72	71.48
	Totals	157	47.96	76	23.52	71.48

possible respondents answered the survey successfully. That percentage rose to 44% by the end of the first week.

The Web responses tapered off quickly after the reminder e-mail on day 7, and the paper responses gradually increased after the paper packet was mailed out to nonrespondents on day 11. The reminder e-mail on day 15 had little impact on Web results. The bimodal model suggests that data collection end 25 days after the first contact. In this case, six paper questionnaires arrived on day 28, four arrived on day 29, and another four were delivered on day 32.

Cost Analysis

An advantage to using the Web as a collection method for survey information is the cost savings associated with not sending as many paper questionnaires, reminder cards, and self-addressed, stamped envelopes. For this case study, the cost breakdown appears in Table 3. Packets using traditional methods were mailed to 175 nonrespondents as of day 11. Average cost for each of the 323 members of the population using the bimodal method was 74 cents compared with a cost of $2.82 if the TDM had been used.

Table 3. Actual Questionnaire Cost per Recipient Using the Bimodal Model. (N = 323)

Contact	Number sent	Materials	Cost in dollars	Units Used	Total $	Cost per recipient
Prenotice	323	n/a	n/a	n/a	n/a	0
Questionnaire	323	n/a	n/a	n/a	n/a	0
Reminder 1	218	n/a	n/a	n/a	n/a	0
Paper Packet	175	6x9 envelope	.1178	1	0.1178	
		Laser mailing labels	.0350	3	0.1050	
		Stamps	.3400	3	1.0200	
		Copy paper	.0200	3	0.0600	
		Return envelope	.0546	1	0.0546	1.3574
Reminder 2	154	n/a	n/a	n/a	n/a	0

Following the methodology for Dillman's Tailored Design Method, we can estimate the costs for conducting the same survey. Table 4 presents this information based on the assumption that 50% of the population would respond to each contact. This method would, most likely, overestimate respondents, but is adequate for the purpose of comparison.

The estimated cost of conducting this survey using the TDM would have been $919.20, while the actual cost of the bimodal model was $238. This is an estimated cost savings of $681.80 or 74%. In addition to these costs, the TDM suggests a fifth contact using special means. Suggestions given by Dillman for this contact are certified mail and a

telephone contact. Following these recommendations would have added to the cost of the TDM.

Table 4. Hypothetical Cost per Recipient Using the Tailored Design Method. (N = 323)

Contact	Estimated number sent	Materials	Cost in dollars	Units Used	Total $	Contact Cost per recipient
Prenotice	323	Mailing envelope	.0546	1	0.0546	
		Stamp	.3400	1	0.3400	
		Copy Paper	.0200	1	0.0200	0.8292
Packet 1	323	6x9 envelope	.1178	1	0.1178	
		Laser mailing labels	.0350	3	0.1050	
		Stamps	.3400	3	1.0200	
		Copy paper	.0200	3	0.0600	
		Return envelope	.0546	1	0.0546	1.3574
Reminder Postcard	161	Postcard	.1499	1	0.1499	
		Stamp	.2100	1	0.2100	0.6599
Packet 2	80	6x9 envelope	.1178	1	0.1178	
		Laser mailing labels	.0350	3	0.1050	
		Stamps	.3400	3	1.0200	
		Copy paper	.0200	3	0.0600	
		Return envelope	.0546	1	0.0546	1.3574

Item Response Comparison

A two-way contingency table analysis was conducted to evaluate whether the mode of reply had an impact on the response given for each question. The mode variable had two levels, Web and paper. Each question had between two and five levels, represented by responses to multiple-choice questions. Table 5 shows that question response was found to be significantly different for five questions of the 20 questions, based on mode of response ($p < .05$).

Table 5. Results for the Pairwise Comparisons

Comparison	Pearson Chi-square	p-value	Sig.
Mode vs. Educational Experience	2.212	.530	NS
Mode vs. Years of Communications Experience	3.205	.668	NS
Mode vs. Type of Job Position	4.596	.032	*
Mode vs. Years Employed by Current Co-op	22.908	<.001	*
Mode vs. Years in Current Position	5.860	.210	NS
Mode vs. Prospects for Promotion	3.560	.469	NS
Mode vs. Years Expected to be in Current Position	2.529	.639	NS

Mode vs. Education Leading to Increased Pay	2.485	.289	NS
Mode vs. Interest in Co-op Principles and Values	7.563	.006	*
Mode vs. Interest in National Directory Listing	.897	.344	NS
Mode vs. Education Leading to Increased Marketability	3.572	.059	*
Mode vs. Educational Support Provide by Co-op	.329	.567	NS
Mode vs. Perception of Ongoing Education	3.922	.417	NS
Mode vs. Education about Co-op Principles and Values	1.208	.547	NS
Mode vs. Interest in Education about Co-op Principles and Values	18.030	<.001	*
Mode vs. Importance of Career Development	7.519	.111	NS
Mode vs. Interest in Adding Workshops to Conference	8.482	.075	NS

*p < .05

Table 6 shows the five questions with significantly different responses, their possible answers, and scores for both response modes. Question 3 from the questionnaire found that 94% of the Web respondents listed themselves as cooperative employees, while 100% of those who responded by paper thought of themselves in that manner. Six percent of the Web respondents were freelancers, whereas on the paper questionnaire, none considered themselves freelancers.

Table 6. Survey Questions with Significantly Differing Answers Based on Response Mode.

Question	Possible Responses	Web Response		Paper Response	
		n	%	n	%
3. How would you best describe your current position?	A. Coop Employee	140	94	73	100
	B. Freelancer	9	6	0	0
4. How long have you been employed by your co-op?	A. Less than 1 year	8	6	4	6
	B. 1-5 years	42	28	33	44
	C. 6-10 years	36	24	15	20
	D. 11-15 years	27	18	10	13
	E. more than 15 years	36	24	13	17
9. Would you be interested in an extra day at the CCA Institute for education on cooperative principles and values and how they apply to your communications work?	A. Yes	82	77	67	59
	B. No	25	23	46	41
11. Do you believe professional career development and ongoing education would expand your personal marketability?	A. Yes	147	69	8	47
	B. No	65	31	9	53
12. Would you like to receive	A. Yes	99	80	55	53

education about cooperative principles and practices?	B. No	25	20	48	47

The major discrepancy in Question 4 was in response B, "1-5 years." Twenty-eight percent of Web respondents have been employed by their co-op for 1-5 years, while 44% of paper respondents fit this category. This is a difference of 16%. The other responses to this question differed only 7% or less.

Question 9 asked a yes/no question about adding an extra day at the annual CCA professional conference to teach how cooperative principles and values apply to the communicators' positions. Of those who responded on the Web, 77% were in favor, while 23% were against adding the extra day. Those who responded via paper were also in favor of having the extra day but to a lesser degree. Fifty-nine percent were in favor, while 41% were against.
The response to Question 11 showed a swing in scores that was positive on the Web questionnaire and negative on the paper questionnaire. Of the Web respondents, 69% thought that ongoing education and career development would expand their personal marketability, while only 31% thought that it would not. The individuals who responded to the paper version, however, were reversed in their opinion. Only 47% answered "yes," and 53% answered "no." This is a difference of 22%.

Question 12 demonstrated the most dramatic swing in scores of any of the five questions. When asked if they would like to receive education about cooperative principles and practices, 80% of the Web respondents marked "yes," while only 53% of the paper respondents marked the same response. This is a difference of 27%.

Nonresponse error
An additional random sample was selected from nonrespondents, and they were contacted in face-to-face interviews and through additional e-mails following the end of the survey period. Thirty-four questionnaires were completed by those who initially chose not to complete and return the instrument. No significant difference was found between respondents and nonrespondents.

Conclusions/Recommendations

This research sought to determine if the bimodal model would prove to be an effective alternative to traditional paper survey methods. It was determined that in the area of response rate the model produced a 71% response rate within a 25-day time period. Within a week after the cutoff date, 14 more questionnaires arrived via the mail service. Extending the deadline one week would have increased the overall return rate to nearly 75%. This is comparable to Dillman's TDM, which reports a consistent return rate of 70%. These results were achieved while spending only $238, compared to an estimated $919 that the TDM would have cost to conduct the same research. This does not include the financial incentives or the special contact that Dillman recommends. These expenses would add to the cost of using the TDM, however, capital costs of computer equipment, software and Internet connection would add to the cost of the bimodal method. Also not

included in the cost analysis is the cost of the Web page creation and management, which is substantial.

Of the 20 questions on the survey, five were found to have significantly different answers based on mode of response. These five questions reflect the fact that individuals chose to answer Web or paper questionnaires based on some unknown characteristic. It is likely that age or gender could have an effect on response mode as stated by Baker and Wilson (1998). Future surveys should collect detailed demographic information to verify this assumption. While the individual responses varied, nonresponse error was not detected using accepted methods. Nonrespondents were randomly resampled until 34 additional instruments were completed. No significant difference was found between respondents and nonrespondents which lead the researchers to believe the overall answers were indicative of the population.

Because there were significant differences in response times and item responses, the researchers believe that comparing early to late respondents or using "days to respond" as a regression variable to control for nonresponse error would fail to provide accurate results. Either of these methods would simply be comparing Web to paper, which demonstrates a difference based on response mode.

In summary, the bimodal model appears to be an effective method of mixed model survey implementation. It produced a high response rate in a relatively short amount of time at a cost 74% less than traditional survey models. This figure, however, does not include capital and expertise cost associated with the bimodal model, and the cost of Dillman's "special means" contact. Choosing between the bimodal model and Dillman's TDM would depend on current availability of the equipment and technical skills of the researchers involved. Responses from Web and paper methods prove significantly different, but, under closer evaluation, were representative of the entire population. One limitation of this study is that the results cannot yet be generalized to other populations. Further testing should be conducted on additional populations to determine if results remain consistent.

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A Test of a Bimodal Survey Model on the Cooperative Communicators Association: A Case Study

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A Critique

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Contribution to the Discipline: Although the use of descriptive research design is in decline, Radhakrashna, Leite and Baggett (2003) report this design represented one-half of the designs used in NAERM/C papers over the past twenty years. At the same time information technology, including Internet and Web Tools, has forever changed the way information is collected, shared and distributed. This case study will help us adjust to a new research environment.

Mechanics: Brashears, Bullock and Akers have examined and updated the traditional survey methods and systematically examined a new model within a well described audience. Their methodologies are well described and their results are clearly presented.

Conclusions: The bimodal survey model shows promise for audiences with similar characteristics to CCA members. The model may provide researchers with procedures that can be completed in less time and with less expense. Brashears, Bullock and Akers caution, however, that respondents may be different from non-respondents and the population on specific beliefs, values, and demographic characteristics. Continued systematic examination of this bimodal model should continue with other audiences.

Implications for Practice: Brashears, Bullock and Akers provide a clear, systematic methodology for survey research. Coupled with the checklist for reporting research designs and procedures developed by Radhakrashna, Leite and Baggett, the descriptive survey research in the discipline should improve.

Radhakrishna, R., Leite, F. and Baggett, C. (2003). *An Analysis of Research Designs and Procedures Used in Agricultural and Extension Education*. Paper presented at the National Agricultural Education Research Conference, Orlando, FL.

Policy Opportunities and Agricultural Education's Strategic Initiatives

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Abstract

This ethnographic study identified the common themes of strategic plans in agricultural education, current thinking of national leaders, stakeholders, and policy makers, and discrepancies between the strategic plans and current thinking of national leaders, stakeholders, and policy makers. Eleven themes emerged from the strategic plans. Program and curriculum reform, as well as leadership and partnerships were mentioned the most in the strategic plans. A noticeable difference between the strategic plans and the national leaders, stakeholders, and policy makers was regarding the need for programmatic, policy, and budgetary changes at the state and federal levels. The national leaders realized the importance of congressional visits, but questioned if their strategies were working. Stakeholders stressed the need of agricultural literacy and awareness and funding opportunities within existing legislation. Policy makers stressed the need for more communications about agricultural education so that they are prepared when funding opportunities arise. The agricultural education profession should focus on policy changes and assess the effectiveness of implementing its strategic initiatives.

Introduction

The agricultural education profession has struggled to implement its strategic plans on a national level for many years. A few years after the National Research Council's (NRC) (1988) study, Shinn (1994) recommended that the agricultural education profession should engage in redefining a strategic plan that collectively communicates a vision, beliefs, values, and focal-point issues. A decade after the NRC's recommendations, Conroy (1997) concluded that agricultural teacher education programs did not change their content.

Environmental scans, needs assessments, and strategic action plans engage stakeholders to help identify critical issues, needs, and priorities (Bryson, 1995). There have been three strategic plans in agricultural education since the NRC's (1988) study. Most recently, a strategic plan was created based on a national visioning initiative from local, state, and national input. There should be no need to question the validity of a strategic plan if it was developed based on consensus of a representative body of stakeholders. However, two issues make stakeholder input difficult to accomplish: (a) stakeholder identification and representation (Kelsey & Pense, 2001); and, (b) meaningful participation (Grudens-Schuck, 2001). A profession or organization should check the validity and relevancy of its strategic plan as perceived by national leaders, stakeholders, and policy makers who help shape public policy that can influence the profession.

Policy makers and stakeholders are demanding that educators respond to changing and increasing needs of students in public education (Cibulka, 2001). Policy makers engage in discourse and reallocate limited resources to fund initiatives (Association of Career and Technical Education, 2003) that they believe will help solve problems in the

nation's best interest. Agricultural education has received state and federal funds for many years and has not been exempt from the scrutiny of legislators (NRC, 1988). Policy makers and educational administrators question the value of agricultural education when there is a shortfall of resources, the reallocation of resources is called into question, relevant community and societal needs are not met, or the educational programming is not perceived as effective or worthwhile.

In 1983, the National Commission on Excellence in Education's report, *A Nation at Risk*, served as a wake-up call for educators across the nation (NRC, 1988). In response to the increasing scrutiny, the agricultural education profession conducted four strategic planning initiatives to respond to stakeholders' needs, address the issues in the education and society, and influence public policy. The National Council for Vocational and Technical Education in Agriculture was formed in 1983 in response to the uncertainty regarding the future of the United States Department of Education. The organization was formed to help develop a uniform national presence for vocational education. In 1990, the name of the organization changed to the National Council for Agricultural Education (NCAE) in response to the changing demographics of the members.

In 1988, the NRC presented a call for reform in agricultural education based on innovative programmatic leadership at the state and national levels to address the concerns about the declining profitability and international competitiveness of American agriculture, as well as concerns about declining enrollments, instructional content, and quality in agricultural education programs. The agricultural education profession has been positioning for systemic reform and change for more than a decade. Although the NRC's findings received a great deal of attention within the agricultural education community, little action has been taken to address this seminal study (Conroy, 1997).

In 1989, the *Strategic Plan for Agricultural Education* affirmed to "…provide the central focus for the vital interaction that will build and expand the national presence through concerted action for excellence" (p. 6). Optimistically, this plan was "to provide a total dynamic educational system." This plan expanded on the findings and themes from the NRC's study. Unfortunately, this strategic plan had little impact on the profession. About five years later, *Building the Future and Serving Today* was second in the series of agricultural education strategic plans following the NRC's (1988) report. During 1994-1995, a task force of leaders in agricultural education revised the 1989 National Strategic Plan for Agricultural Education with two noticeable changes. First, the task force reorganized and reworded the mission statement, values, resolutions, and call to action. Second, the task force revised implementation strategies for the same seven goals from the 1989 strategic plan by emphasizing that "educational professionals must learn how to function in and be a part of new school environments of integrated instruction, Tech-Prep and School-to-Work transitional systems."

In 2000, *The National Strategic Plan and Action Agenda for Agricultural Education*, reiterated the call for action of the 1989 plan. This strategic plan called for a two-fold mission: (a) prepare students for career success; and, (b) create lifetime awareness of the global agriculture, food, fiber, and natural resources systems. Four goals articulated the need for highly motivated, well-educated teachers; a seamless,

lifelong instructional system; conversational literacy of all students; and, partnerships and strategic alliances that would ensure agricultural education's continuing presence in K–12 education.

Although agricultural educators have been active creating strategic plans that would provide focal points to help mobilize the resources toward collective action and address the issues of local communities, few studies have been conducted to determine the validity and relevancy of these strategic plans in agricultural education. Specifically, two research teams have studied strategic plans and public policy impacts. First, Eaton and Bruening (1996) found that agricultural teachers in Pennsylvania agreed with the NRC (1988) recommendations and the need to change their programs, create partnerships, and collaborate with other departments in the school to close the gap between agricultural education and academics.

Second, Conroy and her colleagues conducted several studies related to the NRC's (1988) recommendations—a career study; teacher preparation study; and, agriscience study. Conroy (2000b) conceptualized agricultural careers into six broad clusters, found eight conceptual clusters to improve the preparation of teachers (Conroy, 2000a), and found that stakeholders agreed that a science-based agricultural education program would improve the image of agricultural education if it remained community-based, invoked experiential learning, and stimulated leadership development (Dailey, Conroy, & Shelley-Tolbert, 2001). Further, Dailey et al. found that the greatest challenges facing agricultural education today that were also identified by the NRC: (a) making people aware of the importance of and new changes in agriculture; (b) recruiting and keeping students interested and involved in agriculture; and, (c) promoting agriculture and dispelling common misconceptions about agriculture. Dailey et al. found a new challenge that was not identified in 1988—a shortage of qualified teachers in agricultural education. If the challenges in agricultural education have not changed in the last 15 years, do national leaders, stakeholders, and policy makers see the same challenges facing agricultural education? What is the federal funding outlook for agricultural education? This study was conducted to see if there were any discrepancies between the national strategic plans and determine the current thinking of national leaders, stakeholders, and policy makers in Washington, D.C.

Purposes and Objectives

The purpose of this study was to examine the strategic initiatives of agricultural education over the past 15 years and determine if they matched the current thinking of national leaders, stakeholders, and policy makers in the policy arena related to agricultural education. The objectives of this study were to: (1) identify themes of key initiatives from *Understanding Agriculture: New Directions for Education*, *The Strategic Plan for Agricultural Education*, *Building the Future and Serving Today*; and, *The National Strategic Plan and Action Agenda for Agricultural Education*; (2) identify the emerging interests and initiatives selected national leaders, stakeholders, and policy makers see as key opportunities for agricultural education; and, (3) determine if there are similarities and differences between the key strategic initiatives and the interests of national leaders, stakeholders, and policy makers.

Method and Procedures

This interpretivist ethnography (Tedlock, 2000) used document analysis, participant observations, and interview methods to address the objectives because of the need to understand the strategic initiatives in a fuller, more meaningful context of the activities, understandings, and opinions of national leaders, stakeholders, and policy makers. Ethnography is both a process and a product that is generated from and informed by the meaningful experiences of the ethnographer interacting with lives in the field (Tedlock). A 15-week congressional internship in Washington, D.C., which focused on analyzing agricultural and educational issues during the Fall, 2002 semester, served as the setting of interest for the study. Although the setting was ideal to interact with leaders, stakeholders, and policy makers working for the promotion of agricultural education at the national level, the researcher was limited in the interviews and engagement with participants due to the brief time frame of the internship.

The researcher's epistemological stance was based on the way of knowing as being transactional (Schwandt, 2000), and the enthnographer's role was to determine the relative effectiveness and importance of the national strategic initiatives by letting the participants decide the relevance and opportunities to their particular situations and viewpoints (Donmoyer, 2001). The researcher gathered the data through three methods: (a) document analysis (Hodder, 2000) of four pertinent documents' goals related to national strategic initiatives in agricultural education; (b) observations (Angrosino & Mays de Perez, 2000) of a two-day board meeting of the National Council on Agricultural Education; and, (c) 12 hours of one-on-one, semi-structured interviews (Fontana & Frey, 2000) with four national leaders representing the United States Department of Education (USDE), National FFA Organization, and National Council on Agricultural Education; five stakeholders representing the Association of Career and Technical Education, an agricultural-based lobbying firm, American Farm Bureau Association, and the United States Department of Agriculture (USDA); and, five policy makers representing members of the U.S. Senate, U.S. House of Representatives, and the House Agriculture Committee. The semi-structured interviews were guided by four open-ended questions: How do you define agricultural education? What work have you done with agricultural education? What are the funding options for agricultural education on a national level? What is the future of agricultural education? Probing questions were used in the interviews to determine if the initiatives at the national level were aligned with the themes identified in the documents.

Paper, pencils, and highlighter markers were used to help create organizers to code and summarize the qualitative data. Coding was used to analyze the qualitative data from the open-ended questions. The researcher created a coding scheme of the major concepts, central ideas, or related responses (Glesne, 1999). In an effort to increase trustworthiness and credibility, the researcher reflexively situated himself in the study by identifying his three roles and how his background may have influenced the research study (Denzin, 2000): (a) a future agriculture teacher; (b) a former student and FFA member in agricultural education; and, (c) a concerned stakeholder of the agricultural education community regarding the limited impact of the strategic plans. Additional steps were taken to maximize trustworthiness and believability, and minimize error and subjectivity of the conclusions (Donmoyer, 2001; Glesne, 1999; Lincoln & Guba, 1985).

Credibility was developed through peer debriefing with a faculty advisor and experts in the field of agricultural education. The researcher created an audit trail in order to compile and reference all information and materials used in the study. Reflexive journaling and member checks were also utilized to establish dependability and to ensure accuracy of the evidence. Although much care was taken to ensure accurate and reliable data, the findings of this study are limited due to the interpretation and subjectivity of the researcher (Denzin & Lincoln, 2000).

Results

For the first objective, 11 themes emerged as the key initiatives from strategic plans of 1989, 1994, and 2000 related to those in the benchmark study of 1988 (Table 1): (a) program and curriculum reform; (b) agricultural literacy; (c) diversity; (d) new educational technology, media, and strategies; (e) supervised experiences; (f) FFA leadership development; (g) policy changes; (h) leadership and partnerships; (i) exemplary programs; (j) teacher development and quality; and, (k) entrepreneurship and innovation. The 1989 and 1994 strategic plans were combined because they contained essentially the same content; one difference was the 1994 plan emphasized that agricultural educators needed to work with new school environments that focused on integrated transitional systems of Tech-Prep and School-to-Work. The two themes that were discussed the most in the three documents were: (a) program and curriculum reform; and, (b) leadership and partnerships. Two themes mentioned in the earlier documents, but not mentioned in the goals of the most recent 2000 strategic plan were: (a) exemplary programs; and, (b) entrepreneurship and innovation. The theme, policy changes, was a recommendation from the NRC that was not addressed in any of the following strategic plans.

For the second objective, the common themes with supporting evidence from the interviews were presented in three groups: (a) national leaders in agricultural education, (b) national stakeholders, and (c) national policy makers. Three themes emerged from the interviews and observations of the **national leaders** in agricultural education. First, during the October, 2002 National Council for Agricultural Education (The Council) meeting, the board spent one hour refocusing on the purpose of the Council. The Council re-established its purpose to provide a unified voice for the agricultural education profession (Cibulka, 2001). Then, the Council developed an action agenda of five priorities that the profession should focus on collectively to implement its new purpose: (a) develop a constituent feedback process and simultaneously communicate the leadership role of the Council; (b) report the status and plans of agricultural education through annual reports; (c) realign, revise, and activate the Memorandum of Understanding (MOU) with the USDA; (d) solidify relations with the American Association for Agricultural Education (AAAE) research committee; and, (e) establish a highly focused, continuous strategy to partner with Congress through grassroots engagement to best serve the needs of students. Second, the national leaders in agricultural education stressed the importance of congressional visits. The national leaders examined the impact of the current strategies used to visit with national policy makers. Although the leaders felt that the congressional visits were very important, they questioned their impact on influencing policy development. The leaders expressed a

desire to change the strategies used in the congressional relations process. One leader stated, "The Council may want to rethink how they approach DC visits to critical congressional committee members or sub-committees." It appeared that the national leadership understood the importance of building good congressional relationships to aid in the development of national initiatives and to provide continued funding for agricultural education. During the Council board meeting, three key messages were discussed and outlined as talking points to be delivered on the Congressional visits: (a) the need to build and maintain support for current and future funding; (b) the impact of policy decision on the profession; and, (c) building knowledge of the purpose of the Council and the career opportunities that agricultural education creates. Third, the national leadership in agricultural education emphasized that the profession should focus on the strategic goals that were outlined in *The National Strategic Plan and Action*

Themes	**Understanding Agriculture (1988)**	**The Strategic Plan for Agricultural Education (1989) & Building the Future and Serving Today (1994)**	**The National Strategic Plan and Action Agenda for Agricultural Education (2000)**
Program and Curriculum Reform	Focus of agricultural education must change and subject matter must be broadened; major revisions needed within vocational agriculture and quality of programs must be enhanced	Review, update, and broaden a production agriculture based curricula to agriscience, agribusiness, and natural resources; a competency-based and articulated curriculum; adjust curricula to changing school environments; comprehensive contemporary programs for career-bound students; programs need to continually and systematically respond to trends and demands of the marketplace; agricultural education programs will impact the marketplace and educational systems; develop creative ways to continually monitor the pulse of the marketplace and educational environment; elevate and extend standards of excellence in classroom and laboratory instruction, supervised experience, and student organizations; educational professionals must learn how to function in and be a part of new school environments of integrated instruction, Tech-Prep and School-to-Work transitional systems	All teachers include agriculture in a relevant, integrated instructional approach; cross-curricular course development; students are prepared for successful careers in global agriculture, food, fiber, and natural resources systems; collaboration among educators and educational entities ensures students benefit from effectiveness and efficiency; agriculture teacher collaborate with other groups to bring factual information about agriculture to all students
Agricultural Literacy	K-12 systematic instruction about agriculture	Strive to educate all people in the nation about the total agricultural image and literacy; make a concerted effort to bring meaningful programs to all people in the nation	All students have access to seamless, lifelong instruction; all students are conversationally literate in agriculture, food, fiber, and natural resources
Diversity	Establish specialized magnet schools for the agricultural sciences in urban/suburban areas	To serve all people and groups equally and without discrimination; redesign programs and activities to achieve an enrollment that reflects a diverse society	Student enrollments represent the diversity of the school population; all students in urban, suburban, and rural schools, have access to high-quality agricultural education programs
New Educational Technology, Media, and Strategies	Enhance instruction with high quality computer technology and instructional media	Modern equipment and facilities	Agricultural education leaders provide instruction of educational technologies and teaching strategies; instructional systems and materials provide for diverse learning styles
Supervised Experiences	All students in vocational agriculture programs should participate in SOE's	Work-based learning through supervised experiences should provide real-world experiences, develop a positive work ethic and realistic occupation experiences	Every agriculture student has opportunities for experiential learning
FFA Leadership Development	FFA should change to reflect a contemporary image, and a broadened and improved program	Amplify and expand the "whole person" concept to include all students, not just those in FFA; promote and enable meaningful participation of all students to develop leadership, personal, and interpersonal skills in student organizations	Every agriculture student has opportunities for leadership development

Table 1. Summary of key initiatives in agricultural education (Part 1)

Themes	**Understanding Agriculture (1988)**	**The Strategic Plan for Agricultural Education (1989) & Building the Future and Serving Today (1994)**	**The National Strategic Plan and Action Agenda for Agricultural Education (2000)**
Policy Changes	Programmatic and budgetary policy changes at the state and federal levels		
Leadership and Partnerships	Build coalitions to provide leadership in the initiation of agricultural literacy and agricultural education reform efforts; innovative programmatic leadership needed at state and national levels; states should establish commissions to identify needs and strategies for implementation of agricultural literacy and program reform	Provide leadership and cultivate strong partnerships in the total educational system; find ways to be "a part of – not apart from" colleagues throughout the educational system; develop a united national presence through networking, communication, cooperation, and coordination; strive to expand the quantity and quality of relationships with colleagues throughout all of education; enter the mainstream of education to contribute and receive ideas and leadership; mobilize media, government, industry, education and community support groups to help achieve an enrollment that reflects diverse society	Provide learning experiences for school administrators and counselors on career opportunities in agriculture; broad-based coalitions of groups and organizations collaborate to develop and disseminate contemporary agricultural curricula for all students; partnerships and strategic alliances provide strong support for agricultural education; numerous and varied stakeholders, inside and outside the school system, engage in a continuing effort to strengthen and refine the shared vision, mission, and goals; positive working relationships with multiple stakeholders to build lines of communication and provide a diverse work force for the agricultural, food, fiber, and natural resources industries; partnerships and strategic alliances to ensure a continuous presence of education in and about agriculture
Exemplary Programs	Exemplary programs should be identified, studied, and emulated	Student organizations should be emulated by all branches of education; concerted effort to extend our standard of excellence	
Teacher Development and Quality	Teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers and professionals	All students are taught by a qualified teacher; shortage of teachers hamper the development of quality programs	An abundance of highly motivated, well-educated teachers; sufficient quantity of qualified teachers; prepare all K-adult teachers to integrate agriculture; provide relevant instructional leadership and professional development; research-based teacher preparation; agricultural awareness for school administrators and counselors
Entrepreneurship and Innovation		Foster the spirit of free enterprise and develop creative entrepreneurship and innovation; must never be satisfied with status quo	

Table 1. Summary of key initiatives in agricultural education (Part 2)

Agenda for Agricultural Education. One leader indicated that the agricultural education profession needs to focus more energy on re-evaluating the goals set forth in the national plans. The leader also highlighted national efforts that were taken to achieve the strategic goals in the current strategic plan. It appeared that some of the goals had received more attention than others, and that there was more work to be done on all four goals.

Three themes emerged from the interviews of the **national stakeholders**. First, the stakeholders did not have clearly defined concepts of agricultural education. Their definitions were inferred from their understandings of agriculture and were not as broadly defined as agricultural education is today. Further, there were also concerns expressed about the lack of knowledge and understanding of agricultural education among the stakeholders' constituents. A congressional relations staff member with the American Farm Bureau Federation stated, "In general, the public's base knowledge on agriculturally related issues is not good." Although the stakeholders indicated that progress has been made in raising the awareness of agriculture and agricultural education, there is still much work to do in making the constituents of these national stakeholders more knowledgeable about informational resources of agriculture. The second theme that emerged from the national stakeholders focused on funding. When asked about the future of agricultural education funding at the national level, the stakeholders responded with cautious optimism. The stakeholders agreed that there are limited federal funds for agricultural education. The two primary sources of funding for agricultural education mentioned by the stakeholders were the Carl Perkins funds for career and technical education and Farm Bill funds for specific educational programs in agriculture. A stakeholder mentioned that Perkins funds are likely to see continued challenges with each reauthorization. Funding via the Farm Bill has been maintained at relatively constant levels with small increases occasionally occurring and will likely remain in this trend in the future. Although funding sources are limited, the stakeholders agreed that agricultural education should continually attempt to find new avenues of funding at the national level. Third, the stakeholders stressed the importance of forming strategic alliances to assist with the efforts of agricultural education at the national level. They agreed that targeting key groups of leaders, stakeholders, and policy makers would help accomplish the national goals of agricultural education. An agricultural lobbyist stressed the importance of building on the instant connections that agricultural education has with policy makers from states with strong agricultural backgrounds. This was also supported by another stakeholder who emphasized the concept of building on the connections that are already in place to expand the knowledge and contacts into other important groups of decision makers. It appears that agricultural education could expand its programming and support base in urban settings, but this was not mentioned by the stakeholders.

Three themes emerged from the interviews with the **national policy makers**. First, the five policy makers were knowledgeable about agricultural education. Each of the policy makers had a sound understanding of the concepts of agricultural education and the efforts in their congressional districts and at the national levels. The policy makers estimated that their colleagues' level of knowledge about agricultural education tended to fall into three categories as stated by one of the policy makers, "The knowledge of the [agriculture] committee staff is great, the staff of the agricultural committee members is pretty good, however the general members tend to be less informed of agricultural and agricultural education related issues." Second, the policy makers agreed

that agricultural education has a smaller role at the federal level than at the state level. The policy makers agreed that the majority of the regulations and operations of agricultural education is done at the state government level. However, each of the policy makers also indicated that it is appropriate to have a focus at the national scene as well. One policy maker summarized, "The state sets the priorities of what they need or envision for agricultural education and the federal government can serve as a partner. It is a fifty–fifty deal to meet the needs." Similar to the state and federal partnership, the policy makers stressed the importance of building partnerships between the agriculture, education, and appropriations staff members, as all are equally important in securing additional funding and support from the federal government. Third, the policy makers emphasized the importance of continued communication with the contacts that agricultural education has made. However, when asked if their office receives updates from agricultural education related organizations, the majority of the policy makers stated that they did not receive regular contact or updates. A policy maker suggested, "Agricultural education must build awareness and promote itself better than is currently being done." The policy makers felt that there may be opportunities for additional funding if they have all the needed information available when new funding opportunities arise. The policy makers agreed that anything is possible if they are aware of the benefits, impacts, and details of the funding proposals. Further, they indicated that their offices are willing to listen to proposals and would be willing to try to help agricultural education leaders if the right funding vehicles are present.

For the third objective, the similarities and differences between the strategic plans and the themes from leaders, stakeholders, and policy makers were identified. First, the leaders, stakeholders, and policy makers mentioned three themes that were in agreement with the strategic plans: (a) the need for agricultural awareness and literacy; (b) the need for policy changes, which aligned with current federal funding sources; and, (c) the need for state-national partnerships to accomplish the strategic goals of agricultural education. Second, six themes emerged from the leaders, stakeholders, and policy makers that were not mentioned in the national strategic plans: (a) the need to work closely with policy makers regarding funding possibilities and opportunities; (b) the need to redefine the purpose of the Council; (c) the need to develop different strategies for the congressional visit process; (d) the need to re-evaluate progress and efforts of the national strategic goals; (e) the need to develop the knowledge base of policy makers about agricultural education; and, (f) the need for on-going communication with policy makers.

Conclusions, Implications, and Recommendations

Consistent themes emerged from the NRC's (1988) study and the national strategic plans (1989, 1994, 2000) in agricultural education. The themes of the strategic initiatives in agricultural education appear to call for *programmatic changes* at the state and local levels, with very little focus on policy changes at the state and national levels. A noticeable difference between the strategic plans and the national leaders, stakeholders, and policy makers was regarding the need for programmatic, policy, and budgetary changes at the state and federal levels. Perhaps the greatest implication of this study is that national and state leaders should focus on changing policies that would influence the programmatic reforms that are aligned with the local, state, and national needs in education. Further studies should investigate the barriers and opportunities that would

help national leaders, stakeholders, and policy makers make policy changes that could influence reform in agricultural education.

Themes of *communication and funding* appeared to be occurring in parallel between the leaders and policy makers, yet clear channels of communication were not making connections between the two groups. The Council strategized how to conduct congressional visits, while the policy makers expressed a need to know more about agricultural education activities and proposals. Further, the policy makers discussed that they would be willing to assist with funding opportunities if they worked more closely with leaders in agricultural education. However, little was mentioned in the national strategic plans regarding communication and funding goals. Perhaps, one of the greatest needs is to communicate with policy makers and stakeholders on an on-going basis about the impact of agricultural education programs. National policy makers depend on the information that they are given to make decisions on supporting agricultural education. Communication is vital in the process to ensure that the proper information is reaching the policy makers (ACTE, 2003). The national policy makers were willing to listen to ideas regarding agricultural education. In some cases, educating the policy makers about agricultural education may be the first step in the communication process. Providing the national policy makers with regular updates of the efforts, trends, and accomplishments of agricultural education will better position the profession when a time of need arrives. Agricultural educators should cultivate relationships with their stakeholders and policy makers at local, state, and national levels so that there can be pro-active efforts in capitalizing on opportunities as funding opportunities and policy changes match needs that can be met by agricultural education initiatives. Further, on-going communications with the policy makers and stakeholders may increase their knowledge base of agricultural education. A need for a comprehendible definition of agricultural education is necessary for the national stakeholders to clearly inform their constituents about agricultural education. The selected stakeholders felt that they can influence and inform the people (Grudens-Schuck, 2001) they are representing about agricultural education if they had a better way to explain what exactly the profession entails. Further studies should be conducted to explore effective strategies of establishing and maintaining channels of communication between agricultural educators and stakeholders and policy makers.

Literacy and awareness of agricultural education are the main issues that the national stakeholders view as important for the future of agricultural education (NRC, 1988). Stakeholders can influence agricultural education to a large extent. The presence of the stakeholders can help in the relationship with national policymakers; however, if agricultural education does not continue to build the knowledge base and relations with the stakeholders, the support of the stakeholders could be in danger. Agricultural educators should collaborate with and communicate their strategic initiatives to many different groups of stakeholders. Further studies should be conducted to identify and determine the representation of the stakeholders of agricultural education (Kelsey & Pense, 2001), especially those who have not been traditionally represented.

It appears that the needs of the profession have been fairly consistent over the last 15 years. However, national leaders in agricultural education should re-evaluate the status and progress of the *national strategic plans and initiatives*. A leader in agricultural

education recognized the need to evaluate the initiatives in the strategic plans as well as the rate of accomplishment and indicated that the National Council of Agricultural Education is working on plans to meet the needs of agricultural education. National and state leaders need to evaluate their efforts and focus on how they can influence change to address these needs that continue to persist. Perhaps policy development initiatives and strategies need to be developed to enact the strategic initiatives and influence public policy that could help agricultural education accomplish its strategic goals. Continual assessment and communication analyses (Cibulka, 2003) should be conducted to determine the effectiveness and marketing opportunities of the strategic initiatives.

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Policy Opportunities and Agricultural Education's Strategic Initiatives

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A Critique

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Contribution to the Discipline: "This ethnographic study…" Whoa, I recognized the need for a short course so I immediately audited the online version of AEE 578-Scientific Inquiry in Agricultural and Extension Education from NCSU. In the review, I found that "ethnography is the art and science of describing a group or culture. The description may be of a small tribal group in an exotic land or a classroom in middle-class suburbia" (Genzuk: n.d.). OK, that describes us and this research.

Seriously, this research has profound implications for the discipline and on our preferred future. Additionally, the authors have a great writing style. Adler and Adler (1994) describe their writing as "…verisimilitude, that draws the reader so closely into the subjects' worlds that these can be palpably felt" (p. 381). My suggestion is to read it again, and again.

Mechanics: Returning to AEE 578, I found McDermott and Knobloch met the "5 attributes and 12 components" test described by Ratcliff: appropriate, clear, comprehensive, credible and significant. My initial concern about immersion and trustworthiness was satisfied in the method and procedures section. Table 1 is a précis pearl.

Conclusions: The authors have crafted succinct conclusions, drawn appropriate implications, and provided valuable recommendations. We need to embrace them with enthusiasm and melt them into a shared communicated vision.

Implications for Practice: This paper is a call to action for agricultural education, not only Agricultural Education, but for all who are concerned about food, natural resources and environmental stewardship. The needs are clearly described: "focus on changing policies," "improve communication and funding," "communicate with policy makers and stakeholders," and issues of "literacy and awareness."

Concluding Comments: I am reminded of the response of a farmer when asked why he would not attend the adult course in agriculture, "Why, I already know how to farm better than I am farming now." Sadly, that farmer is no longer in business. It is essential that we as agricultural educators "focus on policy changes and assess the effectiveness of implementing its strategic initiatives" *today*.

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An Analysis of Research Designs and Procedures Used in Agricultural and Extension Education

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Abstract

One of the premier publications of the agricultural and extension education profession was examined to analyze research designs and procedures used in agricultural and extension education. A total of 369 papers presented at the National Agricultural Education Research Meeting/Conference (NAERM/C) for the years 1995-2002 were reviewed. The overall purpose of the study was to examine research designs and procedures reported in papers presented at NAERM/C during this period. Review of research designs reported in papers presented at NAERM/C revealed several trends. The most frequently used design was descriptive research design (185 papers), followed by descriptive correlational (90 papers), experimental/quasi-experimental designs (63 papers), and qualitative (60 papers). The use of descriptive research design has declined in the last 20 years from 67% to 50%. The use of qualitative research has increased substantially, while the use of descriptive correlational and experimental designs, more or less remained constant. Findings also revealed that a number of papers presented at NAERM/C did not report key research procedures relative to sampling, validity, reliability, and data analysis. Based on the findings, a checklist of research procedures was developed for three major types of research designs--non-experimental, experimental, and qualitative.

Introduction

Research design is the conceptual structure within which research is conducted. It implies advanced planning of the methods to be used for collecting relevant data and the techniques to be used in their analysis, keeping in mind the objectives of the research study and the availability of staff, time and money (Kothari, 2001). As early as 1959, Selltiz et al. defined research design as the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with the economy in procedure. According to the Kennedy School of Government (2002), research design is the structure you impose on your inquiry to maximize your confidence that your findings are "real" and as many alternative explanations as possible are ruled out. Research design is the logic that links the data to be collected to the conclusions to be drawn, and in turn, links both data and conclusions to the questions the study is posing. It provides the glue that holds the research project together and is used to structure the research to show how all of the major parts--sample or groups, measures, treatments or programs, and methods of assignment--work together to address central research questions (Trochim, 2001, p.171). According to Creswell (2003), creation of a

research design requires looking at the big picture as well as tremendous attention to detail. Creswell compared the creation of a research design to a "Mandala," a Hindu or Buddhist symbol of the universe. Mandala made of sand can take days to create because of the precise positioning of the pieces, which sometimes are individual grains of sand. The Mandala also shows the interrelatedness of the parts of a whole, again reflecting research design, in which each element shapes a complete study.

A number of researchers, educators, and scholars (Ary, Jacobs, and Razavieh, 1996; Charles and Mertler, 2002; Creswell, 2003; Creswell, 1998; Trochim, 2001) have classified research according to three major perspectives: primary objective, nature of data, and time. From the primary objective perspective, research can be thought of as basic if the goal is to obtain empirical data to formulate, expand, or evaluate theory, or applied if it is used to solve an immediate practical problem (Ary, Jacobs, and Razavieh, 1996). From the time perspective, research can be classified as cross-sectional or longitudinal. Cross-sectional studies are those that take place at a single point in time, while longitudinal studies are those that take place over time with at least two waves of measurement (Trochim, 2001).

Though primary objective and time are to be considered in any research study, research design is closely related to the nature of the data--quantitative or qualitative. Quantitative research relies on objective measurement and numerical analysis of data and seeking an explanation of causes, while qualitative research is concerned with understanding of a phenomenon through the researcher's total immersion in the situation (Ary, Jacobs, and Razavieh, 1996).

Campbell and Stanley (1966), in their landmark work, classified experimental research designs into pre-experimental, experimental and quasi-experimental primarily from the nature of data perspective, including time as an issue. From the qualitative perspective, Creswell (1998) grouped qualitative research into five traditions--biography, phenomenology, grounded theory, ethnography, and case study. Figure 1 illustrates the general framework for research classification based on the three perspectives discussed above.

According to Trochim (2001), the three basic types of research (descriptive, correlational, and experimental) can be viewed as cumulative. For example, correlational research assumes that you can first describe (by measuring or observing) each of the variables you are trying to relate. An experimental study assumes that you can describe both the cause and the effect of variables and that you can show that they are related to each other (Trochim, 2001, p. 5). Although these three types of research appear to be discrete, most research will necessarily involve some dimension of all three (Bowen, 1993).

Several scholars in the profession have examined various aspects of research conducted in agricultural and extension education: content analysis of papers presented at NAERM/C (Iverson, 1982; Moss, 1986, Radhakrishna and Mbaga, 1995), content analysis of the *Agricultural Education Magazine* (Knight, 1984), doctoral research in agricultural education (Moore, 1987), summaries of research and development activities in agricultural and extension education (Crunkilton, 1988), analysis of research methodology in agricultural education for the years 1974-82 (Mannebach, McKenna and

Pfau, 1984), subject-matter topics researched in agricultural and extension education (Radhakrishna and Xu, 1997), 25 years of NAERM/C (Radhakrishna, 1998), statistical procedures used in publishing agricultural education research (Bowen, Rollins, Baggett, and Miller, 1990), handling non-response issues in agricultural and extension education (Lindner, Murphy and Briers, 2001), research capacity in agricultural education (Greiman and Birkenholz, 2002), and conceptual and theoretical frameworks in agricultural education research (Dyer, Wittler and Washburn, 2001).

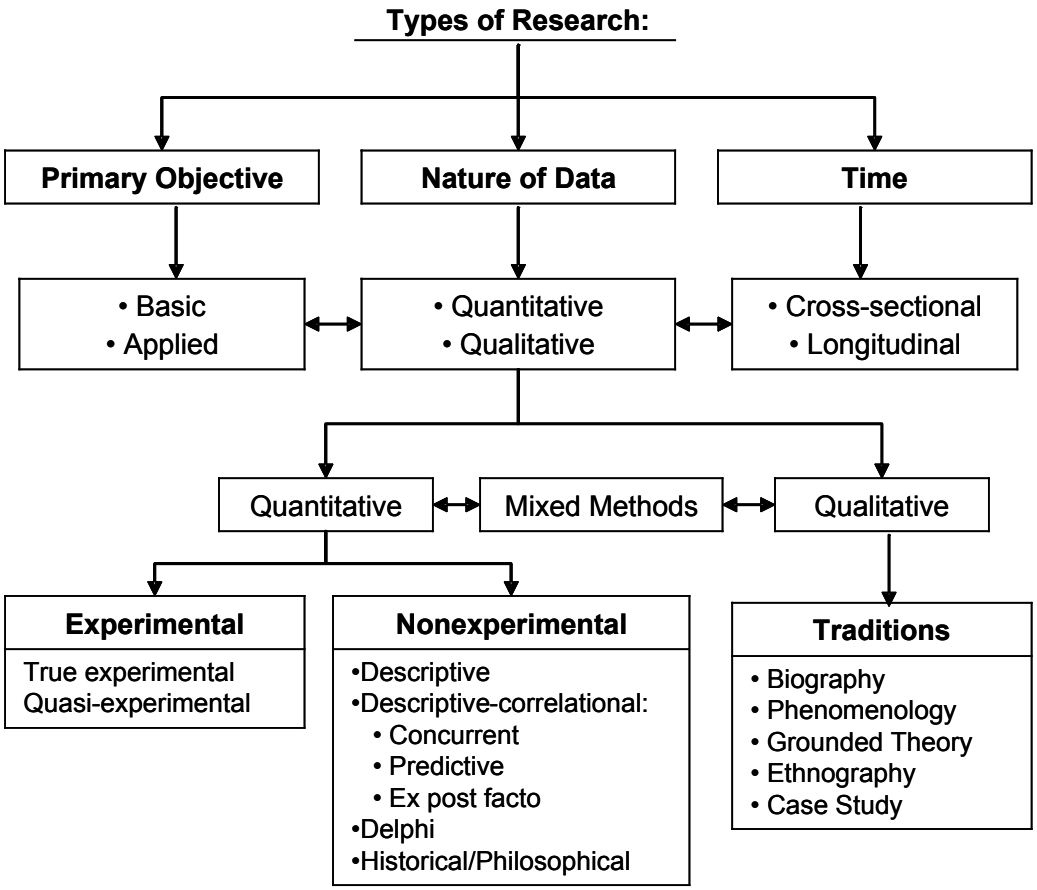

Figure 1. A Framework for Research Classification

Mannebach, McKenna, and Pfau (1984) examined the summaries of research and development activities (1974-1982) in agricultural education to analyze the research methodology used in agricultural education. They found that 90% of the studies reported were descriptive, followed by experimental (9.3%), and historical (0.7%). Fifty-four percent of the studies reported using questionnaires to collect data, followed by appraisal instruments (18.6%), interviews (14.3%), and observations (3.77%).

Radhakrishna and Mbaga (1995) reviewed over 390 papers presented at NAERM/C (1985-1994). Sixty-seven percent were descriptive, followed by 10% correlational, eight percent experimental/quasi experimental. Delphi studies accounted for five percent, while four percent were historical/philosophical, and three percent qualitative designs.

Dyer, Wittler and Washburn (2001) in their review of 348 articles published in the *Journal of Agricultural Education* (1990-1999) found that 54.3% used survey method, followed by correlation studies (16.7%), experimental (10.1%), holistic (5.5%), ex-post facto (4.3%), historical (4.0%), Delphi (3.%), and evaluation (5.14%). Further, they determined that 315 articles (90.5%) to be of applied research, while 23 (6.6%) as action research, and 10 articles (2.9%) as basic research.

Review of these three studies (Mannebach, et al., 1984; Radhakrishna & Mbaga, 1995; and Dyer, et al., 2001) suggests that changes are occurring in the use of research designs and procedures in agricultural and extension education. For example, the number of studies using descriptive research has considerably decreased over the last 28 years (1974-2002). In addition, an increasing number of studies are using qualitative research methods. Twenty years have passed since Mannebach et al. (1984) reported findings on research methodology. Since then, very few studies have examined the use of research designs and procedures in agricultural and extension education. Thus, this study was designed to investigate critical components in the research process, that is, use of research designs and procedures in papers presented at NAERM/C from 1995 to 2002.

Purpose and Objectives

The overall purpose of this study was to examine research designs and procedures reported in the papers presented at National Agricultural Education Research Meetings/ Conferences (NAERM/C) for the period 1995-2002. The study focused on the following objectives:

1. Identify and categorize research designs reported in papers presented at NAERM/C during 1995-2002.
2. Determine research methods and procedures reported in papers presented at NAERM/C during 1995-2002.
3. Develop a checklist, both research and procedural, for reporting research in agricultural and extension education.

Methods and Procedures

A combination of historical and descriptive research methodology was used for this study. The population for this study was all papers presented at the National Agricultural Education Research Meeting/Conference from 1995-2002. Alternate papers were excluded from the analysis. As a result, a total of 369 papers presented were considered for review. Each of the papers presented were given a code number. Then these papers were reviewed in order to categorize the relevant research designs. Three criteria were used to categorize the papers into research designs--title of the study, purpose and objectives, methods and procedures. Particular attention was given to the methods and procedures sections. For each of the 369 papers presented, data were collected on: 1) research designs, 2) sampling procedures, 3) instrumentation, 4) validity and reliability, and 5) data analysis. Research designs were grouped into 7 categories--descriptive survey research, experimental (quasi and true experimental), descriptive correlational, ex-post facto, qualitative (included mixed methods), Delphi, and

historical/philosophical. A category was also created to include papers that had not reported research designs.

Validity of the codebook was established using a panel of experts consisting of faculty and graduate students. Reliability was achieved by using procedures such as independent reviews, intercoder comparison of paper categorization and further review of inconsistencies in coding.

All the data were entered into a database suitable for statistical analysis. SPSS (11.5 version) was used to analyze the data. Descriptive statistics were used to summarize the data.

Findings

Objective 1: Research Designs

When the research designs reported in papers presented at NAERM/C over an eight-year period were examined, several trends were evident (Figure 2). First, there was substantial increase (13.1%) in the use of qualitative research for the period 1995-2002 compared to only 2.8% reported by Radhakrishna and Mbaga (1995). Second, use of descriptive research in papers presented at NAERM/C decreased from 67.2% in 1985-1994 to 50.1% in the current study (1995-2002). Third, correlational research and ex-post facto research continue to be used by agricultural and extension educators. The use of experimental and quasi experimental designs has been virtually constant over this 18 year period—8.1% (1985-1994) and 8.4% (1995-2002). Historical/philosophical studies were seldom reported at NAERM/C.

The research designs reported in papers presented at NAERM/C from 1995-2002 are shown in Table 1. Also shown in Table 1 (2nd column) is data relative to research designs used in an earlier study by Radhakrishna and Mbaga (1995). In the current study (1995-2002), the research design category most reported was the descriptive survey method (185 studies), followed by descriptive correlational (50 studies), qualitative, including mixed methods (49 studies), experimental/quasi experimental (31 studies), Delphi (17 studies), and philosophical/historical (9 studies). For 28 papers, the researchers could not determine the research designs (Table 1). Overall, for the 18 year period (1985-2002), 60% of the papers (450) presented at NAERM/C used descriptive research designs, followed by 90 papers (12%) which used descriptive-correlational designs, 63 papers (8.4%) experimental/quasi-experimental designs, and 60 papers (8.0%) used qualitative research designs.

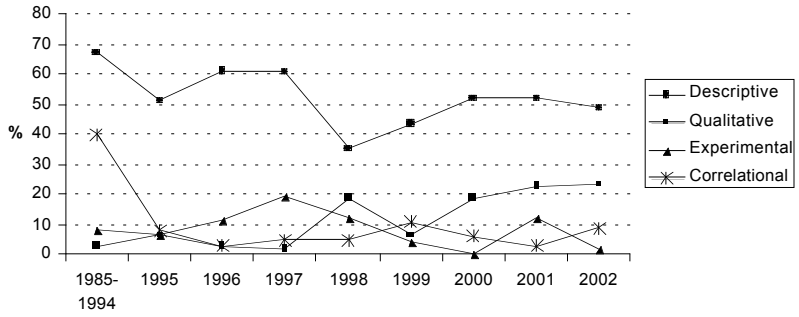

Table 1: Research Designs Used in Papers Presented at NAERM/C from 1985 to 2002

	Research Design	1985 1994*	95	96	97	98	99	00	01	02	Total 1995-2002	Total 1985-2002
1	Descriptive Survey	265	24	22	28	17	21	25	25	23	185	450
2	Experimental/ Quasi-experimental	32	3	4	9	6	2	0	6	1	31	63
3	Descriptive correlational**	40	8	3	5	5	11	6	3	9	50	90
4	Qualitative***	11	3	1	1	9	3	9	11	12	49	60
5	Philosophical/Historical	13	2	1	0	2	1	1	1	1	9	22
6	Delphi	18	2	3	3	1	2	3	1	2	17	35
7	Not reported/ Cannot be determined	--	6	2	0	8	7	4	1	0	28	28
	Total	379	48	36	46	48	47	48	48	48	369	748

*Data from Radhakrishna and Mbaga (1995).
**Includes Ex-post facto design.
***Includes mixed methodologies.

Objective 2: Research Methods and Procedures

Table 2 shows the research methods and procedures (sampling, data collection methods, instrument validity and reliability, and data analysis) reported in papers presented at NAERM/C (1995-2002). Approximately 60% of the papers presented at NAERM/C reported using census or some kind of random sampling for selecting subjects for the study. The "other" category included all non-probability sampling procedures such as convenience and purposive sample (32.0%). A total of 23 studies (6.2%) did not report the population and/or sampling procedures used to conduct the study.

Mailed questionnaires were the most frequent data collection method used (64.2%), followed by tests (13.8%) and interviews (11.1%). A total of 40 papers (10.9%) used multiple techniques to collect data--secondary data, participant observation, document analysis, and the like (Table 2).

A panel of experts was the most used criteria for establishing instrument validity (56.4%). Only six-percent of the papers reported field test as a strategy for establishing instrument validity. Previously established validity and triangulation of data were also mentioned and included in the "other" (6.2%) category (Table 2). However, close to one-third of all papers (31.4%) presented at NAERM/C did not report procedures for establishing validity.

Pilot test was the most used technique to establish reliability for the papers presented at NAERM/C (42.9%), followed by comparison of reliability coefficients

(2.9%). Thirty-nine papers (10.6%) reported previously established reliability, while (10.6%) reported post hoc reliability. However, 33.0% of all papers presented did not report reliability at all (Table 2).

Table 2. Research Procedures Reported in Papers Presented at NAERM/C

	f	%
Sampling		
Sample	125	33.9
Census/Population	103	27.9
Other	118	32.0
Not Reported	23	6.2
TOTAL	369	100.0
Data Collection Method		
Questionnaire	237	64.2
Tests	51	13.8
Interviews	41	11.1
Other	40	10.9
TOTAL	369	100.0
Instrument Validity		
Panel of Experts	208	56.4
Field Test	22	6.0
Not Reported	116	31.4
Other	23	6.2
TOTAL	369	100.0
Instrument Reliability		
Pilot Test	158	42.8
Previously Established Reliability	39	10.6
Comparison of Reliability Coefficients	11	3.0
Post Hoc	39	10.6
Not Reported	122	33.0
TOTAL	369	100.0
Data Analysis		
Descriptive Statistics	195	52.8
Inferential Statistics	63	17.1
Qualitative	41	11.1
Not Reported	70	19.0
TOTAL	369	100.0

The procedures used to analyze data in the 368 papers presented at NAERM/C were grouped into descriptive statistics, inferential statistics, and qualitative procedures (Table 2). The majority of papers (52.8%) used descriptive statistics to analyze data. The next most used procedure was inferential statistics (17.1%). Qualitative approach to data analysis was found in 19% of the papers presented. A total of 70 papers presented (19%) did not report data analysis procedures.

Objective 3: Development of a Checklist for Reporting Research

Based on the review of research designs and procedures reported in 369 papers presented at NAERM/C from 1995-2002, a checklist was developed (Table 3). The intent of the checklist is to provide guidelines for reporting various components of a research study. For clarity of presentation, the research designs were grouped into non-experimental, experimental and qualitative (see Figure 1). The research procedures (population and sample, variables, instrumentation, data collection and data analysis) for each of the three design types were identified and discussed.

Population and Sample: When describing population and/or sample, authors should identify the nature of population, that is, census, probability or non probability sample. When describing probability sampling, they must indicate the types--simple random, systematic, stratified, and cluster. If stratified sampling procedures are used, the authors should clearly indicate the stratification variable and the rationale for selecting the stratification variable. When using cluster or multistage sampling, sampling unit at each stage should be identified. In addition, the sample size, margin of error, and sampling error should be reported. If the authors are using non-probability sampling, they must explain the rationale for not choosing a probability sampling and indicate the type of non-probability sample used (purposive, quota, chunk, etc.).

Research Designs: When describing research designs, the following procedures should be used: First, indicate whether the study is descriptive, descriptive correlational, true-experimental/quasi experimental, and qualitative. Second, wherever appropriate, include a graphic representation of the designs. Such representation should include symbols such as random selection, random assignment, observation, treatment, use of intact groups, etc. Third, for true experimental designs, indicate what groups or individuals will be randomly assigned and identify the levels of independent (manipulated) variable(s). Fourth, briefly describe control or comparison groups, if using comparison group designs. Finally, for experimental designs, identify all the internal and external validity threats to the study and briefly explain how they were controlled.

Variables: Clearly indicate all the variables examined in the study. If the study is primarily descriptive in nature, identify all the variables included in the study. Remember, the primary end sought from descriptive studies is to describe and explore variables. If the study is descriptive-correlational, clearly identify the independent and dependent variables, and scale of measurement for both independent and dependent variable(s). If the study is experimental/quasi experimental in nature, make sure to identify the number of levels for each of the independent variables examined. In addition, indicate how extraneous variables were controlled.

Instrumentation: When describing instrument(s) used for the study, make sure you describe the procedures used in developing the instrument, including establishment of validity and reliability. In describing validity, clearly indicate the panel of experts and procedures used to conduct the field test. Also indicate the type of validity - content, construct, and face. Similarly,

Table 3. Checklist for Reporting Research Designs and Procedures

Components	Quantitative					Qualitative**
	Nonexperimental			Experimental		
	1*	2*	3*	4*	5*	
<u>Sampling procedures</u>						
Census/Population	˛	˛	˛	˛	˛	˛
Probability sample(Simple random, systematic, stratified, cluster)	˛	˛	˛	˛	˛	˛
Non-probability sample (Convenience, purposive)	˛	˛	˛			˛
Margin of error/Sampling error	˛	˛	˛	˛	˛	˝
<u>Research Design</u>						
Graphical representation of design	®	®	®	˛	˛	®
Random assignment vs. random selection	®	®	®	˛	˛	
Threats to internal and external validity	®	®	®	˛	˛	˛
<u>Variables</u>						
Description of variables	˛	®	˝	˛	˛	
Independent (Levels of variables)	®	˛	˝	˛	˛	
Dependent	®	˛	˝	˛	˛	
Moderator	®	®	˝	˛	˛	
Extraneous	®	®	˝	˛	˛	
Scale of measurement	˛	˛	˛	˛	˛	
<u>Instrumentation</u>						
Validity:						
Panel of experts	˛	˛	˛	˛	˛	˝
Field test	˛	˛	˛	˛	˛	˝
Use of standardized instruments	®	®	®	®	®	®
Reliability:						
Pilot test, including no. of subjects	˛	˛	˛	˛	˛	
Post-hoc reliability	®	®	®	˛	˛	
Standardized instruments	®	®	®	˛	˛	
Indicate type (alpha, test-retest, split-half, alternate form, etc.)	˛	˛	˛	˛	˛	˛
<u>Data collection</u>						
Response rate	˛	˛	˛	˛	˛	
Procedures for handling non-response	˛	˛	˛	˝	˝	
Procedures used to follow-up	˝	˝	˝	˝	˝	

˛=Required, ˝=Use judgment (depending on the nature of the study), ®=Not Required, Blank=Not applicable.

*1=Descriptive research; 2=Descriptive-correlational; 3=Other nonexperimental; 4=Quasi-experimental; 5=True experimental.

**Internal and external validity and reliability for qualitative studies should be addressed under the terminology Credibility, Transferability, and Dependability, respectively.

describe the procedures used in establishing reliability. Include the procedures--subjects, location, type of reliability (internal consistency, split-half, alternate form, test retest)--used in conducting the pilot study. Report reliability coefficients for both the pilot test and the final study. If instrument(s) from other studies were used, report and compare reliability coefficients for both studies. If no pilot test was conducted, report post-hoc reliability.

Data Collection: Describe procedures used for collecting data. Procedures should include who collected the data and when it was collected. In addition, method of data collection (mail survey, interviews, observations, etc.) should be reported. Follow-up of non-respondents, response rate, and control of non-response error should be discussed. Appropriate literature used to follow-up non-respondents should be cited.

When reporting qualitative studies, including mixed model studies, it is critical to carefully address issues of credibility, transferability, and dependability. It is also important to keep in mind that qualitative studies do not waive the requirement for describing the criteria used in selecting individuals or other population for the study. When interviews are used as data collection method, it is important to indicate the number of interviewers involved in data collection. If more than one interviewer is involved, the issue of intercoder reliability should be addressed when reporting the findings.

Conclusions and Recommendations

The results reported in this study provide information on research designs and procedures used in agricultural and extension education in the last 20 years. This information, in turn, provide perspectives on use of research designs and procedures by agricultural and extension educators.

Review of research designs and procedures reported in papers presented at NAERM/C revealed some significant changes in the last twenty years. First, use of descriptive research in papers presented at NAERM/C during1985-2002 has declined from 67% to 50.1%. Second, the use of qualitative research, including mixed methodologies increased tremendously from 11(2.8%) in 1995 to 49 (13.1%) in 2002. Perhaps this may be due to a number of factors: 1) the use of qualitative research by agricultural and extension educators has gained importance, 2) a number of qualitative research methods courses are being offered in departments and colleges, and 3) the profession has recognized the use of qualitative research designs through means such as workshops on qualitative research and developing a separate review criteria for qualitative research. Agricultural and extension educators continue to use other designs (descriptive correlational and experimental) as well. However, use of these two designs remained more or less constant. Historical/philosophical designs are seldom used in papers presented at NAERM/C. Overall, agricultural and extension educators know the general framework of research designs in which their studies fit. It is interesting to note that for 28 of the papers presented at NAREM/C did not report research designs.

Although agricultural and extension educators are reporting research procedures (sampling, variables, research designs, instrumentation, validity and reliability and data analysis), there is still room for improvement because a number of papers presented at NAERM/C did not report several research procedures relative to sampling (6.2%), validity (31.4%), reliability (33%) and data analysis (19%). Based on the findings and in-depth review of methods and procedures section of

each paper NAERM/C presented, a checklist for reporting research designs and procedures were developed (Table 3). A check mark in any of the boxes suggests that author(s) of papers should definitely report each of the components of the research process. An "x" in each of the boxes suggests that the author(s) of papers should use judgment and provide an explanation for reporting or not reporting key components of research process. A blank box suggests that the research component is not applicable to the study. The intent of developing this checklist is to guide authors to follow/include appropriate research procedures in reporting research. The researchers believe that a checklist like this will help: 1) authors to know first-hand the key components of research process, 2) plan research in a systematic way so that high standards of quality and rigor are maintained, 3) provide a basis for explaining the procedures used in their study, and 4) help reviewers to judge the quality of papers in a systematic and constructive way.

The researchers recommend that authors of papers use this checklist as a framework to report as much detail as possible of the research procedures used. Authors should take advantage of the increased page length to include all the details. Faculty teaching graduate research courses should use findings and the checklist to help graduate students understand the research process and what it takes to conduct a research study in agricultural and extension education.

As noted by Guba and Lincoln (1981), the trustworthiness of a study is generally based on four criteria: Validity, reliability, objectivity and generalizability--VROG (Guba and Lincoln, 1981). Careful development and field testing of the questionnaire provides the basis for validity. Development of questionnaire based on previous studies and instruments, ongoing reviews by a panel of experts makes the case for construct, content and face validity. Careful wording of the questionnaire, pilot testing the questionnaire with subjects not included in the sample, and the high percentage of usable questionnaires provide evidence of reliability. Analysis of assumptions/hypotheses/objectives/research questions, expert opinion and the use of appropriate statistical procedures as well as results offer evidence of objectivity. Finally, sound sampling procedures that yield a sample very similar to the population on key variable makes the case for generalizability of results to the population.

Agricultural and extension educators, at the minimum, should adhere to these four (VROG) criteria suggested by Guba and Lincoln (1981) to enhance the credibility and trustworthiness of a research study.

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An Analysis of Research Designs and Procedures
Used in Agricultural and Extension Education

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A Critique

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Contribution to the Discipline: The authors have made three valuable contributions and are to be commended for their thorough analysis of our collective research. First, they should be commended for their tact in noting the lack of precision when communicating our work. If not embarrassed; then we should be uncomfortable. Second, the authors provide us with a reflection on the characteristics of 369 papers as reported in eight national conferences. Boud, Keogh and Walker (1985) argue that reflection is essential in turning experience into learning. Finally, the authors provide a gestalt of the components of research design and the necessity of thorough reporting. As a outcome, they provide a useful checklist to improve our scholarship.

Mechanics: This work demonstrated systematic persistent effort to examine an important concern. I do question why the authors grouped research designs into 7 categories in the methods and procedures section (p.4) but used five categories in Table 3. Perhaps ex post facto, historical and Delphi were lumped into "other nonexperimental." Nevertheless, I found Table 3 to be very useful.

Conclusions: The conclusions and recommendations section is succinct and useful. I will admit to initially being a bit confused by the time frame, 20 years v. eight years. Now I think I understand. Too, I would question their word choice in "it is *interesting* to note that for 28 of the papers presented at NAREM/C did not report research designs." Perhaps "*disturbing*" is a more descriptive word?

Implications for Practice: Radhakrishna, Leite and Baggett chide us that "there is still room for improvement… (p.10). This paper has the potential to "kick our research and scholarship up a notch." Maybe two! Guba and Lincoln (1981) promoted "trustworthiness" through VROG; validity, reliability, objectivity and generalizability. The checklist provides authors *and reviewers* with a tool to verify comprehensiveness in reporting sampling, validity, reliability and data analysis procedures.

Concluding Comments: Thanks for your analysis. What is keeping us, as researchers and reviewers, from using this checklist and implementing the recommendations?

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DEVELOPMENT OF AN INSTRUMENT TO ASSIST IN DEFINING STUDENT AND TEACHER RAPPORT IN AGRICULTURAL EDUCATION

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The purpose of this study was to develop an instrument to assist in defining relationship rapport that occurs between agriculture students and their agricultural education teachers in the secondary school setting. An instrument was developed using rapport-type statements from three reliable instruments. This study concluded that the relationship rapport instrument includes one underlying construct that assists in defining relationship rapport occurring between secondary agriculture students and their teachers. Using exploratory factor analysis, the one construct, consisting of 16 items (r = .93), has been entitled Interpersonal Closeness. Interpersonal closeness includes teacher characteristics such as: warmth, sincerity, genuine, honesty, respect, kindness, caring, comfortable, accepting, and communicative. The qualitative analysis portion of the study, which focused on students' written comments, also emulated the concepts that were found in the construct of Interpersonal Closeness. This construct is a key finding in this study because it has revealed important characteristics that assist in defining and describing relationship rapport between secondary agriculture students and their teachers.

Introduction and Theoretical Framework

In a national survey of almost one thousand students 13-17 years of age, teachers treating students like adults, teachers relating well to students, and teachers being considerate of students' feelings were among the top ten characteristics of effective teachers as rated by students (NAASP, 1997). These results support the belief that it is a good strategy for teachers to be able to affiliate and build positive relationships with their students. Moreover, many would argue that the importance of the relationship between a teacher and a student is crucial to the student's academic, psychological, and social development (Condon, 1979). The longer such relationships last, the better chance they have of exerting a positive influence on students (Lui, 1997; Marzano, 1992).

The National Science Education Standards revealed that good teachers of science create environments in which they and their students work together as active learners. Science teachers have continually expanded theoretical and practical knowledge about science, learning, and science teaching. The standards promote the importance of teachers using assessments of students and of their own teaching to plan and conduct their teaching. These teachers build strong, sustained relationships with students that are grounded in knowledge of students' similarities and differences. And, they are active as members of science learning communities (National Science Education Standards, 2001).

There are limited studies that focus on how students and teachers affiliate and build relationships with each other in secondary schools, especially in agricultural education classrooms. Current research studies that investigate the role of the relationship rapport that

occurs between students and teachers would provide helpful information. Earlier studies focusing on teacher-student relationships supported the fact that teachers who were warm and supportive tended to have classrooms that emulate order, respect, and students who are learning (Condon, 1979; Marzano, 1992; Lui, 1997). Additional information about how teachers and students affiliate with each other to develop positive relationships would compliment these findings (Brophy, 1983; Cooper and Good, 1983). In addition to successful classroom management techniques such as instructor effectiveness, clarity, enthusiasm, knowledge for the subject, and professional behavior, novice teachers managing classrooms in which students have the sense of safety, security, empowerment, and support along with a strong positive relationship with their teachers may prove to be what new teachers need to focus on early in their teaching careers. According to Moore and Camp (1979) some agriculture teachers leave the teaching profession due to long hours, having students in class who should not be in an agricultural education class, inadequate salary, teachers disliking student attitudes, and uncertainty of how to promote positive discipline strategies with their students. Knowing how to affiliate with students and build a relationship rapport with students may alleviate teachers' tensions and students may learn to respect their teachers, thus making a positive classroom environment for students and teachers. Teachers need to understand how to affiliate successfully with their students so that strong professional relationships result. Teachers may benefit by knowing what relationship rapport is and how it may impact their role as a teacher. Students' perception of the relationship rapport that they have with their teachers is another important dimension that needs to be studied.

Relationship rapport is a complex construct and is difficult to define and measure. Research focusing specifically on relationship rapport is, therefore, limited. However, it is possible to study the importance and contributions of these relationships, and as more research is done in schools, the importance of these relationships becomes increasingly more obvious.

There have been a few instruments developed to measure rapport, but they did not focus solely on the measurement of rapport between students and teachers. However, some information from various instruments was identified to aid in the development of a new instrument for measuring relationship rapport between students and teachers. In addition, a careful review of the literature also revealed that rapport-type constructs have not been clearly defined, which leads to an inability to effectively describe such constructs. It is important that researchers begin to learn more about relationship rapport because the research appears to be vague in defining what relationship rapport actually is, and, in elaborating in an area that may or may not be useful for researchers to continue to study. Current instruments are needed to inquire into the importance of the relationship rapport that occurs between students and teachers and how rapport impacts student learning and achievement and participation in extra-curricular activities. In sum, it seems that the need for students to affiliate with and begin building a relationship with their teachers is an area of research that needs definition. An exploration into this area is needed to clarify the importance of student and teacher interactions and how relationship rapport is viewed by students and teachers.

A psychosocial theory that supports the need for interaction between human beings is the need for affiliation. This theory is derived from McClelland's motivation theory that focuses on a trichotomy of needs in which the need for affiliation is derived (Turner & Herron, 1997). Affiliation is described as establishing, maintaining, or restoring a positive affective relationship with another person. According to Turner & Herron (1997) words and phrases that best describe

affiliation are 'friendship', 'likeness', 'the desire to be liked', 'accepted by someone', and 'rapport'. Approval seeking is a high priority for persons motivated by the need for affiliation (Turner & Herron, 1997). McClelland's trichotomy of needs is one of the most widely recognized theoretical models used when studying behaviors related to relationships and motivation theory (Turner & Herron, 1997).

Purpose of Study

The purpose of this study was to explore the construct of relationship rapport between junior and senior agriculture students and their agriculture teachers by developing an instrument that may assist in defining relationship rapport. The objectives of the study were to: (1) ascertain how secondary agriculture junior and senior students *perceive the relationship rapport* they have with their agriculture instructors; (2) identify the common themes of secondary students' *positive perceptions about the relationship rapport* they have with their agriculture teachers; (3) identify common themes of secondary students' perceptions of *negative perceptions about the relationship rapport* they have with their agriculture teachers; and, (4) ascertain any *underlying construct(s)* that assists in defining relationship rapport.

Methods and Procedures

This descriptive study sought to explore the construct of relationship rapport by seeking input from secondary agricultural education junior and senior students in randomly selected schools in the state of Missouri. The target population that the researchers sought to survey consisted of junior and senior students enrolled in at least one agricultural education class in 22 secondary schools. Using a random table of numbers, twenty teachers and approximately 350 of their junior and senior level students were identified and invited to participate in the study. A list of all agricultural education teachers was identified by the state agricultural teacher's directory (2001-02) and the agricultural education database at the University of Missouri-Columbia. The agriculture teacher's role in the study was to administer, collect, and return the parental permission forms and the questionnaires from students in a sealed envelope. A total of 15 teachers assisted the researcher and 277 of their students provided usable data for the study revealing a response rate of 79 percent.

The instrument was developed by modifying and adapting items contained in three other instruments with rapport-type constructs. The three instruments used to develop part one included the "Roommate Rapport Scale", the "Purdue Teacher Evaluation Scale", and the "Halo Scale". The Roommate Rapport Scale was found to be a reliable (.97) 28-item scale developed to measure rapport between college roommates (Carey, Hamilton, & Shanklin, 1986). The Purdue Teacher Evaluation Scale (Bentley & Starrey, 1970) is a reliable (.89) rating scale developed for use by junior high students and beyond to assess specific behavioral characteristics of their teachers including characteristics such as teachers' attitudes towards teaching, fairness in the manner in which they assign grades, and exhibiting a positive attitude while teaching (Bentley & Starry, 1970). The Halo Scale yielded a reliability estimate of .89 as found by Good & Grouws (1975) and contained student self-report data to assess the teacher rapport that students perceived they had with their teachers over two consecutive years. The relationship rapport instrument was pilot-tested in a local high school in a Midwestern state for readability

and content validity. In addition, a panel of experts at a Midwestern university reviewed the instrument for content and face validity. No major changes were made to the instrument prior to mailing it to the participating schools.

In scoring the relationship rapport instrument, a quantitative approach was utilized. A Likert- type format was retained as used by Carey et al, Bentley and Starry, and Good and Grouws. The scale developed for this study included 21 items that were stated in a positive direction and 7 items that were stated in a negative direction. Students were asked to circle the appropriate number that represented the extent that they perceived the statement to be true in their experiences with their current agriculture teacher. The Likert-type scale used on the instrument corresponds to the following: 1. **Never**: This is never true, 2. **Seldom**: This is seldom true, 3. **Occasionally**: This is occasionally true, 4. **Often**: This is often true and 5. **Always**: This is always true.

Part II of the instrument contained two open-ended questions, which was used to explore qualitatively the construct of relationship rapport. The first question asked students to describe in two or three words the relationship they currently had with their agriculture teacher. The second question asked students to write two or three sentences that described the relationship they had with their agriculture teacher.

Descriptive statistics were used to analyze the numerical data for Objective 1. The data set was analyzed using SPSS version 10.0. Each item number from the instrument was listed with the frequency illustrating how each student responded to each question on the instrument. For Objectives 2 and 3, students were asked to describe the relationship with their agriculture teachers in Part II of the relationship rapport instrument. The students' responses were grouped into categories that were given titles that represent the underlying meaning of each category. A qualitative approach of categorization was used to group the written statements as indicated by Creswell (1994). Categorization involves bringing together into provisional categories those statements that relate and/or are similiar in some way. Thus, in the current study, students' written comments were categorized into headings that emulate various rapport constructs.

For Objective 4, exploratory factor analysis was judged, by a panel of experts at the University of Missouri-Columbia, to be the appropriate statistical technique to use when developing an instrument due to its' ability to be applied to a single set of variables when the researcher is interested in discovering which variables in the set form coherent subsets that are relatively independent of one another (Tabachnick & Fidell, 2001). In addition, exploratory factor analysis was selected as the appropriate statistical technique to utilize because of its' ability to rotate the relationship rapport variables that were correlated with one another, but largely independent of other subsets of variables, and then combining them into factors. Thus, factors are thought to reflect underlying processes that have created the correlations among variables (Tabachnick & Fidell, 2001). Hence, potentially identifying underlying factors related to relationship rapport may assist in defining what relationship rapport actually is and characteristics that help define relationship rapport in an educational context. In this study, it was assumed that factor analysis revealed patterns of correlation among the variables that reflected underlying characteristics (constructs) of relationship rapport as indicated from student perceptions.

Results and Findings

For Objective 1, descriptive statistics of the students' responses were calculated (Table 1). The seven questions that were stated in a negative manner resulted in mean scores of 2.0 or less. All other items on the instrument were stated in a positive manner. As indicated in Table 1, the mean scores of each of the positively stated items ranged from 3.4 to 4.2. The standard deviations of the scores ranged from .91 to 2.01.

For Objectives 2 and 3, students were asked to write two or three sentences that described the relationship rapport they had with their teachers. Using a qualitative approach, all descriptive words and statements that students wrote down were categorized into clusters representing positive and negative themes and were given descriptor titles that emulate how the students perceive the relationship rapport they had with their teachers. The themes are discussed in order of the most frequently mentioned to the least frequently mentioned:

A Positive Working Relationship: The first theme focused on determining how well students and teachers get along and work together. Thirty percent of the students indicated that they have a positive working relationship with their agriculture teacher.

Helpfulness: The second theme dealt with how much the student perceived the teacher to be helpful and how he/she felt the teacher helped students with problems that they had. Twenty- one percent of the students indicated helpfulness as a positive attribute towards their teachers.

Respect: The third theme focused on whether or not the students felt that their agriculture teacher had respect for them as young adults. Fifteen percent of the students indicated that they had a mutual respect with their agriculture teacher.

Students Feel Comfortable with Teacher: The fourth theme to emerge focused on whether or not the students felt comfortable with their agriculture teacher. Thirteen percent of the students indicated that they felt comfortable with their teacher.

Communication: The fifth theme focused on how well the students felt that their agriculture teachers communicated with them in an effective manner. Thirteen percent of the students felt that they had good communications with their agriculture teacher.

Dislike their Teacher: The sixth theme revealed that students did not enjoy being in their agriculture class and disliked their teacher. Eight percent of the students indicated that they did not like their agriculture teacher.

For Objective 4, exploratory factor analysis was used to group statements describing the characteristics of secondary agriculture teachers as perceived by their junior and senior students in an attempt to develop a reliable and valid instrument to assist in exploring the construct of relationship rapport. This analysis also served as a data-reduction procedure, which focuses on the reduction of a large amount of data being placed into a more manageable size to facilitate additional data analysis. The eigenvalues, scree plot, proportion of variance accounted for, and interpretability information were reviewed to determine the number of components to retain for rotation. The questions related to characteristics of teachers that students observe on a daily basis in the agricultural education classroom. Characteristics for 21 items were stated in a positive manner and seven items were stated in a negative manner. The principal axis method was used to extract the components followed by a promax rotation.

After considering unduplicated factor loadings and interpreting the information, two components were retained for promax rotation that accounted for the largest proportion of variance while being conceptually consistent with the overall intent of this study. The two-component model (58% of variance explained) was selected over the three-component model (61 % of variance explained) because it accounted for an adequate breakdown of eigenvalue loadings of 1.0 and allowed all but three variables to load on two components with factor loadings of .50 or greater. According to Stevens (1992) and because of the complexity of the instrument, .50 was selected as the cut-off value as a conservative measure of how the constructs loaded on the two factors.

Statements and their corresponding factor loadings are presented in Table 2. In interpreting the rotated factor pattern, factor loadings of .50 or greater for an item were retained, provided the item did not load close in value with the other components.

After questions with factor loadings of less than .50 were excluded and those that loaded less than .200 apart in value to each other were excluded (Stevens, 1992), 18 items were retained for the two components. Sixteen statements loaded on the first component, and two statements loaded on the second component. Item number 4 was first eliminated due to both values being less than .50. Items number 2, 3, 9, 10, 14, 19, 25 and 26 were eliminated due to their values being within .200 in range to each other. Loadings that are very close in value (within .200) were eliminated because the loadings are too close in value to be able to justify retaining them on the component factor loading (Stevens, 1996). Items number 1, 5, 11, 12, 15, 16, 17 and 18 were retained due to their loadings of values greater than .50 on one component and less than .50 on the second component. Items number 6, 7, 8, 13, 20, 21, 23, 24, 27 and 28 had loadings on both components. However, the range in values between the two numbers for these questions on the two components were greater than .200, so these question items were retained. Items number 17 and 18 were the only two loadings for component 2. Therefore, because most factor analysis procedures recommend that a strong component is one that has at least five items (Stevens, 1992), component two was eliminated since it did not contain a sufficient number of items. In sum, the exploratory factor analysis utilized in the current study revealed one component with 16 items.

A reliability analysis was performed on the 16 items retained on component one. The alpha coefficient for the items retained yielded a reliability estimate of .93 for the 16 items that were retained.

The one component was given the following title to represent the underlying construct represented by the statements that loaded on the component: <u>Component 1 – Interpersonal Closeness</u>– The student perceived the following about his/her teacher: warmth in their relationship, use of non-verbal cues to make him/her feel comfortable, communicative, comfortableness, genuine, accepted, satisfaction with teacher, teacher is open-minded, humorous, grateful, warm, secure, honest, sincere, and cooperative.

Conclusions, Recommendations, and Implications

Based on the data collected, it can be concluded that most students felt they had a positive relationship rapport with their agriculture teachers. In contrast, a small number of students felt they *did not* have a positive relationship rapport with their agriculture teachers.

It may be concluded that five positive themes emerged from the qualitative portion of this study. The positive themes revealed were: students had a positive working relationship with their agriculture teacher, students felt their agriculture teacher was helpful with problems the students had, students felt respected by their agriculture teacher, students felt comfortable with their agriculture teacher, and students felt their agriculture teacher communicated with them in an effective manner. A negative theme was revealed concluding that few students did not enjoy being in their agriculture class. In addition, these same few students indicated that they disliked their agriculture teacher.

It may be concluded that the relationship rapport instrument revealed one underlying construct (interpersonal closeness) that may assist in defining relationship rapport occurring between secondary agriculture students and their teachers. Using exploratory factor analysis, the one component identified has been entitled Interpersonal Closeness by a panel of experts. Based on the characteristics revealed in this study, from both the quantitative data and the qualitative analysis, interpersonal closeness includes teacher characteristics such as: warmth, sincerity, genuine, honesty, respect, kindness, caring, comfortable, accepting, and communicative. This construct is a *key* finding in this study because it has revealed important characteristics that assist in defining and describing relationship rapport between secondary agriculture students and their teachers.

One may imply that one underlying construct is revealed in the relationship rapport instrument and may be used for future studies focusing on the relationship rapport between students and teachers from agriculture programs. Considering the strong reliability ($\underline{r} = .93$) revealed for the 16-item relationship rapport instrument, it may be helpful to continue to study the construct of relationship rapport and all that it entails as revealed in this study. In addition, once completed, the relationship rapport instrument may prove to be a useful tool for all teachers to assess how their students perceive the relationship rapport that they have with their students. By doing this, teachers may be able to see areas in which they may be weak when trying to build a relationship with students. In addition, it may be helpful for teachers to inquire into areas in which they successfully build relationships with their students.

While the findings of the present study are revealing, additional data could be generated through continued study that focuses on instruments used for measuring the relationship rapport between students and teachers. A synthesis of research should also employ a continued and deeper review of literature that may reveal more studies and instruments utilized in measuring rapport in an educational context.

In research focusing on rapport nearly thirty years ago, Good and Grouws (1975) studied teacher rapport in third and fourth grade classrooms. Much of the research revealed in the literature focused primarily on the role of rapport in elementary school settings suggesting that once students are beyond the elementary school years, relationship rapport is not as important as

it was in the elementary years. Based on the findings of the present study which identified a *potentially* reliable and valid instrument to measure relationship rapport between students and teachers, it is recommended that researchers focus on studying the relationship that exists not only with elementary aged school children, but also the relationship rapport between students and teachers in middle and secondary education.

This study has spawned an important topic that needs to be further explored. Once validated, the relationship rapport instrument would benefit potential studies focusing on various aspects of student and teacher relationship rapport. The following list depicts potential research areas using the relationship rapport instrument with secondary agriculture teachers and students:

- Do teachers who have strong relationship rapport with students have students who achieve at a higher level?
- What is the relationship between student and teacher relationship rapport and student participation in FFA career development events?
- Is there a relationship between teaching methods and teacher/student relationship rapport?
- Is there a relationship between relationship rapport and motivation across learning styles of students?
- What is the influence of selected variables on teacher/student relationship rapport among college students?
- Is there a relationship between teacher/student relationship rapport and students' year in high school?
- Is there a relationship between personality profiles of teachers and how students perceive the relationship rapport they have with teachers?

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Table 1

Descriptive Data of Relationship Rapport Instrument Items **(N= 277)**

Item number	Statement	Frequency 1	2	3	4	5	M	SD
1.	Teacher creates a feeling of warmth	18	31	68	97	63	3.56	1.14
2.	Student feels secure in relationship with teacher	9	26	39	97	106	3.95	1.09
3.	Student has confidence in teachers knowledge	5	16	38	93	125	4.14	.982
4.	Teacher uncertain when dealing with student (N)	143	83	23	17	11	1.80	1.08
5.	Teacher provides comfortable non-verbal cues	18	21	60	120	58	3.65	1.09
6.	Student is comfortable during discussions	17	13	41	102	104	3.94	1.13
7.	Teacher is communicative	16	20	67	89	85	3.75	1.13
8.	Teacher is a warm and sincere individual	13	19	54	101	90	3.85	1.10
9.	Student frustrated with attempt to relate to teacher (N)	122	94	27	24	10	1.94	1.10
10.	Teacher acts cold and distant (N)	161	65	31	14	5	1.68	.983
11.	Teacher has genuine desire to help student	5	12	44	115	100	4.06	.925
12.	Student feels accepted	7	7	26	104	133	4.26	.914
13.	Student feels satisfaction with teacher	10	19	47	123	78	3.87	1.02
14.	Teacher does not understand student (N)	129	82	34	24	8	1.91	1.09

Note. Responses on a 5-point scale (1 = Never, 5 = Always) N=Negative

Table 1 (continued)

Descriptive Data of Relationship Rapport Instrument Items **(N= 277)**

Item number Statement	Frequency 1	2	3	4	5	M	SD
15. Student can talk freely to teacher	26	36	58	92	64	3.47	1.24
16. Teacher helps student understand ag content	7	18	43	102	107	4.03	1.02
17. Student feels frustrated with teacher (N)	114	88	36	29	10	2.03	1.13
18. Student does not trust teacher (N)	182	59	14	15	7	1.58	.988
19. Teacher is very "human" to student	7	13	42	106	109	4.07	.980
20. Teacher has a good sense of humor	13	17	42	101	104	3.97	1.09
21. Teacher makes student feel comfortable in class	10	8	40	116	103	4.06	.977
22. Student feels grateful for teacher's help	5	11	53	96	112	4.08	.956
23. Teacher understands how student feels	13	26	66	101	71	3.69	1.09
24. Teacher is open, honest, and genuine	5	21	46	99	105	4.00	1.00
25. Teacher makes student "feel at ease"	9	14	58	114	82	3.89	.996
26. Teacher does not respect student (N)	196	42	21	12	6	1.52	.961
27. Student is comfortable talking with teacher	12	12	54	108	91	3.92	1.04
28. Teacher is cooperative with student	6	13	54	99	105	4.02	.973

Note. Responses on a 5-point scale (1 = Never, 5 = Always) N=Negative

Table 2

Total Variance Explained

	Initial Eigenvalues			Rotation
Component	Total	% of variance	Cumulative	Total
1	14.64	52.31	52.31	14.42
2	1.5	5.34	57.66	9.2
3	1.0	3.66	61.31	
4	.95	3.41	64.72	
5	.84	2.99	67.71	
6	.80	2.84	70.56	
7	.76	2.72	73.28	
8	.74	2.65	75.92	
9	.73	2.63	78.91	
10	.67	2.34	80.95	
11	.58	2.06	83.01	
12	.50	1.80	84.81	
13	.46	1.67	86.44	
14	.41	1.47	87.91	
15	.36	1.28	89.19	
16	.35	1.25	90.43	
17	.34	1.22	91.66	
18	.31	1.09	92.75	
19	.28	.99	93.76	

Table 2 continued

Total Variance Explained

	Initial Eigenvalues			Rotation
Component	Total	% of Variance	Cumulative	Total
	.26	.90	94.66	
21	.24	.86	95.51	
22	.23	.82	96.34	
23	.22	.78	97.12	
24	.20	.71	97.83	
25	.17	.61	98.44	
26	.16	.59	99.04	
27	.15	.52	99.56	
28	.12	.44	100.00	

Development of an Instrument to Assist in Defining Student and Teacher Rapport in Agricultural Education

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A Critique

Glen C. Shinn, Texas A&M University

Contribution to the Discipline: An attempt to develop any instrument is a bold step; an attempt to develop a psychosocial instrument is courageous. Certainly student and teacher rapport is an important relationship and should be better understood. Clearly, we need more precise instruments to facilitate our work. I will be first to acknowledge that the development of such an instrument is well beyond my expertise. I concur with the authors; "relationship rapport is a complex construct and is difficult to define and measure." This could have long-term benefits for the discipline but will need sustained effort. I applaud Wittler and Stewart for their courage to begin the process.

Mechanics: I have two broad concerns and two procedural questions. The authors posit "there are limited studies that focus on how students and teachers affiliate and build relationships with each other in secondary schools, especially in agricultural education classrooms." However, keyword search of the literature resulted in more than one thousand related citations. Hewitt-Gervais, Bevins, Volety, and Mayfield (2000) noted that "the process of validation involves: (1) identifying the purpose for which the test scores will be used, (2) identifying behaviors that define the domain, (3) prepare a set of test specifications, (4) construct an initial pool of items, (5) have items reviewed, (6) hold preliminary item tryouts, and (7) field-test items on a large sample representative of the proposed examinee population." I concluded that validation is a challenging and laborious process. My second concern centers on issues of sample size, sampling and procedures for handling non-response.

Flory (2002) noted that "there are many known systematic effects independent of the actual student's faculty rapport that can distort the responses. Flory noted that "the formulas for these items, [as] determined by factor analysis, are: Rapport = -0.2(advanced planning) + 0.5(class discussion) + 0.5(personal help) + 0.2(grade accuracy). My question: how do these factors fit with your construct "interpersonal closeness?" I am interested in better understanding the procedures used in the pilot-test and the use of the expert panel. I am surprised that "no major changes were made to the instrument…"

Concluding Comments: I agree that Wittler and Stewart have "spawned an important topic that needs to be further explored." Otherwise, I have reservations about the validity, reliability, objectivity and generalizabilty of this first phase of instrument development.

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Biotechnology Concepts: An Analysis of Agricultural Education Teachers' Attitudes, Knowledge, and Understanding

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Abstract

Science related competencies, such as chemistry, biology, genetics, physiology, and zoology, have always been a part of the agricultural education curriculum. Rapidly evolving technologies in many of these areas have pressured agricultural educators to keep abreast of developments and create relevant curricula. Biotechnology is no exception. The purpose of this study was to provide information on the attitudes toward and knowledge level of biotechnology by Agricultural Education teachers in a Mid-Atlantic state.

A descriptive research design was employed to collect data for the study. A research questionnaire was mailed to 95 agricultural education teachers in a Mid-Atlantic state during the 2000-2001 school year. The questionnaire included questions on the attitudes toward biotechnology, level of knowledge of biotechnology topics, and basic demographics characteristics of the participants.

A major finding of the study was that the Mid-Atlantic state's agricultural education teachers possess a positive attitude towards biotechnology, but lack some of the resources and knowledge to incorporate the subject matter into their curriculum. Teachers perceive themselves as having more knowledge on biotechnology topics that have traditionally been associated with agriculture (animal reproduction, hybridization) and less knowledge on topics that are associated with other fields (environmental biotechnology, human genomics).

Introduction/Theoretical Framework

The concept of biotechnology is not new. If you have consumed a piece of cheese or yeast bread, you have consumed a product of biotechnology. Man has been selectively breeding plants and animals and using microorganisms to make food items such as cheese, bread, and beverages to improve his way of life for thousands of years. In fact, the term biotechnology was originally coined in 1919 by a Hungarian engineer, Karl Ereky (Murphy and Perrella, 1993). At that time, the term meant all the lines of work by which products were produced from raw materials with the aid of living organisms

Modern biotechnology can be traced back over 100 years to the works of Louis Pasteur, Robert Koch, and Gregor Mendel. The groundwork of Pasteur and Koch in microbiology, Mendel in genetic inheritance, and numerous other scientists lead to the discovery of deoxyribonucleic acid (DNA) in the early 1950s (Amgen, Inc., n.d.). Watson and Crick's discovery of the structure of DNA made possible the development of techniques for inserting

foreign genes into bacteria in the 1970s. The first product of modern biotechnology was the construction of a synthetic insulin gene in 1978.

As the use of modern biotechnological techniques was accelerating in the 70s and 80s, agricultural education was at a major crossroad. In a major study funded by the National Academy of Sciences, much of the focus and content of many vocational agriculture programs was found to be outdated. The authors challenged the profession to broaden the relevance and scope of the agricultural education curriculum to better prepare students for the study of agriculture in post secondary schools and colleges and for current and future career opportunities in agricultural sciences (National Research Council, Board on Agriculture, Committee on Agricultural Education in Secondary Schools, 1988).

One response to this challenge was to infuse more science and technology into the agricultural education curriculum. Agriscience, bioscience, and ag-technology became buzzwords that reflected the infusion of biotechnology and genetic engineering into the agricultural education curriculum (National Council on Vocational Education, 1990). The techniques of biotechnology are among the most complex and widely applied innovations of our time, however, many are already applied to agriculture in more ways than most of us suspect (Smith, 1989).

While the concept of integrating more science into the agricultural education curriculum was widely accepted, a major question arose. Did agricultural education teachers have the knowledge, understanding, and attitudes about biotechnology to properly implement the concepts into the high school curriculum?

In a review of the relevant literature, there was an overwhelming support for infusing biotechnology concepts into high school science curriculums. Zeller (1994) in a survey of 250 biology teachers, found the content areas of biotechnology appropriate for both the general and advanced high school biology curriculums. Ahmed (1996) found that introducing students to biotechnology, not only provided an understanding of the principles and techniques involved, but raised awareness of the ethical dilemmas associated with the concepts.

While the concept of infusing biotechnology concepts into high school science curriculums was widely accepted, a number of problems were identified with its implementation. One of the most difficult problems for institutions to overcome in developing a technologically integrated curriculum is the lack of technical experience on the part of the teaching faculty (Mattoon, 1998). In addition, the analysis of issues in bioethical contexts is controversial and can be related to an individual's feelings and beliefs (Conner, 2000). Chowning (2002) felt students need a solid scientific foundation to make informed decisions about important biological and technological issues.

Science related competencies have always been a part of the agricultural education curriculum. Concepts and principles of chemistry, biology, genetics, physiology, and zoology are readily applied to plant and animal studies (Moss, 1985). While the science related competencies have been a part of agricultural education, the literature failed to show the degree to which they were being taught. Martin (1989) stated that, " Although sciences pertinent to

agriculture are being taught, we do not know to what extent they are being taught nor do we know what is being taught and what more should be taught related to the sciences of agriculture" (p. 244).

Since the National Research Council, Board on Agriculture, Committee on Agricultural Education in Secondary Schools' report in 1988, a number of studies have been undertaken to explore the integration of science in the agricultural education curriculum. In 1992, Dormody explored the sharing of resources between secondary school teachers of agriculture and science departments. He found a majority of the agriculture and science departments were sharing resources and agriculture teachers predicted this trend would increase in the future. Whent (1994) found team participation in programs such as the AgriScience Institute and Outreach Program increased cooperation and resource sharing between agriculture and science teacher participants. Osborne and Dyer (1998) in a study of Illinois high school science teachers found that the science teachers felt that agriculture programs should become more science based.

Balschweid and Thompson (2000) conducted a study to determine if participation in an integrated agriculture and science curriculum by pre-service teachers increased their desire and ability to integrate their curriculum and collaborate with other teachers once they started teaching. Participation in the curriculum resulted in a more positive attitude about integrating science into the agriculture curriculum and increased their willingness to attend workshops about integration of science. Teachers believe that integrating science assists students in better understanding science concepts and their application to agriculture (Thompson & Balschweid, 2000).

Johnson (1996a and 1996b) explored the effects and support for offering science credit for agriculture. He found that Arkansas agriculture teachers strongly supported the concept. The teachers identified five effect components of offering science credit which included the benefits to the students, the negative impacts on the agricultural education program, enhanced program benefits, increased enrollment, and improved science content of the program.

In a study of North Carolina agricultural educators, Wilson, Kirby, and Flowers (2002), discovered the agricultural educators felt they lacked biotechnology knowledge, supported its importance, and recognized the benefits of integrated curriculum in agricultural education. The agricultural educators perceived that funding, equipment and teacher knowledge were the largest barriers to adopting integrated science curriculum. They further discovered that agricultural educators were most likely to teach biotechnology if they have less years of teaching experience, have attended some biotechnology training, and perceived that the curriculum will fulfill their program needs.

Purpose and Objectives

The purpose of the study was to explore the attitudes and knowledge of biotechnology issues by agricultural education teachers in a Mid-Atlantic state. The information would be used by the state supervisor of agricultural education and teacher educators to modify undergraduate course requirements and plan in-service workshops and graduate courses to enhance teacher knowledge in the area. The primary objective of this study was to describe the attitudes of

agricultural education teachers in a Mid-Atlantic state toward and knowledge level of biotechnology. A secondary objective was to determine if relationships existed between selected demographic teacher variables and biotechnology attitudes and knowledge levels.

The following research questions provided direction for the study:

1. What were the attitudes of a Mid-Atlantic state's agricultural education teachers toward biotechnology?
2. What level of knowledge and understanding was demonstrated by agricultural education teachers in a Mid-Atlantic state regarding biotechnology?
3. What relationships existed between selected teacher demographic variables and biotechnology attitudes and knowledge levels?

Methods/Procedures

A descriptive survey research method was used to collect data from high school agricultural education instructors in a Mid-Atlantic state. "Descriptive research is not generally directed toward hypothesis testing. The aim is to describe, "what exists" with respect to variables or conditions in a situation" (Ary, 1990, p. 381). It was the aim of this research to discover "what exists" in the areas of biotechnology among agricultural education teachers in a Mid-Atlantic state. "Descriptive surveys focus on determining the status of a defined population with respect to certain variables. They basically inquire into the status quo; they attempt to measure what exists without questioning why it exists" (Ary, 1990, p. 407). A descriptive research design is appropriate for determining the knowledge level, attitudes, and implementation of the study population.

Population of the Study

The population for the study included the 95 agricultural education teachers employed in a Mid-Atlantic state during the 2000-2001 school year. The population frame was established using the Mid-Atlantic state's secondary agriculture teacher directory.

Instrumentation

An existing study and instrument conducted by Kirby (1990) in North Carolina was modified for this investigation. The questionnaire was constructed according to recommendations by Dillman (1978) and Sudman and Bradburn (1982). These include recommendations on question ordering and the color of the paper. The survey was mailed to all agricultural education instructors in the state. The survey was organized into two major sections. Section I focused on the perceived level of knowledge in biotechnology and the attitudes that teachers possess on biotechnology issues and teaching biotechnology. The final section requested demographic information of the participants including: years of experience, highest degree held, operation of a farm, and operation of an agribusiness.

The revised instrument was presented to a panel of experts consisting of teacher educators at the local land-grant university to establish content and face validity. A panel of experts, consisting of agricultural education teachers serving on the Mid-Atlantic state's Program

and Policy committee, was used to pilot test the instrument. They were administered the questionnaire and the data were used to establish the instrument's reliability. The reliability of the three constructs; knowledge of biotechnology issues, attitudes toward biotechnology, and responsibilities of agricultural education teachers relative to biotechnology was found to be exemplary at .89, .85, and .88 respectively (Robinson, Shaver, & Wrightsman, 1991). Because the instrument was found to be reliable and the researchers desired to survey the entire population of teachers in the state, the data collected during the pilot test was included in the final analysis.

Data Collection

Dillman's suggestions for constructing survey instruments, cover letters, and follow-up strategies were implemented (1978). A survey with cover letter was mailed to each of the agricultural education teachers in the state. A stamped, self-addressed envelope was provided for return of the instrument. A follow-up letter was sent two weeks after the original to remind those who had not yet responded that their cooperation was essential. Non-response error was examined by comparing late respondents to early respondents (Smith and Miller, 1983). Late respondents have been shown to be similar to non-respondents. No significant differences were found between responses of early and late respondents.

Analysis of Data

This study sought to measure the knowledge level, attitudes, and implementation of biotechnology by agricultural education teachers in a selected Mid-Atlantic state. Data collected were analyzed using the personal computer version of SPSS. Descriptive analyses were performed on the data, which are presented in narrative and tabular form. The Davis (1971) scale was used to describe the magnitude of relationship between variables.

Results/Findings

Demographics of the Sample Group

Information was received from 62 teachers (65.3%). Of the teachers reporting, the mean for years taught was 16. When asked what was their highest degree earned the respondents indicated that 31 (50%) held a B.S. degree, 29 (46.8%) held a M.S. degree, and 1 (1.6%) held a Ph.D. Among the respondents, 40 (64.5%) operated a farm and 14 (22.6%) operated an agribusiness.

Level of Biotechnology Knowledge

The responses to 18 Likert items were combined and averaged to establish a summated score for agricultural education teachers' knowledge of biotechnological issues. Teachers were asked to rate their knowledge of each of the 18 biotechnology topics using a score of 1 = no knowledge, 2 = heard about, but very little knowledge, 3 = read about, possess some knowledge, and 4 = applied, knowledgeable. Descriptive data on the 18 individual items contained in the summated knowledge score are included in Table 1.

Animal reproduction was the only topic that a majority of the agricultural education teachers (73.7%) perceived themselves as having "applied knowledge." Approximately one-third of the respondents indicated "applied knowledge" on growth hormones (36.2%), hybridization (35.1%), resistant plant species (25.9%), and plant tissue culture (29.1%). Between 10 and 20 percent of the teachers had "applied knowledge" of biotechnology ethics (19.4%), cloning (15.0%), genetically modified food (15.0%), genetic engineering (13.6%), microbial biotechnology (12.1%), electrophoresis (11.9%), food biotechnology (10.0%), and environmental biotechnology (10.0%). Less than 10 percent of the respondents indicated "applied knowledge" about gene splicing (8.3%), recombinant DNA (8.3%), transgenic species (5.4%), human genomics (3.5%), and bioremediation (3.3%).

Using the four-point Likert scale, the average summated score for the knowledge of biotechnological issues construct was 2.58 with a standard deviation of .63. Agricultural education teachers who responded to the questionnaire possessed some knowledge of biotechnological issues. A Pearson's R was calculated to determine if a relationship existed between years of teaching experience and knowledge of biotechnological issues. The relationship (Pearson's R = .027) was not significant.

Table 1
Agricultural Education Teachers' Knowledge of Biotechnology Issues

	No Knowledge		Little Knowledge		Some Knowledge		Knowledge-able	
Topics	*f*	%	*f*	%	*f*	%	*f*	%
Animal Reproduction	1	1.8	2	3.5	12	21.1	42	73.7
Growth Hormones (bST/pST)	2	3.4	9	15.5	26	44.8	21	36.2
Hybridization	5	8.8	9	15.8	23	40.4	20	35.1
Resistant plant species	2	3.4	11	19.0	30	51.7	15	25.9
Plant Tissue Culture	4	7.3	9	16.4	26	47.3	16	29.1
Biotechnology Ethics	1	1.6	14	22.6	30	48.4	12	19.4
Cloning	2	3.3	11	18.3	38	63.3	9	15.0
Genetically modified food	4	6.7	11	18.3	36	60.0	9	15.0
Genetic Engineering	2	3.4	15	25.4	34	57.6	8	13.6
Microbial Biotechnology	11	19.0	19	32.8	21	36.2	7	12.1
Electrophoresis	22	37.3	19	32.2	11	18.6	7	11.9
Food Biotechnology	9	15.0	11	18.3	34	56.7	6	10.0
Environmental Biotech.	8	13.3	14	23.3	32	53.3	6	10.0
Gene Splicing	4	6.7	23	38.3	28	46.7	5	8.3
Recombinant DNA	12	20.0	18	30.0	25	41.7	5	8.3
Transgenic species	12	21.4	26	46.4	15	26.8	3	5.4
Human Genomics	14	24.6	25	43.9	16	28.1	2	3.5
Bioremediation	30	50.0	22	36.7	6	10.0	2	3.3

Scale: 1 = No knowledge, 2 = Heard about, but very little knowledge, 3 = Read about, possess some knowledge, 4 = Applied, knowledgeable

The interval scale data for the knowledge of biotechnological issues construct was forced into an ordinal measurement scale (Elifson, Runyon and Haber, 1982) to examine the relationships between the construct and operate a farm, operate an agribusiness, and highest degree held. The following scale was used: 3.5 – 4 (knowledgeable), 2.5 – 3.49 (some knowledge), 1.5 – 2.49 (little knowledge), and < 1.5 (no knowledge). A Chi-square test revealed no significance difference between knowledge of biotechnological issues and operate a farm (_ =.618, df = 3), operate an agribusiness (_ =4.071, df = 3), Bachelor of Science degree (_ =3.00, df = 3), and Master of Science degree (_ =1.867, df = 3).

Attitudes toward Biotechnology

The responses to 10 Likert items were combined and averaged to establish a summated score for agricultural education teachers' attitudes toward biotechnological issues. Teachers were asked to express their attitudes toward biotechnology topics by responding to 10 items using a score of 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly disagree. Descriptive data on the individual items contained in the summated attitude score are included in Table 2.

Over two-thirds of the respondents agreed (agree or strongly agree) with each of the 10 attitudinal statements. Over ninety percent of the respondents agreed that "biotechnology should be a topic in an agriscience class" (90.3%), "local, state, and federal money should be spent to enhance the teaching of biotechnology" (90.2%), and "genetic engineering of feed crops should be supported" (90.2%). The agreement for the other items included: "support the use of biotechnology for environmental purposes" (82.3%), "support the use of biotechnology for human medicine" (79.0%), "support the genetic engineering of food crops" (75.8%), "biotechnology should be a class taught by AG-ED teachers" (74.2%), "support the genetic engineering of animals" (73.8%), "crossbreeding to produce hybrids is not morally wrong" (72.6%), and "cloning living organisms is not morally wrong" (66.1%).

Using a four-point Likert scale, the average summated score for the attitudes toward biotechnological issues construct was 2.92 with a standard deviation of .47. Agricultural education teachers who responded to the questionnaire possessed a positive attitude toward biotechnological issues. A Pearson's R was calculated to determine if a relationship existed between years of teaching experience and knowledge of biotechnological issues. The relationship (Pearson's R = -.037) was not significant.

The interval data for attitudes toward biotechnological issues construct was forced into an ordinal measurement scale (Elifson, Runyon and Haber, 1982) to examine the relationships between the construct and operate a farm, operate an agribusiness, and highest degree held. The following scale was used: 3.5 – 4 (strongly agree), 2.5 – 3.49 (agree), 1.5 – 2.49 (disagree), and < 1.5 (strongly disagree). A Chi-square test revealed no significance difference between attitudes toward biotechnological issues and operate a farm (_ = 3.417, df = 3), operate an agribusiness (_ = 4.460, df = 3), Bachelor of Science degree (_ = 2.191, df = 3), and Master of Science degree (_ = 1.941, df = 3).

Table 2

Agricultural Education Teachers' Attitudes toward Biotechnology Issues

Topics	Strongly Disagree		Disagree		Agree		Strongly Agree	
	f	%	*f*	%	*f*	%	*f*	%
I believe that local, state, and federal money should be used to enhance the teaching of biotechnology.	1	1.6	5	8.1	36	58.1	20	32.3
Biotechnology should be a topic in an agriscience class.	1	1.6	5	8.2	31	50.8	24	39.3
I support the use of biotechnology for environmental purposes.	0	0.0	6	9.8	36	59.0	19	31.1
Biotechnology should be a class taught by AG-ED Teachers.	2	3.2	9	14.5	36	58.1	15	24.2
I support the genetic engineering of feed crops.	3	4.8	10	16.1	29	46.8	20	32.3
I support the use of biotechnology for human medicine.	4	6.5	11	17.7	28	45.2	19	30.6
I support the genetic engineering of food crops.	3	4.8	13	21.0	29	46.8	17	27.4
Cloning living organisms is not morally wrong.	6	9.8	10	16.4	38	62.3	7	11.5
Cross breeding to produce hybrids is not morally wrong.	4	6.5	13	21.0	16	25.8	29	46.8
I support the genetic engineering of animals.	3	4.8	18	29.0	29	46.8	12	19.4

Scale: 4 = Strongly agree, 3 = Agree, 2 = Disagree, 1 = Strongly disagree

Biotechnology Issues and Teacher Responsibilities

Teachers were asked the relationship between their job responsibilities and 10 biotechnology issues. The responses to 10 Likert items were combined and averaged to establish a summated score for agricultural education teachers' biotechnological job responsibilities. Teachers were asked to rate their agreement on including the 10 biotechnology topics in their job responsibilities using a score of 1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly disagree. Descriptive data on the individual items contained in the summated knowledge score are included in Table 3.

Over eighty percent of the respondents agreed (agree or strongly agree) with four of the job responsibilities. The responsibilities included: teach high school students about biotechnology (90.3%), involve students in biotechnology related SAE's (83.9%), educate farmers and agriculturists about biotechnology (82.9%), and develop biotechnology instructional materials (82.3%). A majority of the respondents agreed with an additional three responsibilities including: educate public policy makers about biotechnology (62.9%), educate consumers about biotechnology (53.2%), and distribute publications about biotechnology (50.0%). A majority of the respondents failed to agree on three responsibilities including: sponsor meetings related to

biotechnology (37.1%), conduct biotechnology research (37.1%), and distribute publications about biotechnology (29.0%).

Using a four-point Likert scale, the average summated score for the responsibilities toward biotechnological issues construct was 2.64 with a standard deviation of .46. Agricultural education teachers who responded to the questionnaire indicated they had responsibilities related toward biotechnological issues. A Pearson's R was calculated to determine if a relationship existed between years of teaching experience and knowledge of biotechnological issues. The relationship (Pearson's R = .090) was not significant.

The interval data for responsibilities toward biotechnological issues construct was forced into an ordinal measurement scale (Elifson, Runyon and Haber, 1982) to examine the relationships between the construct and operate a farm, operate an agribusiness, and highest degree held. The following scale was used: 3.5 – 4 (strongly agree), 2.5 – 3.49 (agree), 1.5 – 2.49 (disagree), and < 1.5 (strongly disagree). A Chi-square test revealed no significance difference between attitudes toward biotechnological issues and operate a farm (_ = 2.462, df = 3), operate an agribusiness (_ = 3.873, df = 3), Bachelor of Science degree (_ = 1.407, df = 3), and Master of Science degree (_ = 4.037, df = 3).

Table 3
Agricultural Education Teachers' Responses to: "It is the job of agricultural education teachers to…"

	Strongly Disagree		Disagree		Agree		Strongly Agree	
Topics	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
Teach high school students about biotechnology	1	1.6	5	8.1	45	72.6	11	17.7
Involve students in biotechnology related SAE's	1	1.6	9	14.5	48	77.4	4	6.5
Educate farmers and agriculturists about biotechnology	1	1.6	10	16.1	43	69.4	8	12.9
Develop biotechnology instructional materials	1	1.6	10	16.1	46	74.2	5	8.1
Educate public policy makers about biotechnology	2	3.2	21	33.9	33	53.2	6	9.7
Educate consumers about biotechnology	4	6.5	25	40.3	29	46.8	4	6.5
Distribute publications about biotechnology	6	9.7	25	40.3	26	41.9	5	8.1
Sponsor meetings related to biotechnology	2	3.2	37	59.7	19	30.6	4	6.5
Conduct biotechnology research	10	16.1	29	46.8	20	32.3	3	4.8
Develop publications about biotechnology	7	11.3	37	59.7	16	25.8	2	3.2

Scale: 4 = Strongly agree, 3 = Agree, 2 = Disagree, 1 = Strongly disagree

Conclusion/Recommendations

Conclusions

Agricultural education teachers in the target population had limited knowledge of biotechnology topics. This finding was consistent with the work of Wilson, Kirby, and Flowers (2002). Teachers perceived themselves as having more knowledge on biotechnology topics that have traditionally been associated with agriculture (animal reproduction, hybridization) and less knowledge on topics that are associated with other fields (environmental biotechnology, human genomics).

Agricultural education teachers in the target population were split on their attitudes about biotechnological issues. They agreed that biotechnology issues had a place in the high school classroom and the agricultural industry. The overall support dissipated as the "extremes" of biotechnology were introduced.

Agricultural education teachers in the target population were split over their role in biotechnology issues. Teachers agreed that it was their role to educate their high school and adult students, develop biotechnology instruction materials, and educate policy makers and consumers. They were not as strong in their support of sponsoring meetings, conducting research, and developing publications on biotechnology issues.

Recommendations

A study should be completed to determine the support from state supervisors and other key stakeholders to include biotechnology issues in the current agricultural education curriculum. Based upon the results of state supervisor research, this study should be replicated in its complete or modified form nationwide to determine if the results from this study are representative of all agricultural education teachers.

If there is support for including biotechnology issues in the agricultural education curriculum and the lack of biotechnology knowledge is consistent throughout the United States, steps should be taken to enhance the teachers' knowledge and experience in this area. This could be accomplished through in-service trainings, grants, workshops, and other incentives.

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Biotechnology Concepts: An Analysis of Agricultural Education Teachers' Attitudes, Knowledge, and Understanding

A Critique

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From a strictly curriculum content perspective, there is not a more important subject matter area than biotechnology. The authors from this mid-Atlantic state immediately relate this controversial topic to consumers by way of a food example. This clever approach enables the reader to view the paper from a common everyday experience, eating.

With the exception of animal reproduction, we have a lot of inservice opportunities ahead of us. With the overall high agreement scores in attitude it appears teachers are ready and willing to learn more about biotechnology. How does biotechnology fit within the mid-Atlantic state's educational goals? Given the "No Child Left Behind" educational emphasis that focuses on high stakes testing, how can we find room for a very specific subject matter area such as biotechnology?

Although the authors outlined topics from the related literature, a theoretical framework was not illustrated in the paper and, subsequently, a purpose statement emerges without a clear reason as to how and why. Some suggestions to improve this section would be to lead the reader through the literature by building a theoretical framework as you go. This is done by illustrating the mid-Atlantic state's agricultural education structure; how it (agricultural education) fits into the state's educational model; how biotechnology concepts fit within the models; etc. An operational framework can be developed then by reviewing past similar research and incorporating variables/characteristics into the current study that have consistently shown up as important. The literature review should build a case for the objectives and develop a clear rationale for inclusion of variables/characteristics. For example, where is the rationale for the demographic questions in the instrument's final section (years of experience, highest degree held, operations at a farm and operations of an agribusiness)?

It was interesting to read that the mid-Atlantic state teachers weren't very knowledgeable, were willing to learn, but didn't really support educating beyond traditional educational settings. What other research needs to be accomplished to verify that this idea (teaching biotechnology) is a viable educational component in the future of this mid-Atlantic state.

Perceptions, Value, and Preparation of University Faculty and Administrators Toward Advising Undergraduate and Graduate Students and Student Organizations

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Abstract

The role of faculty at colleges and universities is ever changing. Demands for time and effort are constantly increasing. The struggle for a balanced program of the three traditional cornerstones of teaching, research and service is becoming more difficult. The advising of undergraduate and graduate students and student organizations is an important function of faculty time that has a direct impact on institutional fiscal stability, student retention, and overall student satisfaction.

This study had three major objectives: to identify the value of advising, as perceived by faculty and administrators, the attitudes and perceptions of faculty toward advising, and the perceived competence and preparation level of faculty to advise students. A total of 222 respondents from 31 universities participated in the study.

It was found that faculty and administrators agreed that there is value in advising undergraduate and graduate students as well as student organizations. Most faculty perceived advising as a teaching activity and felt that it should be a component in promotion and tenure review. Respondents also reported that they felt that both advising undergraduate students and graduate students was a good use of time. However the level of agreement was higher on advising graduate students.

Most respondents also reported that they felt they were competent and prepared to advise students on academic matters. However, respondents noted the need for assistance in advising student organizations and advising on personal matters. To was also found that most faculty had received little or no professional development in advising.

Introduction / Theoretical Framework

The role of faculty at colleges and universities is constantly being redefined. Whereas the cornerstones of teaching, research, and service continue to include a broadening spectrum of activities, the once distinct lines between these categories are sometimes blurred. Even if faculty aspire to fulfill each of these roles, to be successful in obtaining promotion and tenure requires faculty must participate in activities that are deemed appropriate and meaningful by administration and promotion and tenure committee members. Because of the broadening and sometimes varying definitions of the three cornerstones, both new and experienced faculty sometimes have difficultly in prioritizing their time to meet these requirements.

To compound the difficulty of faculty in establishing a balanced program of work that may include the three areas of teaching, research, and service, most faculty do not believe their

participation in activities in the teaching and service areas is rewarded by their administration (Boyer, 1990). This perception may have a major impact upon the amount of time and effort faculty devote to advising students and student organizations.

Boyer (1990) expanded the definition of the scholarship of teaching to include such activities as the advisement of students. Prior to Boyer's work, Crookston (1972), in his groundbreaking and often cited work on advising, clearly stated that advising is a form of teaching. The transfer of current teaching skills to advising can possibly assist faculty in perceiving their role as advisors differently (Ryan, 1992). Dillon and Fisher (2000) noted in their evaluation of faculty advising that study after study documents the need and value of faculty advising. According to Hemwall and Trachte (1999), advising is the intersection of the teaching and learning experience.

In some institutions, individuals other than faculty are employed specifically to advise students, thus freeing up faculty time to participate in other activities. This may be due more to budgetary constraints, however, rather than the opinion that advising is not an appropriate activity for faculty. Hemwall and Trachte (1999) support this position, noting that advising should be a component of faculty load. Miller and Alberts (1994) noted that faculty are in an excellent position to communicate with students about courses or instructors, and to involve the student in the curriculum. In addition, students feel that personal interaction with faculty has a positive influence on their overall experience in their degree programs (Kennedy, Gordon, & Gordon, 1995).

Faculty advising is important for all parties involved in the process: students, faculty members, and the university. Woodbury (1999) suggested that advising provides an opportunity for teaching and learning to occur that is no less important to a student's success than that which is offered through the traditional curricula and classroom. Nevertheless, in times when university budgets are constantly scrutinized for ways to eliminate spending, administrators are sometimes tempted to cut allocations to advising programs that are often seen as non-central to the instructional mission of the institution (Glennen, Farren, & Vowell, 1996). Conversely, the advising of students by faculty members has been found to be an effective avenue by which the institution's mission to provide individualized programs of study for learners can be realized. Therefore, according to Fiddler and Alicea (1996), advising of students is truly an integral part of each student's educational experience.

In addition to the educational benefits for the student, advising provides a financial benefit to the university. This financial impact can be staggering. At one major Midwestern university, the loss due to student attrition was estimated at $11 million (Dyer, Lacey, & Osborne, 1996). Likewise, Glennen et al.(1996) concluded that proper academic advising can improve the fiscal stability of institutions by increasing graduation rates.

Tinto (1993) reported that more students leave college before completing a degree than stay and graduate. One reason for high attrition rates is student dissatisfaction with the university. A frequent source of this dissatisfaction stems from the student's advising experience (Corts, Lounsbury, & Saudargas, 2000). However, despite the positive effects of faculty advising, it continues to be perceived by many as having low status, and thus low priority,

particularly for faculty whose efforts in this area are not generally rewarded (Miville & Sedlacek, 1995).

Gordon (1992) delineated several advantages of a faculty advising system, but also noted that many faculty are unclear as to the specific roles of advising. Whereas advising can include several different facets, O'Banion (1972) outlined various skills, knowledge, and attitudes that are required for quality academic advising in his model. Although the college student population has changed dramatically since the 1970s when the O'Banion model was presented, it has been found to still be effective with only slight modifications (Burton & Wellington, 1998). However, to acquire these attributes, several researchers (Fiddler & Alicea, 1996; Gordon, 1992; Petress, 1996), reported that well-planned professional development activities are needed.

According to Dillion and Fisher (2000), many faculty do not feel that a faculty member's advising load is currently considered in promotion and tenure decisions. Hancock (1996) suggested that if a faculty member believes that promotion and tenure stems more from instruction and research than from advising, the faculty member will likely be disinclined to participate in advising activities.

Also linked to advising motivation is a person's self-efficacy in that area (Bandura, 1997). One method to improve a person's self-efficacy and thereby improve motivation, is by providing professional development in that area (Mager, 1992; Petress, 1996). Petress identified four major factors that affect a faculty member's self perceptions of his or her ability to advise: 1) how advisors interpret their advising role, 2) training and/or guidance that is provided to advisors, 3) expectations of administrators and colleagues for advisors, and 4) recognition and rewards available for competent or exemplary advising.

There is often a mistaken belief that faculty can learn all they need to know about advising students through their own experiences as a student (Selke & Wong, 1993). However, professional development opportunities in advising are often not available to faculty. Habley and Morales (Gordon & Habley, 2000) reported that only about one-third of colleges and universities provide any type of professional development activities for advisors. Of those that do provide assistance, less than one-forth required faculty involved in advising to participate in these activities. In addition, Habley and Morales also noted that most of the professional development assistance provided to faculty focused solely on the communication of factual information from advisor to student. Little time was devoted to development of advising concepts and relationship skills, which have been found to be critical in developmental advising (Crookston, 1972; Frost, 1993; Gordon, 1992; Gordon & Habley, 2000). If actions are a result of attitudes, as espoused by Greenwald (1989), a logical deduction might be that faculty and/or administrators may possess less than positive attitudes toward advising.

There are several possible factors that could affect faculty and administrators attitudes toward advising. Do faculty view advising students and student organizations as worthwhile activities? Do faculty feel prepared to advise? Are faculty and administrators rewarded for their efforts in advising through the promotion and tenure process? All of these questions are key to understanding the perceptions and value of university faculty and departmental administrators toward advising students and student organizations.

A review of literature failed to identify research that has investigated the perceptions, value, and preparation of college of agriculture faculty toward advising. However, this information is needed if faculty and administrators are to understand areas of expertise and deficiency in preparation for advising. Findings from this study could be utilized by both college of agriculture faculty who serve as advisors and by college and department administrators in the development of professional enhancement activities regarding advising activities.

Purpose and Objectives

The purpose of this study was to determine the attitudes, needs, and self-perceived level of competence in advising by faculty and administrators of colleges of agriculture at land grant institutions. The objectives of the study, stated as questions, were as follows:

1. What is the perceived value of advising?
2. What are the attitudes / perceptions of faculty toward student advising?
3. What is the perceived competence / preparation level of faculty to advise students?

Methods

This national study used a descriptive survey research design. A researcher-designed instrument was constructed to assess the attitudes, needs, and perceptions of faculty members toward advising. Respondents were mailed an attitudinal questionnaire that used a four-point scale (1 = Strongly Disagree, 2 = Disagree, 3= Agree, 4 = Strongly Agree) to assess their attitudes. A four-point scale was chosen to compel the respondent to express an opinion about the statement. Dillman (2000) noted that it is appropriate to pose attitudinal questions without giving the option of a neutral opinion or no opinion at all. In addition, each question was designed to be general enough that all faculty would have adequate knowledge on the subject to form an opinion. Demographic questions were asked using open-ended and short-answer options.

The instrument was evaluated for face and content validity by a panel of experts consisting of faculty, administrators, and graduate students at two land grant universities. The instrument was pilot tested using individuals similar to those in the sample. Reliability for the individual constructs of "Value of Advising," "Attitudes / Perceptions Toward Advising," and "Perceived Knowledge and Preparation for Advising" was determined using Crombach's alpha. Reliability coefficients for each of these constructs were calculated at .68, .68, and .88, respectfully.

The population for the study was faculty and departmental administrators in colleges of agriculture at each of the 1862 land-grant universities in the United States. Data were gathered from a purposive sample of five faculty and three department heads from these colleges. The associate dean for academic programs at each institution provided administrator and faculty names. This sampling method was used as an accurate population frame of all faculty at the 1862 land-grant universities in the United States was not available. No guidelines were provided to the college administrators for selecting the faculty and department administrators for

participation in this study. Whereas this is a purposive sample and the findings are not generalizable, this was deemed to be of little concern.

In an attempt to reduce nonresponse error, a total of six respondent contacts were made (Dillman, 2000). These included a pre-study electronic mail contact, instrument mailings, and reminders via both and electronic and land mail. A total of 222 respondents from 31 universities returned questionnaires for a 90% response rate.

Data were analyzed using SPSS software. Item frequencies, standard deviations, and means were calculated, as well as the grand mean for each construct. Although by definition scale responses produce ordinal data, results were treated as interval data for analysis and interpretation purposes. This procedure is commonly accepted in social science research, especially if data are categorized into equal intervals as was done in this study (Clason & Dormody, 1994).

Results

Faculty reported advising a mean of 42.6 undergraduate students and 3.1 graduate students. Faculty met with undergraduate students just under two times per semester and graduate students just under 12 times during that same period of time. The average length of an advising session was 29.6 minutes for undergraduates and 43.3 minutes for graduate students. Faculty reported 18.8 hours per month spent advising undergraduate students and 14 hours per month advising graduate students.

The first objective sought to describe the value placed upon advising, as determined by responses to selected items. Statements pertaining to advising were posed for both individual student advising and also for advising student organizations. Respondents' attitudes were within the range of "agree" ($M = 2.77$) on the construct "Value of Advising." Most respondents indicated that advising students should be a component of promotion and tenure (91.3%) and teaching FTE (91.3%). However, only 36.4% of the respondents indicated that advising is currently valued in promotion and tenure decisions (see Table 1). Similarly, over 64% indicated that advising student organizations should be a factor in promotion and tenure, yet only 21% reported that it is currently considered.

Table 1

Faculty Perceptions of the Value of Advising[a]

Statement	Agree[b]		Disagree[b]	
	f	%	*f*	%
The number of students advised should be a component of teaching FTE.	199	91.3	19	8.7
Student advising should be a component of promotion and tenure review.	198	91.2	19	8.8
Student advising should be a component of faculty compensation.	195	90.3	21	9.7
Quality advising is valued in my department.	173	79.7	44	20.3
The advising of student organizations should be a component of teaching FTE.	162	74	57	26.0
The quality of student advising, as determined by student advising evaluations, should be a component of faculty pay scale.	153	72.2	59	27.8
Advising student organizations should be a component of promotion and tenure review.	140	64.5	76	35.0
Faculty are provided enough time to adequately advise students.	90	41.3	128	58.7
Student advising is currently a valued component of promotion and tenure review.	79	36.4	138	63.6
Advising student organizations is currently a valued component of promotion and tenure review.	45	21.0	169	79.0

[a] Note: $n = 209$; Grand Mean = 2.77; ($SD = .22$).
[b] Means were indexed and categorized as: Disagree ($M = 1.00 – 2.49$), Agree ($M = 2.50 – 4.00$).

The second objective of the study sought to describe attitudes/perceptions of faculty toward advising. All respondents (100%) indicated that advising graduate students was a good use of time (see Table 2). Ninety-five percent of the respondents agreed with a similar statement dealing with undergraduate students. Almost all faculty respondents agreed that advising is an effective way to build rapport (99.1%), retain students (98.6%), and recruit students (90.8%). Most respondents also agreed that faculty should advise students – regardless of pay (71.5%), and that advising (either graduate or undergraduate students) should be an expectation of all faculty (67.1%). However, 56.4% of the respondents indicated that only faculty with teaching appointments should advise undergraduate students. By contrast, only slightly over 10% agreed that only faculty with teaching appointments should advise graduate students.

Advising graduate students was perceived to be more scholarly than advising undergraduate students. A majority of respondents (60.6%) agreed that advising undergraduate students was scholarly. However, over 91% of the respondents viewed advising graduate students as a scholarly activity.

Table 2

Attitudes / Perceptions of Faculty Toward Advising[a]

Statement	Agree[b]		Disagree[b]	
	f	%	*f*	%
Advising graduate students is a good use of faculty time.	218	100.0	0	0.0
Advising students is an effective way to build rapport.	214	99.1	2	.9
Advising plays an important role in retaining students.	214	98.6	3	1.4
Advising undergraduate students is a good use of faculty time.	204	95.0	11	5.0
Advising plays an important role in recruiting students.	197	90.8	20	9.2
Advising graduate students is a scholarly activity.	197	91.2	19	8.8
Advising student organizations is a good use of faculty time.	189	87.9	26	12.1
University faculty should be responsible for advising students regardless of pay.	153	71.5	61	28.5
Advising students should be an expectation of all faculty.	147	67.1	72	32.9
Advising undergraduate students is a scholarly activity.	131	60.6	85	39.4
Only faculty with teaching appointments should advise undergraduate students.	123	56.4	95	43.6
Students should utilize advising sessions with faculty on a walk-in basis.	80	37.7	132	62.3
Only faculty with teaching appointments should advise student organizations.	41	18.7	178	81.3
Only faculty with teaching appointments should advise graduate students.	23	10.6	195	10.6

[a] Note: $n = 200$; Grand Mean = 2.97 ($SD = .42$).
[b] Means were indexed and categorized as: Disagree ($M = 1.00 – 2.49$), Agree ($M = 2.50 – 4.00$).

The third objective sought to describe faculty preparation to advise students. Over 98% of the respondents indicated that they felt comfortable communicating with students one-on-one, whereas over 97% indicated they felt competent in assisting students in planning schedules (see Table 3). Most faculty also indicated they were competent in finding information on academic policies (93.5%), helping students make career choices (94%), and in locating campus resources to assist students with academic difficulties (86.6%). However, only slightly more than 58% reported that they felt comfortable counseling students on personal matters. Also only 41% of the respondents indicated that they felt competent in their knowledge of legal issues concerning advising. However, 83.3% of respondents agreed that their expertise in advising was adequate.

Table 3

Perceived Knowledge and Preparation of Faculty for Advising[a]

Statement	Agree[b]		Disagree[b]	
	f	%	*f*	%
I feel comfortable in communicating one-on-one with students.	212	98.1	4	1.9
I feel competent in assisting students in planning schedules.	210	97.2	6	2.8
I know where to find information on academic policies.	202	93.5	14	6.5
I feel competent in counseling students on making career choices.	202	94.0	13	6.0
I am aware of campus resources to assist students who are in academic difficulty.	187	86.6	29	13.4
My current level of expertise in advising students is adequate.	180	83.3	36	16.7
I feel competent in advising student organizations.	169	79.0	45	21.0
I feel competent in using on-line advising tools.	156	72.9	58	27.1
I feel competent in counseling students on personal matters.	123	58.3	88	41.7
I feel competent in my knowledge of legal issues concerning advising.	86	41.0	124	59.0

[a] Note: $n = 203$; Grand Mean = 2.44 ($SD = .14$).
[b] Means were indexed and categorized as follows: Disagree ($M = 1.00 – 2.49$), Agree ($M = 2.50 – 4.00$).

Only slightly over half of the respondents (57.9%) indicated that they had received training on how to advise students on academic and professional matters (see Table 4). Only 18% of respondents reported having received training on counseling students on personal matters. Additionally, only slightly more than 12% reported received training on how to advise student organizations.

Table 4

Professional Preparation to Advising Students[a]

Demographic	Yes		No	
	f	%	*f*	%
I have received training in how to advise students on academic and professional matters.	1	5	9	4
	25	7.9	7	2.1
I have received training on how to counsel students on personal matters.	3	1	1	8
	9	8.0	78	2.0

I have received training on how to advise student organizations.	2	1	1	8
	8	2.8	89	7.1

[a] Note: $n = 219$.

Over 96% of the faculty reported they were either "competent" or "very competent" in advising students concerning degree and programs requirements. However, only 35.1% were able to mark the same categories for their level of competence on dealing with personal issues (see Table 5). Furthermore, only approximately 40% of the respondents reported they were "competent" or "very competent" on financial assistance opportunities for students.

Table 5

Perceived Advising Competence Levels of University Faculty[a]

Area of Advising	Not at all Competent		Somewhat Competent		Competent		Very Competent	
	f	%	*f*	%	*f*	%	*f*	%
Degree / Program Requirements	0	0.0	8	3.7	51	23.5	158	72.8
Course Scheduling	1	0.5	11	5.1	61	28.2	143	66.2
Career Counseling	1	0.5	38	17.5	121	55.8	57	26.3
Industry / Job Market Demands	0	0.0	38	17.6	127	58.8	51	23.6
Student Organization Advising	23	10.6	60	27.8	91	42.1	42	19.4
Activities / Competitions	17	7.9	80	37.0	88	40.7	31	14.4
Financial Assistance Opportunities	29	13.4	101	46.5	64	29.5	23	10.6
Personal Issues	38	17.8	101	47.2	62	29.0	13	6.1

[a] Note: $n = 210$.

Conclusions / Implications / Recommendations

The first objective of this study was to identify the perceived value of advising. Faculty and administrators agreed that there is value in advising, but expressed opinions that it is not valued in promotion and tenure decisions. This concurred with the opinions reported by Boyer (1990). Following the work of Tien and Blackburn (1996), one would expect that the lack of importance given to advising activities in promotion and tenure decisions would have a negative effect on motivation toward advising. However, further study is needed to determine if this relationship exists.

The second objective sought to identify the attitudes and perceptions of faculty and administrators toward undergraduate and graduate student advising. It was found that advising both undergraduate and graduate students was viewed as a good use of time. However, advising graduate students was perceived to be more scholarly than advising undergraduate students.

Further research is needed to identify ways to increase the scholarly perception of undergraduate advising.

Recruitment and retention problems could be minimized if faculty perceptions of the value of advising in recruiting, retaining, and building rapport with students are accurate. Almost 99% of the respondents indicated that advising plays an important role in retaining students. Additional research into this phenomenon is warranted, however, to determine the relationship between advising proficiency and student recruitment and/or retention.

The third and final objective of the study was to identify the perceived competence and preparation level of faculty to advise students. Faculty perceived themselves to be competent and prepared to advise students on academic and career decisions, but need assistance in advising student organizations, using advising technology, advising on personal matters, and in legal issues concerning advising. Though beyond the scope of this study, an apparent relationship exists between respondents' perceived competence in an advising area and the perceived value of that area. Again, further research is needed to determine if this relationship exists, and to determine if remedial action is warranted.

Many advisors have had little or no professional preparation to advise students or student organizations. Although faculty and administrators generally perceived their level of knowledge to be adequate to advise, most of that knowledge is experiential. Only 42% of respondents indicated they had received any type of assistance in advising students on academic matters. Only 18% had received help on advising students on personal matters, and only about 13% had received training on working with student organizations. These findings compare similarly to those of Habley and Morales (Gordon & Habley, 2000). Selke and Wong (1993) stated that faculty are mistaken to believe that they can learn all that is needed for quality advising through experience only. Petress (1996) also noted that professional development is needed to prepare advisors for the important task of advising undergraduate and graduate students as well as student organizations. This lack of professional development in advising may call into question the quality of advising that students are receiving. However, research is needed to assess this quality. This information would be key to support or rebuff the finding of Selke and Wong and Petress on the need of professional development for advisors. Also, further research is needed to identify strategies used by faculty who are successful in advising. This information is crucial in developing successful faculty advisors. In addition, research is warranted to identify the type of professional development opportunities needed by advisors and to identify the most effective methods for delivering that professional development.

These findings are significant to the agricultural education profession as many of the faculty in this profession will be called upon by college administrators to design, deliver, and evaluate professional development on advising students and student organizations. An understanding of the current perceptions of faculty towards advising will assist agricultural educators in providing effective formal and informal professional development.

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Perceptions, Value, and Preparation of University Faculty and Administrators Toward Advising

Undergraduate and Graduate Students and Student Organizations

A Critique

Jack Elliot, Professor
The University of Arizona

Because advising students can take a large percentage of faculty's time and is sometimes viewed as a thankless task, the study provides some direction, especially for young faculty as they progress through the promotion and tenure process. Given the caring nature of many young agricultural education faculty, what is the best advice you can provide department heads in this area?

Is the answer to how useful this information is reliant on each university's interpretation of the tenure and promotion process? If yes, than should more research be done in this area, or should faculty simply determine the local situation and act accordingly?

As in the previous paper, many articles were summarized, but a theoretical framework was void. What is the rationale for including (or not including) certain variables or characteristics? Can you visually place student advising into a faculty responsibility framework? What would be the key concepts in a conceptual or theoretical framework? What would then be the variables/characteristics you would include in an operational framework?

Therefore, what is your recommendation to assistant professors as it relates to advising? Is this issue worthy as a possible AATA workshop entitled, "effective advising," or "advising and getting tenured," or "advising in a research world? (other title ideas?)"

Analysis of Computer Knowledge, Skills, and Experiences of Students Enrolled in Undergraduate

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ABSTRACT

The purpose of this study was to analyze computer experiences, self-perceived level of computer skills, and computer knowledge of students enrolled in undergraduate courses in the College of Agricultural Sciences and Natural Resources (CASNR) at Texas Tech University.

The target population included students enrolled in undergraduate CASNR courses during the Spring 2002 semester. The instrument was administered to a sample of 740 non-duplicated students; each provided usable questionnaires.

The students reported a variety of computer experiences; 88.1% reported completing a course in computer usage and 87.2% owned a computer. Students indicated receiving instruction in word processing (93.9%) and spreadsheet use (91.0%). The students reported above average self-perceived skills in word processing (34.6%) and Internet use (35.3%). The number of correct responses on the Computer Experiences and Knowledge Inventory was 20.06 (60.8%) out of 33 with a standard deviation of 4.94.

There were no strong predictors that could be established from correlations between demographic characteristics and computer experiences with self-perceived level of computer skills and computer knowledge.

Introduction and Theoretical Framework

Computers and information technologies are transforming nearly every aspect of American life. They are changing the way Americans work and play, increasing productivity, and creating entirely new ways of doing things. According to the United States Department of Education (1996), every major U.S. industry has begun to rely on computers; hence, computer literacy is no longer an option in the work force, but rather a requirement.

Computers play an ever increasing role in agriculture (Odell, 1994). In modern agriculture, employers place significant importance on computer skills, with more than 80% indicating computer skills are either a "very important" or "important" factor considered when making employment decisions, according to a study conducted for the College of Agriculture and Life Sciences at Cornell University (Monk, Davis, Peasley, Hillman, & Yarbrough, 1996). In a study conducted at Pennsylvania State University of agricultural graduates, respondents rated computer skills more important to job success than technical agricultural skills (Radhakrishna & Bruening, 1994). Since adequate computer skills are necessary for an individual to succeed in industry, a need exists to determine the current and expected trends of industry relating to computer usage. As a result, colleges of agriculture must ensure that graduates are competent in computer skills necessary for success with regard to these trends.

In a study at Cornell University, Monk et al. (1996) determined that agricultural graduates needed to be proficient in computer skills, such as word processing, presentation graphics, Internet use, and electronic mail. Also, students should be comfortable with computer and information technologies in order to expand and strengthen computer skills throughout their careers. On the other hand, in a recent study conducted by the College of Agriculture and Natural Resources at Michigan State University, Heyboer and Suvedi (1999) discovered that graduates believed they obtained less than satisfactory preparation in computer usage. They rated computers as the area in which they were least prepared for employment.

According to Kieffer (1995), many university administrators and faculty accept the premise that students enter college possessing basic computer skills. However, in a study conducted by Johnson, Ferguson, Vokins, and Lester (2000), the researchers concluded that students did not have a common core of computer experiences, lacked confidence in their computer skills, and had a low level of computer knowledge. A USDE (1996) report stated that "computers and information technologies are not part of the way most American students learn" (p. 9). In 1996, 65.5% of eleventh grade students reported using computers at school once a week or less (USDE, 1996).

After conducting a study of entering students in a college of business, Gordon and Chimi (1998) concluded that students lacked sufficient computer knowledge and recommended that an introductory computer literacy course be required. Brown and Kester (1993) posited that students have the tendency to forget many of the skills learned in introductory computer courses, because they did not apply the skills in subsequent courses. According to the National Center for Education Statistics (1997), only seven states require students to complete a computer literacy course in order to graduate from high school. Within these states the most common computer literacy requirement is one-semester course. In addition, a computer coursework requirement for

admission is not included at many colleges and universities. In order to develop strategies to ensure that graduates of the College of Agricultural Sciences and Natural Resources (CASNR) at Texas Tech University are proficient in computer usage, computer skills of undergraduates must be determined.

According to Brent (1999), application of computers in classrooms as well as in learning labs and homes must succeed concurrently on different levels. There are multiple interest groups that must be considered when using computers in the classroom. Each group plays an essential role in the process. If any group is not willing to do its part, room for failure is present. Figure 1 illustrates the various interest groups that are related to computers in the classroom.

"The use of computers in the classroom will never be successful if it does not meet student needs" (Brent, 1999, p. 165). If students do not perform well when using computers, then room for failure exists. According to Brent (1999), if students are finding that computer programs are inconvenient or too demanding, they will not hesitate to make their feelings known.

For faculty, computers can offer advantages in the classroom. Computers offer lecture support in order to create interesting presentations for teaching purposes. Instructors may also use computers in labs for students. Online resources are also used in the classroom for students conducting research.

Technology in the classroom creates logistical issues for the instructor. The instructor must make sure that the right type of support is available for students at the right time. For instance, do computer labs have enough computers available for those students that wait until the last minute to complete an assignment? Having adequate facilities and a helpful support staff is necessary for successful application of computers in education (Brent, 1999).

Administrators have become enthusiastic and supportive of computer usage and adoption in the classroom by instructors and students. Brent (1999) indicated that administrators are supportive of high-tech classrooms, because they can document technology in annual reports and make the school look good to prospective students.

According to Long, Straquadine, and Campbell (1992), graduates value knowledge and skills in the computer sciences. Many studies have found that college graduates rate computer skills important to career success (Andelt, Barrett, & Bosshamer, 1997; Graham, 1997; Radhakrishna & Bruening, 1994). Still, there are graduates who believe they have not received satisfactory preparation in computer usage (Heyboer & Suvedi, 1999). One way to adequately prepare students in computer usage is through partnerships that involve industry.

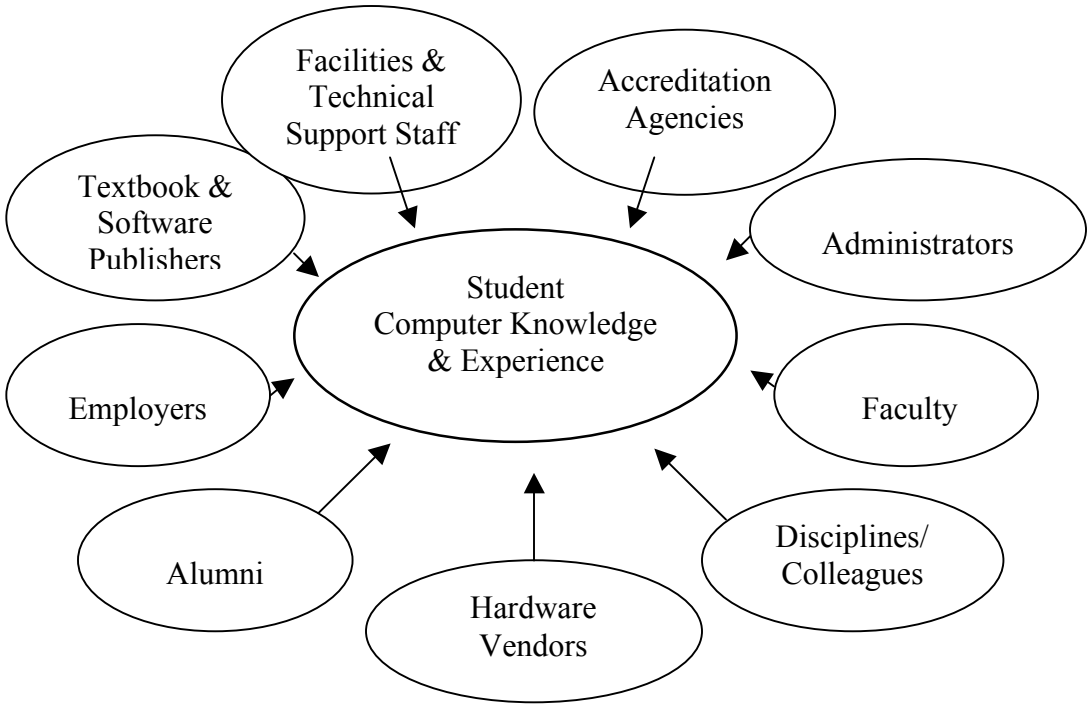

Figure 1. Multiple Interest Groups Related to Computers in the Classroom. Source: Modified from Brent (1999, p. 165).

Partnerships between higher education and industry have great implications for agriculture. Employers have expressed concern for the lack of sufficiently trained graduates to meet the challenges of a high-performance workplace and have further proposed that the curriculum for agriculture was out of date and should be changed (Graham, 2001; Kunkel, Maw, & Skaggs, 1996). As a result, core competency skills have become a requirement for both higher education and industry. To meet the demand for computer-literate students, accreditation agencies have recommended that universities implement computer competency entrance exams, exit exams, and require computer courses (Young, 1997). Incorporating the desired skills into the curriculum, will help graduates to be more qualified to adapt to the high-tech, fast paced jobs of the future (Graham, 2001).

In order for computers to be successful in the classroom, good software is essential. Departments and disciplines must address the use of computers in the courses, along with computer-related work. Faculty members need to consider how technology is valued by other colleagues in their discipline (Brent, 1999).

The final interest group are publishers of software and textbooks. Software publishers have an important position influencing the development of computer applications. Software must be appropriate for the course, interesting to the students, and capable of running on computers available to students and faculty. Today, textbook publishers are offering software with their textbooks, usually a CD-ROM. Additional resources for the classroom include Web pages supported by publishers in support of their texts.

According to Brent (1999), computers in the classroom will continue to be affected by the interaction among these various interest groups. "Successful technology in the classroom will need to meet the needs of each group" (Brent, 1999, p. 173).

Purpose and Objectives

The purpose of this study was to analyze computer experiences, self-perceived level of computer skills, and computer knowledge of students enrolled in undergraduate courses in the CASNR at Texas Tech University. The following objectives were formulated to accomplish the purpose of this study:

1. Determine demographic characteristics along with computer experiences of students;
2. Determine self-perceived level of computer skills of students;
3. Determine computer knowledge of students as measured by scores on the exam portion of the Computer Experiences and Knowledge Inventory (CEKI); and
4. Determine relationship between demographic characteristics, computer experiences, self-perceived level of skills, and scores on the exam portion of the CEKI.

Method and Procedures

A descriptive-correlational design was used in this study. The instrument used to collect data for this study was a modified version of the Computer Experiences and Knowledge Inventory (CEKI) developed by the University of Arkansas. The CEKI consisted of three sections. The first section provided descriptive demographic and prior computer experience data. The second section included 8 Likert-type items requiring students to assess their self-perceived level of skill in specific areas of computer experiences. The third section consisted of 33 multiple choice items designed to measure computer knowledge.

The CEKI was pilot-tested by a group of students that were not included in the sample for this study, to verify instrument reliability and make changes and clarifications prior to conducting the study. The instrument was found to be reliable with a Cronbach's coefficient alpha of .89 for Part Two, and a Kuder-Richardson-20 of .72 for Part Three. The reliability of Part One of the CEKI was not assessed, since, according to Salant and Dillman (1994), responses to non-sensitive, demographic items are subject to "very little measurement error" (p. 87).

The target population for this study included students enrolled in undergraduate CASNR courses during the Spring 2002 semester. The total student enrollment, which includes each CASNR course taught during the Spring 2002 semester, was 3,605. This number does not exclude students that were enrolled in more than one CASNR course. Therefore, consideration should be taken of the fact that the total enrollment includes duplication. The researcher used cluster sampling in this study and also eliminated participant duplication.

The sample consisted of non-duplicated students (n = 740) enrolled in undergraduate CASNR courses at Texas Tech University during the Spring 2002 semester. These courses were identified using an official list supplied by the dean's office. Faculty teaching one course during the semester were automatically chosen to participate in the study. Those teaching two or more

courses had only one course randomly selected to participate in the study. Faculty members teaching multiple sections of one course had each section participate in the study. Internship and special problems courses were not included in the study since these courses did not have a scheduled time to meet.

The researcher met with the executive associate dean and individually with the department chairpersons representing each of the six departments in the CASNR in order to request support and permission to conduct the study. A memorandum, which was signed by the researcher and executive associate dean, was then sent to faculty members in the CASNR on February 12, 2002, requesting their cooperation and participation in this study. The researcher then corresponded with each faculty member to schedule a date and time when the CEKI would be administered in the respective course. From March 4, 2002, through April 19, 2002, data was collected in the selected CASNR courses.

Statistical analysis was completed using a statistical software program, SPSS, version 10.0. Descriptive statistics were used to summarize the data pertaining to: (a) the demographic variables of students, (b) their computer experiences, (c) their self-perceived level of computer skills, and (d) their computer knowledge. Pearson product moment correlations were used to examine data pertaining to the relationship between demographic characteristics, computer experiences, self-perceived level of skills, and scores on the exam portion of the CEKI

Results and Findings

Of the 740 respondents providing usable data, ages ranged from 17 to 38 years, with a mean of 20.9. There were 159 (21.8%) participants that were 20 years old and 153 (20.7%) participants that were 21. Twenty-three participants had no response to this item. Of the survey participants, 39.2% (290) were female and 60.8% (450) were male. There were 256 (34.6 %) seniors that participated in the study. A little over one-fourth (186) of the participants reported their classification as junior. The percentage of sophomores that took the CEKI was 21.2% (157). Freshmen represented 17.7% (131) of the sample taking the questionnaire.

Over three-fourths (88.1%) had taken a computer course, while 88 (11.9%) had not taken a computer course. A mean of 2.63 was reported for the number of courses completed. Of the survey participants, 24.9% (163) had completed computer courses in high school, 10.1% (66) had indicated completing computer courses in college, and 65.0% (425) reported computer courses were completed in both high school and college. There were 86 participants with no response to this item. Participants that had completed a course in computer use were asked to indicate if they had received instruction in selected computer topics. Table 1 indicates respondents reporting the highest percentage (93.9%) for instruction received in word processing, while the lowest percentage (40.6%) for instruction received had been in computer programming.

Table 1

Computer Topics Taught in Computer Course(s) Completed by Participants (n=740)

Computer Topic	Taught (%)	Not Taught (%)
File management	89.0	11.0
Word processing	93.9	6.1
Internet (World Wide Web) use	79.1	20.9
Electronic mail (e-mail)	74.0	26.0
Spreadsheet use	91.0	9.0
Presentation graphics	87.2	12.8
Database use	77.7	22.3
Computer programming	40.6	59.4

Of the 740 students participating in the study, 95 (12.8%) reported that they did not own a computer, while 645 (87.2%) indicated that they did own a computer. Students owning a computer were asked to indicate the type of computer they owned and what operating system they used. There were 623 (95.3%) participants that reported owning an IBM compatible computer, while 4.7% (31) indicated owning a Macintosh system computer. There were 86 students with no response to this item on the CEKI.

Participants were asked to rate their self-perceived level of skill in eight areas of computer use, using a five-point Likert-type scale (0 = 'none' and 4 = 'high'). A little over one-third (34.6%) of respondents indicated word processing skills above average and an additional 35.3% of respondents indicated Internet use above average (Table 2). Participants reported average skills in spreadsheet use (43.6%), presentation graphics (41.4%), and file management (40.1%). In addition, average skills were also reported for database use (37.3%) and electronic mail (32.4%). There were 42.7% of participants reporting a skill of none in computer programming. An overall mean of 2.3 was reported for self-perceived level of skills.

Table 2

Self-Perceived Level of Skill in Selected Areas of Computer Use as Reported by Participants (n = 740)

	Self-Perceived Skill Level						
		Below		Above			
	None	Average	Average	Average	High		
Area of Computer Use	(%)	(%)	%	(%)	%	Mean	SD
File management	1.2	7.2	40.1	23.5	28.0	2.70	0.99
Word processing	0.4	3.5	32.3	34.6	29.2	2.89	0.88
Internet use	0.5	4.9	32.7	35.3	26.6	2.83	0.90
Electronic mail (e-mail)	0.8	5.1	32.4	31.5	30.1	2.85	0.94
Spreadsheet use	3.5	18.4	43.6	23.8	10.7	2.20	0.98
Presentation graphics	5.3	18.2	41.4	22.8	12.3	2.19	1.04
Database use	8.8	32.7	37.3	14.7	6.5	1.77	1.02
Computer programming	42.7	27.0	20.5	7.4	2.3	1.00	1.07

The mean number of correct responses on the CEKI was 20.06 (60.8%) with a standard deviation (*SD*) of 4.94. Participants scored a higher percentage of correct responses on the Internet (82.4%) and general computer knowledge (71.2%) sections. The percentage of correct responses for word processing was 56.6%, followed by file management (53.6%) and spreadsheet use (49.3%) The lowest overall score was on the use of database (42.3%). Table 3 summarizes student scores on the exam portion of the CEKI.

Table 3

Participant Scores on the Exam Section of the CEKI by Area and Total (N = 740)

Exam Section (number of items)	M	SD	% Correct
General computer knowledge (6)	4.27	1.33	71.2
Internet (WWW) use (5)	4.12	.94	82.4
Word processing (8)	4.53	1.52	56.6
File management (5)	2.68	1.36	53.6
Spreadsheet use (6)	2.99	1.57	49.3
Database use (3)	1.27	.86	42.3
TOTAL (33)	20.06	4.94	60.8

Table 4 indicates the significant relationships between demographic characteristics and computer experiences with self-perceived level of skills at the p=.05 level. The relationship between self-perceived level of skills and age was r =.094, while the relationship between self-perceived level of skills and number of courses was completed was r =.306, which indicates a low positive correlation.

Table 4

Correlations Between Selected Demographic Characteristics, Computer Experiences, and Self-Perceived Level of Skills

Variable	Self-Perceived Level of Skills	P – Value
Age (*r*)	-.094*	.012
Gender (*r*)	-.071	.055
High school graduating average (*r*)	-.193*	.000
High school graduating class size (*r*)	.058	.125
College classification (*r*)	.010	.786
Computer course(s) completed (*r*)	.122*	.001
Number of courses completed (*r*)	.306*	.000
Computer experiences (topics studied) (*r*)	.268*	.000
Own a computer (*r*)	.190*	.000
Type of computer owned (*r*)	.003	.947
Type of operating system used (*r*)	-.009	.821

Note. r = Pearson product moment correlation coefficient, * = significantly correlated at the p = .05 level (2-tailed).

The relationship between demographic characteristics, computer experiences, self-perceived level of skills, and scores from the exam portion of the CEKI were also examined. The significant relationships at the $p = .05$ level between demographic characteristics and CEKI scores are shown in Table 5. All relationships showed "little if any correlation" for demographic characteristics and computer experiences (Hinkle, Wiersma, and Jurs, 1998, 120). The relationship between CEKI exam score and gender was $r = .024$, while the relationship between exam score and completed computer courses was reported at $r = .216$. A "low positive correlation" ($r = .402$) was found between self-perceived skills and the CEKI score (Hinkle, Wiersman, and Jurs, 1998, 120).

Table 5

Correlations Between Selected Demographic Characteristics, Computer Experiences, Self-Perceived Level of Skills, and Exam Score on the CEKI

Variable	CEKI Exam Score	P - Value
Age (*r*)	.074	.052
Gender (*r*)	.024	.529
High school graduating average (*r*)	-.276*	.000
High school graduating class size (*r*)	-.042	.270
College classification (*r*)	.212*	.000
Computer course(s) completed (*r*)	.216*	.000
Number of courses completed (*r*)	.209*	.000
Computer experiences (topic studied) (*r*)	.139*	.001
Own a computer (*r*)	.157*	.000
Type of computer owned (*r*)	-.103*	.010
Type of operating system used (*r*)	-.081*	.044
Self-perceived level of skills (*r*)	.402*	.000

Note. r = Pearson product moment correlation coefficient, * = significantly correlated at the p = .05 level (2-tailed).

Conclusions

The findings from this study indicate that students enrolled in CASNR courses have been exposed to previous computer usage through courses at the high school and college level. Over three-fourths of the participants owned a computer and had completed a course in computer usage. However, over one-half of the participants indicated that they had not received instruction in computer programming, while over one-fourth indicated they had not received instruction in electronic mail (e-mail). Nearly one-fourth indicated they had not received instruction in database and Internet use. A majority of participants indicated that they had received instruction in word processing, spreadsheet use, file management, and presentation graphics. Thus, it was concluded that these students have participated in a common core of educational experiences related to the most commonly used computer applications.

Overall, the participants perceived their level of skills in word processing and Internet use above average. They perceived their skills in file management, electronic mail (e-mail), spreadsheet use, presentation graphics, and database use as average. Based on these findings, it was concluded that a majority of respondents believed they possessed above average to average skills in the eight areas of computer usage. The lowest level of computer skill was computer programming. The mean reported for self-perceived level of skills in this study was 2.30.

Based on the results on the CEKI, it was concluded that students were deficient in all areas covered by the questionnaire, especially in database use, spreadsheet use, file management, and word processing. Participants scored the highest on the Internet use and general computer knowledge sections on the CEKI. The mean number of correct responses was 20.06 (60.8%).

The relationships between demographic characteristics and computer experiences with self-perceived level of skills were statistically significant with either negative or positive correlations. However, correlations between age, high school graduating average, computer courses completed, computer experiences (topics studied), and computer owned by student had little influence on self-perceived level of skills. A low positive correlation was found between number of computer courses taken and self-perceived level of skills. Therefore, it was concluded no strong prediction could be established from these correlational results.

A statistically significant, low positive correlation was found between self-perceived level of skills and CEKI exam score. The relationships between high school graduating average, type of computer owned, and type of operating system used with CEKI exam score had statistically significant, negative correlations, indicating these variables had little influence on the CEKI exam score. However, the relationships between college classification, computer course(s) completed, number of courses completed, computer experiences (topics studied), and computer owned with CEKI exam score yielded statistically significant, positive correlations. It was also concluded that no strong prediction could be established from these correlational results. Overall, regardless of demographic characteristics, computer experiences, and computer knowledge, there were no significant differences in computer knowledge and skills that existed among participants.

Recommendations

The study of computer experiences, self-perceived level of skills, and computer knowledge of students enrolled in CASNR courses adds to current research in regard to the importance of computer knowledge and skills required of graduates once they enter into the job market.

Further research concerning computer experiences, self-perceived level of skills, and computer knowledge of students in the CASNR should be continued and expanded. This study should be replicated with samples of entering freshmen and graduating senior-level students. If such studies should yield similar results, efforts must be made within the CASNR to enhance the computer knowledge and usage of students. To accomplish this, the following actions are recommended.

First, entering freshmen across each department should be required to complete a computer applications course during their first semester of enrollment. Second, to ensure that students maintain adequate usage of various computer applications throughout their undergraduate years, instructors should integrate required computer usage into their courses. This should be done with usage of various applications through assignments and learning labs that can be used to enhance the academic subject matter. This would be useful in ensuring students do not forget how to use specific computer applications. Third, efforts should be made to ensure graduates are adequately prepared for careers upon graduation through the requirement of computer-intensive courses.

Research is also recommended in order to gain perspectives from faculty, alumni, and potential employers. Perspectives from faculty members are needed in order to determine what computer applications are most used in courses within the six departments in CASNR. Perspectives from alumni must be used to determine how CASNR courses prepared former students for careers as well as determine views of what computer skills are required by current employers. An employer perspective must be used to determine how important computer skills are in selecting employees, what type of computer applications are used by employees, and how often computers are used on the job.

Finally, researchers and educators in other universities are encouraged to conduct similar studies in order to identify student computer experience, self-perceived level of skills, and computer knowledge. Research in these areas will provide the data needed to make sound decisions involving computer education courses and requirements.

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Analysis of Computer Knowledge, Skills, and Experiences of Students Enrolled in Undergraduate Courses

A Critique

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The world is moving into a technologically-driven society where computer skills are deemed essential for success. Therefore, the authors attempt at analyzing computer abilities is certainly warranted.

Why do you suppose students' perceived abilities were above average and the CEKI clearly showed a deficiency? Why were no strong predictions established from the correlational results? Provide some specific examples to this question please.

The Multiple Interest Groups Related to Computers in the Classroom figure can be viewed as a conceptual framework. It includes concept areas that influence the center of the model, student computer knowledge and experience. What are the variables or characteristics within each eclipse? What would an operational framework look like? That is, which eclipses does this study address and what variables/characteristics are included? For example, what is the rationale for including demographics in the study (see objectives 1 and 4)?

Can you elaborate on the significant relationships from tables 4 and 5 from a practical point of view? You mentioned partnerships with industry and that job market skills are needed by graduates, but how much influence should they have on curriculums? If the influence you suggest is high, than should business/industry support computer laboratories with hardware and software? What are the implications of too much versus no business and industry support? There are those who feel we should eliminate computer classes and simply include computer skills within each college course. What are your feelings about no computer classes if all necessary skills were applied in regular courses.

Improving the college experience: Perceptions of agricultural and natural resources undergraduate students regarding effective educational practices

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Abstract

The purpose of this study was specifically designed to assess the extent to which college of agriculture and natural resource undergraduate students at a Midwest land-grant university are engaged in empirically derived good educational practices and what they gain from their college experience. The questionnaire used in this study was a modified version of the *2002 National Survey of Student Engagement* and was divided into five constructs: level of academic challenge, active and collaborative learning, student interaction with faculty members, enriching educational experience, and supportive campus environments. Findings indicated that a vast majority of undergraduate students where not raised on a farm (73%) and had not completed a high school course in agricultural education (73%). Over three-quarters (82.9%) had not been a member of FFA and just over a half (67.9%) had not participated in 4-H. A vast majority of student 'never' to 'seldom' participated in a community-based project as part of a regular course (80%). Most students 'never' to 'sometimes' discussed ideas from readings or classes with faculty outside of class (90%), conduct research with faculty (88%), work with faculty on activities other than coursework (78%), or talk about career plans with a faculty member (68%).

Introduction/Theoretical Framework

What students do during college counts more in terms of desired outcomes than who they are or even where they go to college (Kuh, 2002). Research on college student development shows that the time and energy students devote to educationally purposeful activities is the single best predictor of their learning and personal development (Astin, 1993; Pascarella & Terenzini, 1991). The implication for estimating collegiate quality is clear. Those institutions that more fully engage their students in a variety of activities that contribute to valued outcomes of college can claim to be of higher quality compared with other colleges and universities where students are less engaged (Kuh, 2002).

Certain institutional practices are known to lead to high levels of student engagement: 1) clear, coherent and consistently expressed educational purposes (Chickering & Reisser, 1993; Kuh, Schuh, Whitt, & Associates, 1991); 2) an institutional philosophy that embraces a holistic view of talent development (Kuh et al., 1991); 3) a balanced curricular approach to general education (Astin, 1993); 4) complementary institutional policies and practices congruent with students' characteristics and needs (Chickering & Reisser, 1993; Kuh et al., 1991); 5) high, clear expectations for student performance (Chickering & Gamson, 1987; Kuh et al., 1991); 6) use of effective teaching approaches (Pascarella & Terenzini, 1991); 7) systematic assessment of student performance and institutional environments, policies and practices (Banta, 1993); 8)

ample opportunities for student involvement in educationally purposeful out-of-class activities (Kuh et al., 1991); 9) human-scale settings characterized by ethics of membership and care (Kuh et al., 1991); and 10) an ethos of learning that pervades all aspects of the institution (i.e., the institutional culture communicates to students, faculty, and staff – at a deep, almost subconscious level – the central role of learning in the community) (Kuh et al., 1994).

Perhaps the best known set of engagement indicators is the Seven Principles for Good Practice in Undergraduate Education (Chickering & Gamson, 1991). These principles state that good practice: 1) encourages student-faculty contact; 2) encourages cooperation among students; 3) encourages active learning; 4) gives prompt feedback; 5) emphasizes time on task; 6) communicates high expectations, and 7) respects diverse talents and ways of learning. Also important to student learning are institutional environments that are perceived by students as inclusive and affirming and where expectations for performance are clearly communicated and set at reasonably high levels (Kuh et al., 1991; NRC, 1992; Kuh, 2001; Pascarella, 2001). All these factors and conditions are positively related to student satisfaction and achievement on a variety of dimensions (Pascarella & Terenzini, 1991; Astin, 1993; Bruffee, 1999). Thus, educationally effective colleges and universities – those that add value – channel students' energies toward appropriate activities and engage them at a high level in these activities (NASULGC, 1997).

Taken together, the conditions just listed characterize an institution with a seamless learning environment (Kuh, 1996; Kuh et al., 1994). The word seamless suggests that what was once believed to be separate, distinct parts (e.g., in-class and out-of-class, academic and nonacademic, curricular and co-curricular, or on-campus and off-campus experiences) are now of one piece, bound together so as to appear whole or continuous. In seamless learning environments, students are encouraged to take advantage of learning resources that exist both inside and outside the classroom (Kuh, 1996); faculty and staff use effective instructional practices (Chickering & Gamson, 1987); and students are asked to use their life experiences to make meaning of material introduced in classes and laboratories, and to apply what they are learning in class to their lives outside the classroom (Strange, 1992).

According to the Kellogg Commission on the Future of State and Land-Grant Universities report *The Student Experience* (NASULGC, 1997), emphasizing a seamless educational environment helps focus faculty, staff, students, and others on the tasks and activities that are associated with higher yields in terms of desired student outcomes. Toward these ends, the 1992 National Research Council report *Agriculture and the Undergraduate* contends that faculty and administrators within colleges of agriculture would do well to arrange the curriculum and other aspects of the college experience in accord with these good practices and seamless learning environment. These good practices and seamless environments within agricultural education encourage students to put forth more effort which will result in greater gains in such areas as critical thinking, problem solving, effective communication, and responsible citizenship (Dormody & Stutphin, 1991; Torres & Cano, 1995; Rudd et al., 2000; Woods, 2001).

Thus, as the NRC (1992) and the NASULGC (1997) reports emphasized, assuring that students and society get what they need from land-grant and state colleges of agriculture has

never been more important. An information-based economy and increasing reliance on technology make it imperative that undergraduates obtain the knowledge, skills and competencies required to live productive, economically self-sufficient, and civically responsible lives (NASULGC, 1997; NRC 1992). The task is especially challenging because college of agriculture students today are different in almost every way from their counterparts of just two or three decades ago, including their academic preparation and social and economic backgrounds (Scofield, 1995; Russell, 1993; Dyer, Breja & Andreasen, 1999).

In light of these changes facing state universities and land-grant colleges, NASULGC (1997) indicated that there is a need to "help our institutions encourage better teaching, improve retention and graduation, enhance our ability to assess our own performance, and prepare our students for a lifetime of seamless learning" (p. 22). Previous research within agricultural education has identified attitudes of college of agriculture freshman toward agriculture (Dyer et al., 1999); leadership skills of college of agriculture graduates (Birkenholz & Schumacker, 1994); academic performance and retention of college of agriculture students (Garton, Ball & Dyer, 2002); relationship between student's learning style and academic performance (Torres & Cano, 1994); performance in agriculture courses (Garton, Dauve, & Thompson, 1999); the relationship between learning styles, academic major and academic performance of college students (Cano & Porter, 1997; Cano, 1999); and undergraduate agriculture student learning styles and critical thinking abilities (Rudd et al., 2000; Torres & Cano, 1995). However, data are lacking that describes the college of agriculture undergraduate students' level of academic challenge, active and collaborative learning opportunities, student-faculty interaction, enriching educational experiences, and supportive campus environments. Possessing this knowledge could provide administrators, faculty members and others with the necessary information to assist with establishing a seamless learning environment for college of agriculture undergraduate students.

Purpose/Objectives

The purpose of this study was to assess the attitudes and perceptions of College of Agriculture and Natural Resources (CANR) undergraduate students toward their overall college experience. The objectives of the study were to:

1. Describe the demographic composition of CANR undergraduate students.
2. Measure the level of academic challenge that CANR students encounter.
3. Assess the level of opportunity that CANR students have to experience active and collaborative learning.
4. Ascertain the level of student—faculty interaction within the CANR.
5. Measure CANR student level of exposure to enriching educational experiences.
6. Assess CANR student's perception of various supportive campus environments.

Methods

<u>Population</u> - This study used a descriptive survey, which was administered to all undergraduate students enrolled in the College of Agriculture and Natural Resources at a Midwest land-grant

university (N=2,353). A student roster from the College's admission office served as the population frame for this census study.

Instrument - Guided by Dillman (2000), survey instruments were emailed during the 2003 spring semester with follow-up email reminders mailed after two weeks. A second instrument packet and reminder email was sent at two-week intervals, respectively. A total of 372 (16%) usable questionnaires were returned. To check for nonresponse bias, a random sample of the remaining nonrespondents was drawn (Lindner, Murphy & Briers, 2001), totaling 85 CANR undergraduates (five respondents for each of the 17 departments in the CANR). A total of 42 valid questionnaires were returned. Nonrespondents were compared statistically to respondents by demographic data. There were non statistical differences between nonrespondents and respondents. Borg and Gall (1989) recommend that if no significant differences are found when the responses of the initial respondents are compared with those of the nonrespondent sample then the researcher can reasonably assume that the respondents represent an unbiased sample of all who receive the questionnaire. Nonrespondent's data were compiled with respondent's data, yielding a total response rate of 17% (n=414)

The two-part questionnaire used in this study was a modified version of the 2002 National Survey of Student Engagement (NSSE, 2002) and was reviewed for content and faces validity by CANR faculty, administrators and staff. Part I of the survey addressed demographic information and contained close-ended and partially close-ended questions. Part II of the instrument was divided into five constructs: level of academic challenge, active and collaborative learning, student interaction with faculty members, enriching educational experience, and supportive campus environments. These sections used a five-point Likert-type scale (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, 5 = Always).

As with all surveys, the survey used for this study relied on self reports. Using self-reports from students to assess the quality of undergraduate education is common practice (Dyer et al., 1999; Garton et al., 2002). Some outcomes of interest cannot be measured by achievement tests, such as attitudes and values or gains in social and practical competence. For many indicators of educational practice, such as how students use their time, student reports are often the only meaningful source of data.

The validity and credibility of self-reports have been examined extensively (Baird, 1976; Berdie, 1971; Pace, 1985; Pike, 1995). With this in mind, research suggests (Bradburn & Sudman, 1988; Hansford & Hattie, 1982; Laing, Swayer, & Noble 1989; Pace, 1985; Pike, 1995) that self-reports are likely to be valid under five general conditions. They are: 1) when the information requested is known to the respondents; 2) the questions are phrased clearly and unambiguously; 3) the questions refer to recent activities; 4) the respondents think the questions merit a serious and thoughtful response; and 5) answering the questions does not threaten, embarrass or violate the privacy of the respondent or encourage the respondent to respond in socially desirable ways. The survey for this study was intentionally designed to satisfy all these conditions.

Analysis – All data were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Appropriate statistical procedures for descriptive and inference were used. The alpha level was set *apriori* at .05. To describe the magnitude of relationships all correlation coefficients were interrupted utilizing, Davis (1971) scale of descriptors.

Results/Findings

Objective 1 - *Demographic Composition*- A majority of the respondents were females 59.4% (n=246) and males comprised 40.6% (n=168). Ninety-one percent (n=375) of the respondents were White/Caucasian non-Hispanic, 3.2% (n=14) Black/African American non-Hispanic, 1.2% (n=5) Chicano/Mexican American, .2 %(n=1) Hispanic, .2% American Indian/Alaskan Native, 2.5 %(n=11) Asian/Pacific Islander, and 1.7% (n=7) other. Forty-one percent (n=170) were seniors, 33.6% (n=139) were juniors, 14.3% (n=59) were sophomores, 7.5% (n=31) were freshman, and 3.6% (n=15) are other. Finding indicate that a majority of the respondents 92.5% (n=383) were enrolled full-time. The remaining 7.5% (n=31) of the respondents were attending school less than full-time.

Seventy-three percent (n=303) of the respondents reported "no" when asked if they were raised on a farm. Likewise, 73.2% (n=303) of the respondents reported "no" when asked if they completed any high school courses in agriculture or natural resources, while, 26.8% (n=111) of the respondents that reported "yes" when ask if they completed any courses in agriculture or natural resources.

Respondents reported that 82.9% (n=343) that they were not members of FFA, and 67.9% (n=281) of the respondents reported that they were not members of 4-H. Fifty-one percent (n=213) of the respondents reported that they were a part of a student organization within CANR, 58.5% (n=242) of the respondents were a part of an organization not associated with CANR and, 76.6% (n=317) of the respondents were a part of a student organization not associated with the university.

Findings indicate that 46.1% (n=191) of the respondents were from a small town with a population less than 10,000, 26.3% (n=109) of the respondents were from a medium urban neighborhood of a population between 10,000-99,999, 19.1% coming from a suburb of a metropolitan area over 100,000, and 8.5% coming from a large metropolitan area over 100,000. A majority of the respondents 70.5% (n=292) started their college experience as MSU, while 24.2% (n=100) of the respondents started college at a community or junior college, and 5.3% transferred into the university.

Objective 2 – *Level of Academic Challenge*- As seen in Table 1, six questions from the survey related to integral components of academic challenge that represent the nature and amount of assigned academic work, the complexity of cognitive tasks presented to students, and the standards faculty member use to evaluate student performance.

Table 1.
Level of Academic Challenge

	N		S		ST		O		A	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Comprehend facts, ideas, or methods from your course and readings so you can grasp meaning, explain and restate ideas	1	.2	9	2	75	18	246	59	83	20
Analyze the basic elements of an idea, experience, or theory, such as examining a particular case or situation in depth and considering its components	2	.5	28	7	125	30	203	49	56	14
Applied theories or concepts to practical problems or in new situations	6	1	34	8	138	33	181	44	55	13
Memorized facts, ideas, or methods from your courses and readings so you can repeat them in pretty much the same form	8	2	42	10	148	36	175	42	41	10
Making judgments about the value of information, arguments, or methods such as examining how others gathered and interpreted data and assessing the soundness of their conclusions	13	3	57	14	145	35	158	38	41	10
Synthesized and organizing ideas, information, or experiences into new, more complex interpretations and relationships	11	3	61	15	150	36	156	38	36	9

Alpha reliability = .77; N=Never; S=Seldom; ST=Sometimes; O=Often; A=Always

Objective 3 – *Active and Collaborative Learning* - Students learn more when they are intensely involved in their education and have opportunities to think about and apply what they are learning in different settings. According to research students that collaborate with others to solve problems or master difficult material acquire valuable skills that prepare them to deal with the messy, unscripted problems they will encounter during and after college. Table 2 outlines findings of the six survey questions that contribute to this area.

Table 2.
Active and collaborative Learning

	N		S		ST		O		A	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Worked with other students on projects	23	6	25	6	145	35	173	42	48	12
Worked with classmates outside of class to prepare class assignments	18	4	54	13	130	31	178	43	34	8
Asked questions in class	25	6	81	20	176	43	97	23	35	9
Made a class presentation	65	16	76	18	134	32	111	27	28	7
Tutored or taught other students	170	41	122	30	88	21	27	7	7	2
Participated in a community-based project as part of a regular course	246	59	88	21	55	13	20	5	5	1

Alpha reliability = .75; N=Never; S=Seldom; ST=Sometimes; O=Often; A=Always

Objective 4 – *Student-Faculty Interaction* - In general, the more contact students have with their teachers the better. Working with a professor on a research project or serving with faculty members on a college committee or community organization lets students see first-hand how experts identify and solve practical problems. Through such interaction teachers become role models, mentors and guides for continuous, life-long learning. Table 3 summarizes findings of the four questions used to measure this construct.

Table 3.
Student-Faculty Interaction

	N		S		ST		O		A	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Talked about career plans with a faculty member	84	20	92	22	109	26	98	24	31	8
Worked with faculty members on activities other than coursework	150	36	96	23	79	19	68	16	21	5
Discussed ideas from readings or classes with faculty outside of class	115	28	152	37	102	25	41	10	4	1
Conducted research with faculty	257	62	59	14	50	12	31	8	17	4

Alpha reliability = .68; N=Never; S=Seldom; ST=Sometimes; O=Often; A=Always

Objective 5 – *Enriching Educational Experiences* - Educationally effective colleges and universities offer a variety of learning opportunities inside and outside the classroom that

complement the goals of the academic program As seen in Tables 4 and 5, the 10 questions from the survey representing these kinds of experiences are outlined.

Table 4.
Enriching Educational Experiences

	Yes		No		Undecided	
	f	%	*f*	%	*f*	%
Internship, field experience, or co-op experience	368	89	21	5	25	6
Community service or volunteer work	297	72	57	14	60	15
Independent study or self-designed course	131	32	178	43	105	25
Study abroad	139	34	189	46	86	21
Foreign language coursework	83	20	265	64	66	16

Table 5.
Enriching Educational Experiences

	N		S		ST		O		A	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Had serious conversations with students who are very different from you in terms of their religious beliefs, political opinions, or personal values	31	8	88	21	152	37	99	24	44	11
Had serious conversations with students of a different race or ethnicity than your own	46	11	99	24	130	31	92	22	47	11
Encouraging contact among students from different economic, social, and racial or ethnic backgrounds	51	12	128	31	130	31	81	20	24	6

Alpha reliability =.67; N=Never; S=Seldom; ST=Sometimes; O=Often; A=Always

Objective 6 – *Supportive Campus Environment* - Students perform better and are more satisfied at colleges that are committed to their success and cultivate positive working and social relations among different groups on campus. The six survey questions contributing to the construct of campus environment are outlined in Tables 6 and 7.

Table 6.
Supportive Campus Environment

	N		S		ST		O		A	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Providing the support you need to help you succeed academically	9	2	26	6	100	24	186	45	93	23

Providing the support you need to thrive socially	53	13	116	28	148	36	72	17	25	6
Helping cope with your non-academic responsibilities (work, family, etc.)	95	23	143	35	108	26	50	12	18	4

Alpha reliability =.78; N=Never; S=Seldom; ST=Sometimes; O=Often; A=Always

Table 7.
Supportive Campus Environment

	SD		D		N		A		SA	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Relationships with other student were supportive	3	1	6	1	47	11	217	52	141	34
Relationships with faculty were supportive	6	1	9	2	60	15	196	47	143	35
Relationships with Administrative Personnel and Offices were supportive	7	2	17	4	126	30	173	42	91	22

Alpha reliability = .75; SD= Strongly Disagree, D = Disagree, N=Natural, A=Agree, SA=Strongly Agree

Conclusions

In this section we note those findings by demographic variables and within the five constructs (level of academic challenge; active and collaborative learning; student interaction with faculty members; enriching educational experience; and supportive campus environments) that appear most promising and most disappointing with respect to the undergraduate experience as a whole in the CANR

Demographic Variables – Similar to findings by Scofield (1995), Russell (1993), and Dyer et al. (1999) respondents in this study are different in almost every way from their counterparts of just two or three decades ago, including their academic preparation and social and economic backgrounds. Specifically, it is important to note that 73% of the respondents had not been raised on a farm and had not completed a high school course in agricultural education. Equally important is that 82.9% of the respondents had not been a member of FFA and 67.9% 4-H. Likewise, 53.9% of the respondents had been raised in a medium to large metropolitan area.

Level of academic challenge – respondents state that 'often' to 'always' their academic coursework focused on comprehension of facts, ideas or methods (79%); analyzing the basic elements of an idea, experience, or theory (63%); application of theories or concepts to practical problems (57%); memorizing facts, ideas or methods (52%); making judgments about the values of information, arguments or methods (48%); and synthesizing and organizing ideas, information, or experiences into new more complex interpretations and relationships (47%).

Active and collaborative learning – In responses to the questions about faculty member's use of engaging teaching methods, certain forms of active and collaborative learning are becoming the norm on college campuses. Respondents stated that they 'sometimes' to 'often' worked with other students on projects within class (77%); worked with classmates outside of class to prepare class assignments (74%); asked questions in class (66%); and made a class presentations (59%).

However, respondents also noted that they 'never' to 'seldom' tutored or taught other students (77%) or participated in a community-based project as part of a regular course (80%).

Student interaction with faculty members – Many studies show that substantive interactions between students and faculty are important to a host of desired outcomes of college. Unfortunately, according to respondents in this study, such interaction does not occur very often. Indeed, respondents state that they 'never' to 'sometimes' discussed ideas from readings or classes with faculty outside of class (90%); conducted research with faculty (88%); worked with faculty on activities other than coursework (78%); or talked about career plans with a faculty member (68%).

Enriching educational experience – Most respondents participated in one or more learning experiences inside and outside the classroom that enrich their academic programs. Internships are particularly popular with 89% of the respondents stating that they have or will participate in an internship prior to graduation. Seventy-two percent of the respondents also stated that they participate in community service or volunteer work outside of class. Conversely, 64% of the respondent's state that they do not plan on taking a foreign language course, only 34% stated they would participate in a study abroad program, while only 32% intend to take part in an independent study or self-designed course. Seventy-two percent of the respondents stated that they 'sometimes' to 'always' had serious conversations with students who are very different from them in terms of their religious beliefs, political opinions, or personal values. Sixty-four percent of the respondents stated they 'sometimes' to 'always' have serous conversations with students of a different race or ethnicity than their own. However, 74% of the respondents stated their department 'sometimes' to 'never' encouraged contact among student from different economic, social and racial or ethnic backgrounds.

Supportive campus environments – Ninety-two percent of the respondents stated that 'sometimes' to 'always' their department provided the support needed to help succeed academically. However, 84% of the respondents stated that their department 'never' to 'sometimes' helped students cope with their non-academic responsibilities; while 77% of the respondents also stated that their department 'never' to 'sometimes' provided the support needed to thrive socially. In contrast, respondents 'agreed' to 'strongly agreed' that their relationship was supportive with other students (86%), faculty (82%) and administrative personnel and offices (64%).

Recommendations/Implications

Everyone wants the same thing from our colleges and departments – an undergraduate experience that results in high levels of learning and personal development for all students. To realize this goal, key players within the CANR – deans, faculty, academic advisors, and students – must work together to structure learning opportunities and arrange institutional resources so that more students take part in a variety of coherent, challenging and complementary educational activities, inside and outside the classroom. The good news is that based on findings from this study many departments within the CANR seem to be using appropriate techniques in some areas, such as incorporating active and collaborative learning actives and promoting internships.

However, the findings also note that there is plenty of room for improvement when it comes to faculty-student interactions, promotion of diversity, advancing community service within curriculum activities and student-faculty research endeavors.

Towards this end, those of us who teach, advise and support students must clearly articulate what really matters to student learning and consistently use proven educational practices. Faculty must encourage more students to take advantage of the numerous learning opportunities that exist across campus, and measure student engagement and publicly report progress. Based on findings of this study, the following recommendations are provided:

1. Continue to evaluate the relative strengths and weakness of the CANR undergraduate experience to determine progress and set benchmarks.
2. Focus discussions about the quality of undergraduate education at faculty retreats, meetings and professional development programs.
3. Assess and address the barriers for entrance into the CANR for students from rural communities and former FFA and 4-H members.
4. Advance student recruitment and public relations efforts of students from rural communities and members of the FFA and 4H.
5. Each department should look at the high-performing departments to discover what they are doing and how they achieved this high level of performance.
6. Use student engagement findings to inform complementary teaching and learning initiatives across the college.
7. Establish programs that support the advancement of service learning and diversity efforts across the CANR curriculum; and
8. Agricultural education department – as learning specialists – should establish a teaching and learning program to advance a seamless learning experience across all departments within the CANR. This could be established by providing a teaching-learning methods course (certification program) for all Ph.D. graduate students and faculty.

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Improving the College Experience: Perceptions of Agricultural and Natural Resources Undergraduate Students Regarding Effective Educational Practices

A Critique

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Student/faculty interactions should be frequent, positive and enriching. Yet, this study indicates that we fall short in meeting those targets. How do your findings relate to the promotion and tenure process?

Why the emphasis on FFA/4-H in your recommendations? What evidence supports your views? In other words, where in the conceptual framework and literature review does it warrant an emphasis in youth organizations? Should Boy and Girl Scouts be included? What about Boy's and Girl's Clubs?

Do you think that the Seven Principles for Good Practice in Undergraduate Education could be the foundation for building a conceptual framework? Why or why not? What is the rationale for asking demographic questions in this study? How did you determine that you would include the five constructs in your study? Could they become the basis for an operational framework?

How do the demographics in your results compare to actual college demographics, specifically in gender? What stands out in Table 1, Level of Academic Challenge? Is there a better way to present the Table 1 result so that your key findings will be easier for the reader to notice?

A Descriptive Study on Characteristics of Female High School Agricultural Teachers Employed in Illinois

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Abstract

In 1980, one of the first female high school agriculture teachers opened the door to her classroom at Arthur High School in Illinois. Since that time, the number of female high school agriculture teacher has grown significantly. "Women in agriculture are role models for each other, for aspiring non-traditional agriculturists, and for nontraditional occupations outside of agriculture" stated Whittington (1990). A descriptive study was used to conduct a survey to identify and describe the characteristics of female high school agriculture teachers employed in Illinois. The results of the study can be used as a preparation tool for those females who decide to pursue agriculture education as a career, and can be used to encourage more female students to enter this challenging career. This study also determines the demographics, background and support given to female teachers of agriculture in Illinois prior to and after college. Almost half the current female high school agriculture teachers are under the age of 30, and 52% of these teachers are instructors of Agriculture Mechanization, a once male dominated area of instruction.

Introduction

In 1980, one of the first female high school agriculture teachers opened the door to her own classroom at Arthur High School in Illinois. The positive but slow increase of women in nontraditional occupations was put into perspective as Whittington stated, "Women in agriculture are role models for each other, for aspiring nontraditional agriculturists, and for nontraditional occupations outside of agriculture" (1990, pg. 20). Since this time, the number of female high school agriculture teachers has grown. Changes in the expectations that society holds for women, the women's movement, new laws which prohibit sex discrimination, and the implementation of career education are reasons that females decided to enter this field (Curry, 1975). Females are showing a high degree of interest in agriculture education. There are currently 51 (14%) female high school agriculture teachers in Illinois out of 359 total teachers providing agricultural instruction.

Foster wrote, "In a traditional male dominated field, like agricultural education, artificial barriers based on attitudinal bias often prevent qualified women from reaching their potential…. there are very few role models for young women entering the profession" (2001, p.386). Whent (1993) goes on to say that probably the most common bias toward women in agricultural education is the expectation that women in agriculture want to, or are capable of, teaching only horticulture. Based on theses biases, a need is established to determine what perceptions are perceived of Illinois female teachers as they proceed in their career path that could be beneficial to them as teachers. A descriptive study was used to conduct a survey to identify and describe the characteristics of female high school agriculture teachers employed in Illinois. The results of

this study can be used as a preparation tool for those females who decide to pursue agriculture education as well as a way to encourage more female students to enter this challenging career.

Theoretical Framework

America's classrooms have always been diverse in terms of ethnicity, socio-economic status, gender, and other variables (Wakefield & Talbert, 1999). In 1972, the Smith Hughes Act provided for the college training of teachers of agriculture for secondary schools (Kren, 1975). However, it was not until Title IX of the 1972 Educational Amendments were the doors opened wider for females in agriculture education. Title IX of the 1972 Educational Amendments prohibits discrimination based on sex under any education program or activity receiving Federal financial assistance (Kren, 1975). Even with the passing of Title IX, females were still experiencing biases as professionals in agricultural education. Ogbu (1978) goes on to state that minorities usually experience greater and more persistent difficulties in the educational system. Many educators seem to be unaware of their embedded biases against women who are employed in agricultural education, and some educators did not perceive females as minorities. (Whent, 1993). Foster, Pikkert, and Husmann (1991) conducted a study looking at self-perception of gender bias among women agriculture teachers in a six state region. In their findings it was concluded that female teachers expresses satisfaction in their current positions, however gender bias was viewed as a definite deterrent to women entering the agricultural education profession.

Gregg, Hampton, and Juergenson (1975) conducted a study on 20 female agriculture teachers in California. The study showed that: (a) women do not have any more problems in the classroom than do men, (b) women are accepted in the community, (c) personal problems involving students are the same for females as males, (d) female agriculture teachers are accepted by students and (e) female agriculture teachers are as technically and professionally competent as their male counterparts.

Bass (1977) conducted a study to identify attitudes towards women as agriculture teachers. Results indicated that the respondents agreed females could manage all areas with an exception of large animals and agriculture machinery. 95.7% of the respondents as well as 81.4% of the respondents agreed upon good classroom control in agreement that females could be accepted in the community.

Ries and McCracken (1980) examined the perception of sexual bias and if this is an influence for females deciding whether or not to teach vocational agriculture. According to the findings, 60% of female high school agriculture teachers are happy with their career choice and 80% would recommend this career to other women. There were about 40% of the female high school agriculture teachers surveyed that believed other teachers find it difficult accepting a female vocational agriculture teacher.

Cano and Miller (1992) conducted a gender analysis of job satisfaction, job satisfier factors, and job dissatisfaction factors of agriculture education teachers. There were 37 female and 299 male secondary agriculture teachers from Ohio surveyed. They described demographic

characteristics of secondary agriculture teachers by gender. Cano and Miller found that female agriculture teachers were significantly younger, had less years of teaching experience, and had been in their current position for a shorter period of time. In another similar study, Cano (1990) sought to reveal the attitude and perception of male vocational agriculture teacher's towards female vocational agriculture teachers. The results suggested that there was some agreement among male agriculture teachers, a 7.36 on a 10-point scale, that female agriculture teachers were competent teachers.

Purpose and Objectives

This study was conducted to identify and describe the characteristics of female high school agriculture teachers employed in Illinois. The results of the study can be used as a preparation tool for those females who decide to pursue agriculture education as well as a way to encourage more female students to enter this challenging career.

The specific objectives of the study were to:

1. Determine the demographics of female high school agriculture teachers in Illinois.

2. Determine the background and support given to female agricultural teachers prior to and after college, and to identify the support they receive as agricultural education teachers.

3. Determine what areas of curriculum are viewed as most difficult to instruct.

Methods/Procedures

A census was conducted utilizing the Illinois Agricultural Directory published annually through the Illinois Association of Vocational Agriculture Teachers (IAVAT). The target population was the 51 female high school agricultural teachers in Illinois listed in this directory. A questionnaire was researcher-developed and reviewed for content and clarity by a panel of experts at Southern Illinois University composed of agricultural education faculty, and faculty teaching in the Plant, Soil and General Agriculture Department. The research instrument was validated and field tested by a group of female high school agriculture teachers as subjects to assist in identifying content specific question relating to the study.

The final questionnaire used to collect data was mailed to the 51 female agricultural teachers listed in the directory. Follow up included a second mailing, telephone calls and email contact. Each of the envelopes contained a cover letter, a copy of the survey, and a stamped, self-addressed envelope for return to the researcher. The instrument was coded to allow for follow-up. The subjects were provided with a stamped, self-addressed envelope to ensure confidentiality of the data. The final usable response rate was 61% (N=31).

The questionnaire was researcher-developed, four pages in length, consisting of two parts. The first section asked the participants general descriptive questions and the second section consisted of the questionnaire. The descriptive section relates to the grade levels and curriculum taught, population of the community, and population and gender of the students. The questionnaire section consists of background in agriculture prior to college, community support, agriculture curriculum, enjoyable aspects of teaching agriculture, and the source of encouragement to pursue agriculture education at the college level with a five point Likert-type scale ranging in value from one to five to assess the questionnaire items. Data was analyzed using Statistical Package for the Social Sciences. Descriptive perimeters, including frequencies and percentages, were used to analyze data.

Results/Findings

Objective one: Demographics

Data were gathered concerning educational level, age, years of teaching, grade levels taught, population of community, population of school, number of agriculture teachers in the school, average class size, average number of students each week, and subject areas taught (see tables 1 to 9). The educational levels of these female high school agriculture teachers were 48% holding a B.S. and 52% held M.S. degrees. Forty-eight percent of the teachers are under the age of 30, 19% are between the ages of 31 to 40, and the remaining 32% are between the ages of 41 to 60.

Table 1. Educational levels of the Responding Female High School Agriculture Teachers (N=31)

Educational Level	No.	%
Bachelor of Science	15	48
Master of Science	16	52
Ph.D.	0	0

Table 2. Ages of the Responding Female High School Agriculture Teachers (N=31)

Ages	No.	%
Under 30	15	48
31-40	6	19
41-50	5	16
51-60	5	16
Over 60	0	0

The responding female high school agriculture teachers educate students from grades seventh to twelfth. There are 23% teaching seventh grade, 29% teaching eighth grade, 94% teaching both ninth and tenth grade, 100% teaching eleventh grade, and 97% teaching twelfth grade. The majority (68%) of the female high school agriculture teachers are in their first five years of teaching. Class sizes for these female high school agriculture teachers range from zero to thirty with the range of 11 to 20 students holding the most percentage with 68%. The subject areas taught include: agricultural business (58%), horticulture (77%), agricultural mechanization (52%), agricultural resources (13%), and agricultural science (74%).

Table 3. Grades Levels Taught by the Responding Female High School Agriculture Teachers (N=31)

Grade Levels	No.	%
7	7	23
8	9	29
9	29	94
10	29	94
11	31	100
12	30	97

Table 4. The Number of Years Teaching of the Responding Female High School Agriculture Teachers (N=31)

Number of Years	No.	%
0 to 5	21	68
6 to 11	3	10
12 to 17	3	10
18 to 23	1	3
Over 23	3	10

Table 5. Class Size of the Responding Female High School Agriculture Teachers (N=31)

Class Size	No.	%
0 to 10	4	13
11 to 20	21	68
21 to 30	6	19

Table 6. Subject Areas Taught by the Responding Female High School Agriculture Teachers (N=31)

Subject Areas	No.	%
Agricultural Business	18	58
Horticulture	24	77
Agricultural Mechanization	16	52
Agricultural Resources	4	13
Agricultural Science	23	74
Other	12	39

Fourteen (45%) of the respondents stated they live in a community with less than 6,000 people. In addition, eleven (35%) stated their school's population is less than 200 students, with eight (26%) stating they teach in schools with over 800 students. Of the 31 female teachers that responded, 24 (77%) teach in a one-teacher department with 12 (39%) stating they see between 51-75 students a week.

Table 7. Population of Community of the Responding Female High School Agriculture Teachers (N=31)

Population Size	No.	%
0 to 999	7	23
1,000 to 5,999	14	45
6,000 to 10,999	0	0
11,000 to 16,999	2	6
Over 17,000	8	26

Table 8. Population of the School of the Responding Female High School Agriculture Teachers (N=31)

Population Size	No.	%
0 to 199	11	35
200 to 399	7	23
400 to 599	3	10
600 to 799	2	6
Over 800	8	26

Table 9. Total Students Each Week of the Responding Female High School Agriculture Teachers (N=31)

Number of Students	No.	%
0 to 50	4	13
51 to 75	12	39
76 to 100	9	29
Over 100	6	19

Objective two: Background and support for female agricultural teachers

Respondents were asked to circle a number from one to five concerning their participation in high school agriculture classes, high school FFA, and whether or not they lived on a grain/livestock farm prior to college, using one for strongly disagree and five being strongly agree. 52% of the 31 responded they strongly agreed their background of living on a grain/livestock farm was important whereas 39% strongly disagreed with this statement. The respondents' answers for their participation in agriculture classes and FFA while in high school were closely related to those answers about living on a grain/livestock farm. There were also 52% that strongly agreed that participating in high school agriculture classes and FFA was important in their background (see Table 10).

Table 10. Background in Agriculture Prior to College of the Responding Female High School Agriculture Teachers (N=31)

Background	1 %	2 %	3 %	4 %	5 %
Lived on a Grain/Livestock Farm	39	3	3	3	52
Participated in Agriculture Classes	31	3	3	13	52
Participated in FFA	32	3	6	6	52

Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Respondents were asked to circle a number from one to five concerning their encouragement to pursue agriculture education at the collegiate level, using one for strongly disagree and five being strongly agreed. The answers of the respondents were varied across the board. There were 26% of the female high school agriculture teachers that strongly disagreed that they were encouraged to enter agriculture education at the college level by their parents with 32% being neutral, and 10% strongly agreeing with this statement. Twenty-one percent of the respondents strongly disagreed they were encouraged by their high school agriculture teacher, 24% remained neutral, and 24% strongly agreed with this statement. 26% of the teachers

strongly agreed they were encouraged once they entered college by their professor while, 16% strongly disagreed, and 24% remained neutral (see Table 11).

Table 11. Encouragement to Pursue Agriculture Education at the Collegiate Level of the Responding Female High School Agriculture Teachers (N=29)

Encouragement	1 %	2 %	3 %	4 %	5 %
Encouraged by Parents	26	13	32	19	10
Encouraged by High School Agriculture Teacher	21	7	24	24	24
Encouraged by College Professor	16	3	24	32	26

Percentages do not total 100 due to questions not completed by 2 agriculture teachers.
Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Respondents were asked to circle a number from one to five concerning their support from different avenues in the community, using one for strongly disagree and five being strongly agree. The responding female high school agriculture teachers felt they received good support from all three of these avenues. A majority of the respondents either strongly agreed or agreed that farmers, agricultural businesses, and parents supported their program (see Table 12).

Table 12. Community Support of the Responding Female High School Agriculture Teachers (N=31)

Community Support	1 %	2 %	3 %	4 %	5 %
Farmers	13	0	10	42	35
Agricultural Businesses	3	6	13	45	32
Parents	3	3	16	48	29

Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Objective three: Most difficult curriculum area for Illinois female agricultural teachers

Respondents were asked to circle a number from one to five concerning the areas of difficulty in the agriculture curriculum, using one for strongly disagree and five being strongly agree. The curriculum that was in question was Agricultural Business & Management, Horticulture, Agricultural Mechanization, Agricultural Resources, Agricultural Science as well as discipline in the classroom and shop/lab area. Over half of the respondents, strongly disagreed that they had any difficulty in Agricultural Science (55%), maintaining discipline in the classroom (61%), and maintaining discipline in the lab/shop area (52%). There were 32% that strongly disagreed about having difficulty in Agricultural Business & Management, 29%

disagreed, 29% were neutral, and 10% agreed. Forty-two percent strongly disagreed, 39% disagreed, 16% were neutral, and 3% agreed that teaching Horticulture was difficult. There were 46% of the of the respondents that remained neutral about Agricultural Resources, 29% strongly disagreed, 17% disagreed, 3% agreed, and 3% strongly agreed. Agricultural Mechanization was varied a little different from the other curriculum. There were 13% that strongly disagreed, 13% disagreed, 26% remained neutral, 16% agreed, and 32% strongly agreed that Agricultural Mechanization was difficult to teach (see Table 13). The mean of the curriculum ranged from 1.61 to 3.42. The mean shows that Agricultural Science (1.61) is the least difficult for female high school agriculture teachers to teach whereas Agricultural Mechanization (3.42) is the most difficult to teach students (see Table 14).

Table 13. Difficulty Areas of Agriculture Curriculum of the Responding Female High School Agriculture Teachers (N=31)

Agriculture Curriculum	1 %	2 %	3 %	4 %	5 %
Agricultural Business & Management	32	29	29	10	0
Horticulture	42	39	16	3	0
Agricultural Mechanization	13	13	26	16	32
Agricultural Resources	29	17	46	3	3
Agricultural Science	55	35	6	0	3
Discipline in the Classroom	61	16	16	3	3
Discipline in the Lab/Shop	52	29	6	10	3

Percentages do not total 100 due to questions not completed by agriculture teachers.
Scale: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Table 14. Difficulty Areas of Agriculture Curriculum of the Responding Female High School Agriculture Teachers (N=31)

Agriculture Curriculum	Total Points	Mean
Agricultural Business & Management	67	2.16
Horticulture	56	1.81
Agricultural Mechanization	106	3.42
Agricultural Resources	57	1.84
Agricultural Science	50	1.61
Discipline in the Classroom	53	1.71
Discipline in the Lab/Shop	57	1.84

Conclusions/Recommendations/Implications

The purpose of this study was to identify and describe the characteristics of female high school agriculture teachers employed in Illinois. This study can be used as a preparation tool for those females who do decide to pursue agriculture education as well as a way to encourage more female students to enter this challenging career.

The first objective dealt with the demographics of the responding female high school agriculture teachers. It is determined that forty-eight percent of female agricultural teachers in Illinois are under the age of 30 with the remaining 52% spread over the years of 31 to 60. In comparison, 68% have taught between zero to five years with the remaining 32% having taught over 6 to 31 years. Therefore, it can be concluded that the majority of female high school agriculture teachers are in their beginning years. The subject areas taught by the responding female high school agriculture teachers include: Agricultural Business & Management, Horticulture, Agricultural Mechanization, Agricultural Resources, and Agricultural Science. Agricultural Mechanization, which is considered a male dominated skill area, is taught by 52% of the respondents.

The second objective focused on the background in agriculture of the respondents prior to college. Approximately one-half of the respondents stated that coming from a farm background, was important, whereas, 39% strongly disagreed about the important of coming from a farming background. In addition, only 31% participated in high school agriculture classes and high school FFA.

High school agriculture teachers require support from the community to build and maintain a quality agriculture program regardless of gender. 75% of the respondents stated that that farmers, agricultural businesses, and parents strongly support their programs. Therefore, it can be concluded that female high school agriculture teachers receive a vast amount of support from the community.

There are few areas of agricultural curriculum that provide difficulty for the responding female high school agriculture teachers. Agricultural Mechanization, which is considered to be a male dominated skill area, provides difficulty to only 32% of the respondents. Discipline, which has been another concern that administrators have had in the past about female high school agriculture teachers, provides difficulty to only 3%, both in the classroom and in the lab/shop area, for these responding female high school agriculture teachers.

Foster (2001) in a comparative study, stated that women are reporting increasing levels of acceptance by administrators, but other barriers of acceptance were still a concern. Whent (1993) stated that probably the most common bias toward women in agricultural education is the expectation that they want to teach horticulture, but when given the chance women excel in animal science, agronomy, and agricultural mechanics. She goes on to mention that some women believe that teaching horticulture is their only means of obtaining an agricultural education teaching position. Based on this study conducted with Illinois female teachers, it can

be determined that female teachers have the background, experience, and administrative and community support as men in the profession to be effective in agricultural education, but there are still many challenges facing them.

It is recommended that continued efforts be made to support women that pursue careers in agriculture. As Whittington (1990) stated, "Women in agriculture are role models for each other, for aspiring nontraditional agriculturalists, and for nontraditional occupations outside of agriculture." An implication of this study is it's use as a tool for those females who do decide to pursue agriculture education as well as a way to encourage more female students to enter this challenging career. A nationwide survey should be conducted focusing on areas of instruction to which female agricultural students should better prepare themselves for the profession.

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A Descriptive Study on Characteristics of Female High School Agricultural Teachers Employed in Illinois

Mandy Brandenburg and Dexter B. Wakefield

Critique by: Carol A. Conroy, SRI International

This paper presented results of a study designed to describe characteristics of female high school agricultural teachers in Illinois. The authors are to be commended for collecting baseline descriptive data on the population of female agricultural teachers in Illinois. This type of information is useful from both the research and programmatic perspective. I sincerely hope that the authors will use this study as a springboard to future research on issues with women and minorities in agricultural education. Unfortunately, beyond providing them with information for their own initiatives, the study does not provide much in terms of new information to the field, or to application and practice. The authors should consider enhancing the overall study with a more in-depth treatment of the theoretical issues, and weaving those into the discussion of the results.

The theoretical framework was more on the order of a conceptual framework. Did the authors consider looking at some of the research in demography and sociology that dealt with labor mobility for women? There is a solid body of knowledge that identifies factors influencing occupational choice and mobility subsequent to entrance into the labor market. Women in agricultural education are not immune to these influences.

The purpose and methods were clearly stated; I also appreciated the way that the authors organized the results by objective. It would have been helpful to have some information about what process the authors used to develop their questionnaire and how they conducted their follow-up activities. Did they use a body of literature to frame their questions and statements? Did they ascertain the reliability of the piloted instrument? How did they conduct their follow-up activities? Were they able to determine any differences between the respondents and the non-respondents? In addition, the authors should cite the literature sources for their choices of methods.

The results, conclusions, and recommendations are presented in a logical fashion, are supported by the findings, and are compatible with the theme of the paper. These sections could have been strengthened if the authors had not repeated, in the text, actual information provided in the tables, but had discussed their findings relative to the body of literature as outlined in their (and in a strengthened) theoretical framework. As written, the text in the Results/Findings section provides little information beyond what is in the tables.

This paper is well written from a grammatical and style point of view and I encourage the authors to build on their results with some additional research.

Trends in Learner Characteristics and Program Related Experiences Associated With Two Off-Campus Agriculture Degree Programs

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Abstract

Iowa State University began offering an off-campus master of agriculture degree in 1979 and an off-campus bachelor of science degree in 1991. In the fall of 1993 a follow-up study was conducted to evaluate the programs and to gain an understanding of the off-campus learning experience. Seven years later another follow-up study was conducted. Data were obtained from 46 of 53 persons who graduated by fall 1993 and from 34 of 54 persons who graduated from spring 1994 to spring 2001. When compared to 1993 respondents, a smaller proportion of 2001 respondents were male and employed in farming. A greater proportion of 2001 respondents were employed in agribusiness and Aother@ occupations. Graduates in both follow-up studies took about five and three quarter years to complete their programs, but respondents in 2001 traveled to campus more often for reasons associated with their degree program. Year 2001 respondents perceived thirteen challenges to off-campus study as less significant than 1993 respondents. Respondents in 2001 perceived they had significantly greater access to instructors and that instructors understood their needs more than did respondents in 1993. The two most significant challenges faced by graduates in both studies was the limited number of course offerings and the difficulty in balancing school, personal and work responsibilities.

Introduction

Off-campus students are significantly different from traditional college students. Distant learners are typically older and generally maintain a professional career in addition to taking courses (Wilson, 1991). Miller and Honeyman (1993) described off-campus learners enrolled in selected agricultural videotaped courses as being older, generally farmers or agricultural professionals, and motivated to enroll in the program to pursue a degree. Lehtola and Boyd (1992) described agricultural distant learners as self-motivated and self-disciplined while Gulliver and Wright (1989) noted that distant learners did not place a high degree of value on interacting with other students.

Students who pursue degrees through off-campus programs face a number of obstacles not normally encountered by traditional college students. Off-campus students often live too far from campus to attend on-campus classes, generally have a number of competing demands placed on their time, and are concerned with the costs associated with college (Hezel & Dirr, 1990; Thompson, Simonson & Hargrave, 1991). Asynchronous delivery technologies such as videotape can be effectively used to reduce the negative effects of obstacles related to time, costs, and convenience (Miller & Honeyman, 1993; Owen & Hotchkis, 1991). In response to student choice, asynchronous delivery methods are very popular methods of delivering courses associated with Iowa State University's off-campus professional agriculture degree programs. In

fact, Miller and Pilcher (2002) discovered that 95% of the adult distance learners who participated in their study on learning strategies were enrolled in courses delivered primarily through asynchronous technology (i.e., videotape, Internet, CD-ROM).

The College of Agriculture at Iowa State University began offering an off-campus master of agriculture degree in 1979. The off-campus program expanded to include a bachelor of science degree in 1991. The purpose of the off-campus agriculture degree programs is to provide post-secondary agricultural education opportunities to persons who are unable to or prefer not to study on campus (Miller & Honeyman, 1993). In the fall of 1993, Miller (1995) conducted a follow up study of graduates of the off-campus degree programs. Miller was motivated to conduct the study to generate knowledge of agricultural distance learners, their experiences with off campus degree programs, and the obstacles they face in pursuit of their degrees to use in creating higher quality programs that are more responsive to student needs. New leadership and other changes that were under consideration for the off-campus professional agriculture degree programs stimulated interest in conducting a second follow-up study to examine trends in learner characteristics and experiences.

In the years since Miller's 1993 follow up study, distance education and related educational technologies have developed rapidly. According to a report by International Data Corporation (as cited in American Federation of Teachers, 2001), the percentage of colleges offering distance education courses increased from 62 to 85 percent from 1998 to 2002. Projected enrollments increased from one-half million to over two million during the same period. As further evidence of development, consider the fact that no graduate surveyed in 1993 had ever used a graphics-based web browser (PBS, n.d.) nor had they experienced all of the learning tools associated with this level of technology. High profile distance learning providers such as the Western Governor's University did not exist (Western Governors University, 2003). Much had changed in seven years and the time was right to examine trends related students and their experiences with the Iowa State University off-campus professional agriculture degree programs.

Purpose and Objectives

The purpose of this longitudinal study was to identify trends in learner characteristics and program related experiences associated with two off-campus agriculture degree programs. The study was guided by the following objectives.

1. Compare alumni of the off-campus professional agriculture degree programs who graduated prior to spring semester 1994 with those who graduated between spring 1994 and spring 2001 on selected demographic characteristics.

2. Compare alumni of the off-campus professional agriculture degree programs who graduated prior to spring semester 1994 with those who graduated between spring 1994 and spring 2001 on selected program-related experiences.

3. Compare alumni of the off-campus professional agriculture degree programs who graduated prior to spring semester 1994 with those who graduated between spring 1994 and spring 2001 on their perceptions of selected obstacles to off-campus study.

Methods

The population for the study consisted of all persons who had earned a bachelor's or master's of professional agriculture degree from Iowa State University through spring semester 2001. The population was studied at two points in time. Forty-six master's degrees and seven bachelor's degrees had been awarded through fall semester, 1993. All 53 of these graduates were surveyed in the fall of 1993. In the spring of 2001, all persons who had graduated between spring 1994 and spring 2001 were surveyed. Thirty master's and 20 bachelor's degrees had been awarded during this time.

Relevant portions of the questionnaires used to collect data in 1993 and 2001 were identical. A six point Likert-type scale with response categories ranging from insignificant (1) to significant (6) was used to measure graduates' perceptions related to obstacles faced by off-campus students. An item pool for the perception scale was generated by interviewing administrators, advisors, professors, and students associated with the off-campus professional agriculture degree programs. Ten students enrolled in the off-campus programs participated in a field test of the instrument. Ultimately, 13 obstacles were selected for the scale. Cronbach's alpha was calculated to estimate the internal consistency of the scale and resulted in a coefficient of .71 for data collected in 1993 and .83 for data collected in 2001.

The questionnaire included the obstacles scale in addition to selected demographic questions and questions related to graduates' experiences with the off-campus programs. A panel of faculty and graduate students in agricultural education judged the questionnaire to be content and face valid.

Data for the study were collected by mailed questionnaire. The questionnaire, a cover letter, and a stamped return envelope were sent to all graduates of the professional agriculture degree programs. Approximately four weeks after the initial package was mailed, a second complete package was sent to all nonrespondents. No additional follow-ups were conducted in 2001. Two weeks after the second complete package was mailed in 1993, however, telephone calls were made to all nonrespondents to encourage participation in the study. In 1993, 42 master's graduates and four bachelor's graduates completed and returned the questionnaire for a response rate of 87%. In 2001, 24 master's graduates and 10 bachelor's graduates completed and returned the questionnaire for a response rate of 68%.

Data were analyzed with the SPSS personal computer program. Appropriate statistics for description were used including, percentages, means and standard deviations.

Results

Graduates of the off-campus professional agriculture degree programs prior to spring 1994 ranged in age from 27 to 67 years. They were, on average, 45.04 years old with a standard deviation of 9.19. Most (89.1%) of the graduates were male. Persons who graduated between 1994 and 2001 ranged in age from 25 to 60. Their mean age was 43.56 with a standard deviation of 8.73. A majority (79.4%) were male.

Graduates were asked to identify their occupation at the time they enrolled in their degree program and to identify their occupation at the time they participated in this study. Table 1 shows a decline in the proportion of graduates who were farmers or agricultural extension workers from 1993 to 2001. The proportion of graduates who reported occupations in agribusiness or "other" areas increased from 1993 to 2001. Almost half (46%) of the graduates surveyed in 1993 indicated that a change in their occupation or position within their occupation was influenced by their professional agriculture degree. Forty-two percent of graduates surveyed in 2001 credited their professional agriculture degree with occupational changes.

Table 1
Occupation of Graduates at the Time of Enrollment and at the Time of the Survey

	At Time of Enrollment		At Time of the Survey	
Occupation	1993 %	2001 %	1993 %	2001 %
Farming	34.8	23.5	34.8	15.2
Agricultural Extension	21.7	11.8	23.9	18.2
Agribusiness	19.6	26.5	19.6	27.3
Agricultural Education	8.7	5.9	4.3	9.0
Soil Conservation	6.5	11.8	6.5	6.1
Other	13.0	23.5	28.3	30.3

Note. The numbers represent the percentage of respondents who indicated employment in each occupation. Some respondents indicated more than one occupation.

Graduates were asked to rank four motivating factors for enrolling in the off-campus professional agriculture degree programs. Graduates participating in the 1993 and 2001 surveys ranked pursuing a degree as the most motivating factor and rated acquiring current technical knowledge second. Graduates participating in the 1993 survey rated enjoyment of learning new information third and career advancement fourth while those participating in the 2001 survey rated career advancement third and enjoyment of learning new information fourth (Table 2).

The amount of time taken to complete the off-campus degree programs ranged from a low of 24 months to a high of 126 months for graduates surveyed in 1993 and from a low of 3

months to a high of 168 months for graduates surveyed in 2001. Table 3 shows that a higher proportion of graduates surveyed in 2001 graduated in five years or less when compared to graduates surveyed in 1993. However, the rates at which 2001 respondents graduated beyond five years slowed considerably. For example, 91.3% of graduates surveyed in 1993 had graduated after eight years whereas 76.5% of graduates surveyed in 2001 had graduated after eight years. Graduates surveyed in 1993 and in 2001 took, on average, five and three quarter years to complete their program. It is important to note that B.S. degree students were expected to enter their program after having completed all general education requirements. General education requirements accounted for approximately half of the credits required for the B.S. degree.

Table 2
Mean Rankings and Standard Deviations for Factors that Motivated Graduates to Enroll in the Off-Campus Programs

	1993		2001	
Motive	*M*	*SD*	*M*	*SD*
Pursuing a degree	1.59	.90	1.52	.87
Acquiring current technical knowledge	2.52	.99	2.82	.88
For the enjoyment of learning new information	2.93	1.09	3.27	1.01
Career advancement	3.12	1.17	2.84	1.30

Table 3
Time in Months Taken by Graduates to Complete the Off-Campus Programs

	1993[a]		2001[b]	
Number of Months	%	Cum. %	%	Cum. %
<25	2.2	2.2	14.7	14.7
25-36	6.5	8.7	5.9	20.6
37-48	10.9	19.6	23.5	44.1
49-60	21.7	41.3	11.8	55.9
61-72	19.5	60.9	2.9	58.8
73-84	19.5	80.4	11.8	70.6
85-96	10.9	91.3	5.9	76.5
97-108	4.4	95.7	5.9	82.4

109-120	2.2	97.8	8.8	91.2
>120	2.2	100.0	8.8	100.0

[a] *M*=69.72, *SD*=22.77. [b] *M*=68.56, *SD*=42.48.

Graduates of the off-campus agriculture degree programs experienced a variety of delivery methods for their courses. Persons who were surveyed in 1993 may have taken several courses taught at off-campus sites through conventional methods. Videotape was a popular delivery tool during their tenure as students. Courses were also offered via satellite broadcast and through two-way audio and video communications technologies. This group would have been required to attend one or more on-campus sessions for each off-campus course that they took. Persons surveyed in 2001 also experienced a variety of delivery methods. After 1993, asynchronous delivery methods such as videotape and web-based courses became very popular. Methods that required students to attend classes at specific places and times became much less popular. The requirement to attend on-campus sessions was also discontinued shortly after the 1993 survey. The trends in course delivery made it possible for students to travel to campus less often. However, Table 4 demonstrates that graduates surveyed in 2001 actually came to campus more frequently than those surveyed in 1993 for reasons related to the off-campus programs.

Table 4
Number of Times Graduates Traveled to Campus for Reasons Related to the Off-Campus Programs

	1993		2001	
Number of Times	%	Cum. %	%	Cum. %
0 to 10	39.1	39.1	25.0	25.0
11 to 20	26.1	65.2	37.5	62.5
21 to 30	21.7	87.0	12.5	75.0
31 to 40	8.7	95.7	6.3	81.3
41 to 50	2.2	97.8	3.1	84.4
51 to 60	2.2	100.0	3.1	87.5
> 60	0	100.0	12.5	100.0

Graduates were asked to rate the significance of 13 obstacles to off-campus study using a six-point Likert-type scale. Table 5 reveals that taken together the 13 obstacles were considered to be less significant by graduates surveyed in 2001. For example, 45.7% of graduates surveyed in 1993 rated the obstacles slightly or moderately significant while only 22.6% of graduates surveyed in 2001 provided ratings this high. The overall mean score for 1993 respondents was 3.34 with a standard deviation of .67 but the overall mean for the 2001 respondents was 2.97 with a standard deviation of .88.

To further elucidate graduate's perceptions of the 13 obstacles to off-campus study, the percentages of respondents who rated each obstacle as slightly significant to significant are presented in Table 6. Three obstacles were perceived to be slightly significant to significant by a majority of graduates surveyed in 1993 and 2001. The three obstacles were "limited number of courses offered", "difficulty in balancing school, personal, and work responsibilities", and "cost of the program". The proportion of respondents who rated five obstacles as slightly significant to significant declined by 12% or more from 1993 to 2001. With the percentage of decline in

Table 5
Perceived Significance of 13 Obstacles to Off-Campus Study

	1993[a]		2001[b]	
Perceived Significance	%	Cum. %	%	Cum. %
Insignificant	0.0	0.0	3.2	3.2
Moderately insignificant	10.9	10.9	25.8	29.0
Slightly insignficant	43.4	54.3	48.4	77.4
Slightly significant	41.4	95.7	12.9	90.3
Moderately signficant	4.3	100.0	9.7	100.0

Note. Scale: 1=insignificant, 2=moderately insignificant, 3=slightly insignificant, 4=slightly significant; 5=moderately significant; 6=significant.
[a] M =3.34, SD =.67; [b] M = 2.97, SD =.88

Table 6
Percentage of Respondents Who Selected Slightly Significant, Moderately Significant, or Significant for Each Obstacle

Obstacle	1993	2001
1. Limited number of courses offered.	82.6	70.6
2. Difficulty in balancing school, personal, and work responsibilities.	71.7	67.6
3. Lack of access to library facilities.	65.2	48.5
4. Cost of the program.	60.9	55.9
5. Attending sessions held on campus.	47.8	35.3
6. Course offerings did not fit needs.	47.8	47.1
7. Lack of scholarships.	47.8	45.5
8. Lack of access to instructors.	47.8	33.3

9. Lack of access to other students.	43.5	41.2
10. Dealing with a number of different departments.	39.1	41.2
11. Faculty did not understand student needs.	37.0	17.6
12. Accessing financial aid at the University.	34.8	33.3
13. Prerequisites required for classes.	19.6	23.5

parentheses, these obstacles included; "faculty did not understand student needs" (19.4%), "lack of access to library facilities" (16.7%), "lack of access to instructors" (14.5%), "attending sessions held on campus" (12.5%), and "limited number of courses offered" (12%).

Conclusions, Recommendations, and Implications

The characteristics of clientele served by the Iowa State University off-campus professional agriculture degree programs had changed significantly in a seven year period. A greater proportion of graduates surveyed in 2001 were women. In addition more graduates in 2001 were employed in agribusiness and "other" occupations while fewer were employed as farmers or extension workers. Graduates surveyed in 1993 and 2001 were primarily motivated to enroll in their programs to pursue a degree. However, in 2001 graduates placed more emphasis on career advancement. A similar proportion of graduates surveyed in 1993 and 2001 credited their degree with occupational change. These data should be reviewed by curriculum planners as they work to align program outcomes with clientele needs, interests, and motivations.

The average amount of time taken to complete the off-campus professional agriculture degree programs reported by graduates surveyed in 1993 and 2001 was almost the same. Data for 2001 revealed that a higher proportion of graduates completed their degrees in five years or less. This may indicate progress in making it possible for students to complete their degrees in a timely manner. Even so, approximately 44% of graduates surveyed in 2001 took more than 5 years to complete their program. It is a realistic expectation that the off-campus professional agriculture degree programs take longer to complete than comparable on-campus degree programs. This conclusion may have policy implications for the masters degree program. At Iowa State University, students are expected to complete their masters degree program within five years. Otherwise the student's major professor and the director of graduate education for the program must request an extension from the dean of the graduate college.

Graduates surveyed in 2001 came to campus more often for reasons related to the off-campus professional agriculture degree program than those surveyed in 1993. Policy changes, course delivery changes, and advances in communication technology would lead one to expect a different finding. Perhaps the 2001 graduates came more often simply because they wanted to. This may demonstrate that the off-campus students valued face-to-face human contact and were willing pursue opportunities to have such contact independent of program requirements.

Significant progress has been made to lessen the significance of obstacles faced by off-campus students. Obstacles on which the greatest degree of improvement was achieved include: "faculty did not understand student needs", "lack of access to library facilities", "lack of access to instructors", attending sessions held on campus", and "limited number of courses offered". Much had changed in seven years that may have contributed to this progress. Some examples include: coordination of distance education across the university had become more standardized; faculty had participated in a range of professional development activities related to teaching at a distance; the requirement to attend on-campus sessions was discontinued; the World Wide Web made various documents more readily available; and electronic mail enhanced the ability of students and faculty to communicate. In spite of the progress, data from this study clearly indicate the priorities for continued improvement remain unchanged from 1993. Faculty, staff, and administrators associated with the off-campus professional agriculture degree programs should work to increase course offerings, support students in achieving a balance among competing responsibilities, enhance library access, and control program costs.

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Trends in Learner Characteristics and Program Related Experiences Associated with Two Off-Campus Agriculture Degree Programs

Greg Miller and W. Wade Miller

Critique by: Carol A. Conroy, SRI International

Miller and Miller continue their ongoing look at distance education for agriculture professionals with this timely study. The authors examined two cohorts of alumni from Iowa State's off-campus professional agriculture degree programs in an effort to compare demographic characteristics, program-related experiences, and perceived barriers to distance education between the two groups. As I mentioned in the Brandenburg and Wakefield critique, this type of information is useful from both the research and programmatic perspective and I agree with the authors' statement that it was important, at this time, to examine trends and issues associated with the ISU off-campus programs.

There really was not a theoretical framework, or a conceptual framework, contained in this paper and there should have been. Much has been written about the origins of distance education, and its evolution over the past 40 years and there is no evidence, either in the introduction of the paper or in the later discussions that this body of knowledge was used as a basis for any of the study design.

The purpose and objectives were well written and clearly stated, as was most of the Methods section. There was sufficient detail to understand the specific processes undertaken by the authors in conducting the study. One suggestion would be to write all steps taken for data collection, follow-up, etc. with one cohort before adding information about the other. This would minimize some confusion during reading this paragraph. Also, I must question what literature was drawn upon to develop the questionnaire? I am curious as to why there were no follow-ups conducted after the 2001 survey, especially since the response rate was so high for the initial study. It would be helpful to have that information.

The results, conclusions, and recommendations are presented in a logical fashion, are supported by the findings, and are compatible with the theme of the paper. The authors did a good job of presenting data in tables and then summarizing the data in the text sections. I would have liked to see references to prior research and a theoretical or conceptual framework in this section, however, since the discussion really focused on the authors' interpretations of the findings. Knowing if the results of this study supported (or did not support) prior research would generate opportunities to delve more deeply into an analysis of the results and provide the authors with more freedom to "hypothesize."

Overall, this is a useful study, informative, and well written. I enjoyed reading it.

Internationalization of Agricultural Education and Related Disciplines: A Review of Research

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Abstract

Instituting international perspectives in agricultural education and related disciplines in the U.S. has increased over the years. Preparing graduates for succeeding in a global society, world events, and other factors have contributed to increasing our involvement in internationalization efforts. It is anticipated that more result-oriented internationalization initiatives will occur in the future; therefore, researching the impact of these efforts will be crucial. The researchers determined the need for examining previous research exploring the internationalization of the U.S. agricultural education and related disciplines for the purpose of providing a basis to direct future research. The findings in this paper outlines internationalization studies in agricultural education and related disciplines for a 10-year period (1992-2001). Selected agricultural education and related publications were used to gather information for this research. Findings from the studies indicate that various internationalization initiatives have benefited students, programs, and personnel in agricultural education and related disciplines. However, additional research in this area is needed in order to support programmatic initiatives and the impact of these efforts.

Introduction and Theoretical Framework

The world is increasing becoming integrated as a result of communications, economics, transportation, social, politics, and other events. As a result of these efforts, Americans are recognizing that they live and work in a global marketplace of goods, services, systems, and ideas. Educational systems from kindergarten to graduate schools have escalated a number of program initiatives in order to increase global perspectives in their respective systems. Program thrusts include globalizing curriculum, offering more study or internships abroad, encouraging and in some cases requiring foreign language study, and coordinating international activities internally and externally. Pickert (1992) reported these thrusts have been designed to "deliver graduates who are competent not only to function professionally in an international environment, but who are equipped to make personal and public-policy decisions as citizens of an international society" (p. iii).

Considering all efforts in education to prepare American citizens for succeeding in a global society, Rhinesmith (1979) stated "[t]he most formidable test of strength of the United States and the American people is whether they will be able to achieve the changes necessary in a way which preserves the peace of the Republic and the best interest of the entire world community" (p.11). McBreen (1992) reported "there appears to be no lack of understanding of

the international trade impact on agriculture, there is considerable recognition of global environmental impacts, and there is a growing awareness of the value for U.S. agriculture of the international agricultural research community's work. Yet, almost no real progress has been made to ensure that graduates of our colleges of agriculture are internationally literate" (p. 253). Foster (1988) revealed, "[o]ur students simply do not have the knowledge base or the cultural experiences to understand and compete in an internationally driven economy. They simply do not understand the world in which they live, causing many to speculate that the average U.S. student is one of the most culturally illiterate in the developed world" (p.2).

According to Crawford (1987a), prior to the 70s the number of agricultural education faculty that were involved in international assignments was small. Moreover, Crawford (1987b), Thummel, McCreight, Welton (1967), Yahaya and Moore (1987) concluded that much of the work involved helping to improve agriculture and education took place outside of the U.S. boarders in the developing countries of the world. Recognizing that very little had been done to internationalize agricultural education programs in the U.S., Moore (1987) challenged the profession to set the record straight and increase its involvement in internationalizing agricultural education programs. In order to assess the extent of international dimensions within undergraduate agricultural education programs throughout the United States, Sabella et al. (1991) reported that a very small percentage of departments were involved in internationalization efforts. Likewise, Martin (1991) assessed and analyzed perceptions regarding the infusion of a global perspective into the curriculum as identified by faculty of the College of Agriculture at Iowa State University and found: 1) the college lacked a global perspective; 2) internationalization of the curriculum was important; 3) global perspectives were incorporated in course work by some faculty utilizing teaching strategies and student learning activities; 4) adding a global perspective to the curriculum is necessary for student development; and 5) respondents felt students lacked an interest in developing an understanding of global perspectives.

At the secondary level, Braun (1987) stated, "a local vocational agriculture program has an obligation to incorporate an understanding of agriculture into its curriculum" (p. 9). Moore (1989), Martin (1990), Emo and Leising (1990) reported earlier internationalization efforts in Michigan, California and work of the National Task Force on International Agriculture assisted greatly in launching U.S. global agricultural education endeavors. Shortly afterwards, the Cooperative Extension Service in Michigan and Extension personnel at North Carolina Agricultural and Technical State University began to globalize program thrusts. Inspired by the 1992 NRC report *Agriculture and the Undergraduate*, land-grant colleges of agriculture across the nation began to give greater attention to global education here at home.

Martin (1989) stated, "[d]evelopment and enhancement of one nation's agricultural system is unavoidably inter-woven with those of other nations. If these developments and inter-relationships are to be successful, it is critical that students of agriculture learn as much possible about systems of agriculture in cultures and societies around the world." A number of program efforts have been initiated over the years to internationalize agricultural education programs and related disciplines, and research on this topic is expected. Prior to addressing the many calls for

internationalizing the discipline, the profession needs to take stock of the research that has examined the internationalization of agricultural education.

Indicating the importance of such a compilation Mannebach, McKenna, and Pfau (1984) declared, "if research and development are to lead the way, we must continually review and evaluate our efforts" (p. 15). Williams (1991), in his "*Dimensions of Agricultural Education*" model further suggested that in order to raise the professional status of agricultural education, there is a need for a collection and codification of what is known about various educational theories that impact agricultural education research and programmatic efforts. Particularly, "we must fully understand the dimension of agricultural education before we can successfully focus our research" (p.8). Thus, "professors must identify studies and evaluate research already done in the fields of interest" (Williams, 1991, p. 19).

A number of researchers have examined various research and publishing aspects in the agricultural education profession. These include: diversity issues in agricultural education (Woods & Moore, 2002); safety issues in agricultural education laboratories (Dyer & Andreasen, 1999); benefits of supervised agricultural experience programs (Dyer & Williams, 1997); a review of subject matter topics researched in agricultural and extension education (Radhakrishna & Xu, 1997); developing a model for supervised agricultural experience program quality (Dyer & Osborne, 1996); participation in supervised agricultural experience programs (Dyer & Osborne, 1995); an empirical analysis of the literature cited in *Journal of Agricultural Education* (Radhakrishna et al., 1994); and the most prominent subjects discussed included empirical analysis of the *Journal of Agricultural Education* during the eighties (Radhakrishna & Jackson, 1992). As these studies indicate, many systematic literature reviews have been conducted to guide the disciplines research focus. However, in light of the growing interest in both programmatic development and research of internationalization, there still exists a need to compile and review research findings addressing the topic.

Purpose/Objectives

The major purpose of this investigation was to determine the scope of research conducted relative to internationalizing agricultural education programs and related disciplines in the U.S. for a 10-year period. In particular, the researchers were interested in examining studies that actually addressed internationalization of programs in the U.S. Objectives established to guide this study were:

1. To synthesize a 10-year period of research related to the internationalization of agricultural education and related disciplines;
2. To identify research deficiencies related to the internationalization of agricultural education and related disciplines; and
3. To recommend future research exploring the internationalization of agricultural education and related disciplines.

Procedures

In order to gather data for this study, the researchers examined the following six sources: 1) *Dissertation Abstracts International* (DAI); *Journal of Agricultural Education* (JAE); 3) *NACTA Journal*: 4) *Proceedings from the National Agricultural Education Research Conference* (NAERC); (5) Journal of International Agricultural and Extension Education (JIAEE); and the Journal of Extension (JOE). Utilizing the library at Michigan State University and the internet, research studies published from January 1992 through December 2001 were secured. Key words used by the researchers in conducting the search included internationalization, globalization, global perspectives, international agriculture, internationalizing programs/curriculum.

The authors reviewed the first 20 studies in a 'pilot test' of the review criteria. The purpose of this pilot test was to test the initial review criteria and assess the degree of inter-rater reliability. Inter-rater reliability refers to the consistency of results when two reviewers use the same data assessment criteria. In comparing the results of the two independent reviews of the pilot test, the authors found that the reviews diverged approximately 10% of the time and agreed 90% of the time. The statistic Cohen's kappa was used to determine if this degree of agreement actually represents reliability in completing the review. The authors calculated the statistic and determined that the statistic fell within the 95% confidence interval representing true reliability of the review process. However, the two reviewers did discuss the disagreements revealed by this analysis and agreed to appropriate interpretations of criteria. After the pilot test was completed, the authors revised the criteria forms and reviewer instructions based on pilot test results. The criteria used in reviewing the articles consisted of examining the title, purpose, findings, and conclusions. Articles were grouped under themes found in the literature and the studies themselves, based upon a consensus by the researchers. To identify areas of convergence, the authors used the conclusions derived from the review and the coding process in concert with a second careful examination of each source.

Findings

The researchers discovered that 47 thesis and papers were published on internationalization initiatives from 1992-2001 in the six agricultural education and related disciplines research sources (Table 1). Table 2 outlines the themes and sub-themes for the 10-year period (1992-2001).

Table 1.
Total number of articles addressing internationalizing areas

Publication/ Year	92	93	94	95	96	97	98	99	00	01	Total
DAI	3	3	-	-	1	-	-	1	-	-	8
JAE	1	2	1	-	1	-	-	-	-	-	5
NACTA	-	2	3	1	-	-	-	1	1	1	9
NAERC(M)	-	-	-	-	-	-	-	1	1	-	2
JIAEE	-	-	3	5	1	1	3	4	1	-	18

JOE	-	-	-	-	1	-	-	1	1	2	5
Total	4	7	7	6	4	1	3	8	4	3	47

Table 2.
Total number of articles addressing internationalizing issues

Internationalization Themes	DAI	JAE	NACTA	NAERC	JIAEE	JOE	Total
Secondary Ed. & Youth							
Agricultural Education	1	1	-	-	1	-	3
FFA and 4-H	-	1	-	-	1	1	3
Educators & Administrators	4	1	-	-	1	-	6
Higher Education							
Students	-	1	7	1	9	-	18
Faculty	1	-	2	-	2	-	5
Administration	2	-	-	-	-	-	2
Extension System	-	1	-	1	4	4	10
Total	8	5	9	2	18	5	47

Secondary Education and Youth: McCracken (1995) indicated that reasons for global instruction in agricultural education included schools were changing, the U.S. and American agriculture is dependent on international trade, students should be prepared for living and working in a global society, and the profession should care about human suffering. Harbstreit and Welton (1992) concluded: 1) high school agriculture student awareness about international agriculture in the areas of agricultural products, agricultural policy, geography, and people and cultures is limited; 2) agriculture students with higher grades poses more knowledge about international agriculture than their counterparts with lower self-reported grades; 3) student awareness about international agriculture increases as advancement is made to the next high school class; and 4) the longer a student is a part of a high school agriculture program and involved with supervised occupational experience, awareness about international agriculture increases. Williams and Moore (1992) investigated the attitudes of selected junior and senior students toward internationalizing agricultural education program (IAEP) initiatives in their respective schools and found that students:1) responded positively toward IAEP; 2) expressed preferences for methods of learning about IAEP; and 3) thought they should receive more instruction on IAEP in their coursework. Lindley (1993) reported that "not many land grant universities have seriously addressed the issues related to the global development of youth." He challenged land-grant universities to "protect, nurture, develop, and refine our greatest resource, the world's youth."

Several studies focused on the integration of international concepts into secondary programs as well as the attitudes of teachers regarding various processes. Hossain and Moore (1992), Hossain, Moore, and Elliot (1995) reported Michigan agriscience teachers expressed favorable attitudes toward making their curriculum more internationally focused. Moreover, teachers were more positive if they held membership in professional societies/organizations, read the Agricultural Education Magazine and newspapers for agricultural information, participated in national seminars, taught certain classes, and lived near large metropolitan areas. According to Battle and Moore (1993), and considering a nearly 95% response rate from African American

agricultural education teachers in North Carolina, the respondents expressed positive attitudes toward making their programs more internationally focused. Ibezim and McCracken (1993) stated the most significant factors contributing to the integration of international agricultural concepts were: 1) utilizing visual materials (slides, video tapes) on international agriculture; 2) attitudes towards integrating international concepts; 3)utilizing basic international agriculture curriculum guides; 4) mass media as most important source of information; and 5) teachers level of formal education. Bell and Christiansen (1999) revealed the forces affecting the improvement and implementation of international agricultural perspectives in the secondary programs of agricultural science in Texas from perspectives of teachers were: knowledge of the perspectives, knowledge gained (by personal initiative, from stakeholders, and from teacher training), personal relevance, and general support from all stakeholders.

In examining the impact of study abroad programs on 4-H youth, Body et al. (2001) revealed that such experiences made participants: 1) more sensitive to other cultures 2) more aware of global events; and 3) more involved in community activities. In light of a number of international youth exchange program models, Ethling (1994) has suggested that during difficult budget times, the profession must have successful program models. If not, it was his opinion that various organizations and institutions supporting these model programs "may eliminate the very programs that provide the long term solutions to the short term economic pressures."

Higher Education: In order to determine the global education curriculum needed in colleges of agriculture, college personnel should have a clear understanding relative to global awareness and understanding of entering students. Radhakrishna and Dominguez (1999) reported data collected over a four year period from junior and senior high school students who attended the Governor School for Agricultural Sciences provided the basis for accelerating curricula changes at both the secondary and college levels. They reported the "governor school scholars possess limited awareness and understanding about international concepts." Based upon faculty efforts at Pennsylvania State University, Etling (1996) outlined 33 recommendations for internationalizing land grant universities. Acker and Scanes (2002; 2000) argued that "the advantages for globalizing programs in research and graduate education greatly outweigh any disadvantages." Duffy, Tones, and Christiansen (1998) stated, "internationalizing of curricula at land-grant universities remains a crucial step in preparing effective natural resource managers." Acker (1999) challenged the profession to think strategically by examining itself in the context of global needs, re-inventing and reforming program thrusts, and collaborating with other entities.

King and Martin (1995, 1994) and King (1991) concluded that faculty are very important in an internationalization effort and the development of a plan and strategy were also important. Kelsey and Dormody (1995) indicated that barriers for faculty participation in international activities were extrinsic in nature and included lack of time, lack of rewards, and lack of language skills. Motivating factors to participate were intrinsic motives and included cognizance, exposition, pay, achievement, and affiliation. Colyer (1993) conducted a study involving Agricultural, Natural Resource Economics in Colleges of Agriculture at land grant universities and a few selected other universities and reported: 1) about one fifth of the departments had substantial international efforts; 2) one fifth had no or very little; and 3) the other three fifths had

some degree. In examining the globalization of the learning environment, Acker and Taylor (2000) stated, "The north central region colleges of agriculture have an impressive array of efforts under way to globalize the learning environment. However, there is considerable variations among the colleges. This variation lend itself to mutually beneficial sharing of experiences and programs ideas among colleges." Schweitzer and Baumgardner (1993) revealed that after teaching six semesters of 'Global Awareness' enrollment had grown, old stereotypes about people and cultures had decreased, and greater understanding of world geography and the human community was built.

Ahmad and Stitt (1992) discovered: 1) graduate students were more knowledgeable than undergraduate students with regard to students location of countries; 2) male students out performed females in crop knowledge; 3) students who had courses in international agriculture scored better than students without courses in international agriculture; and 4) major, age, and travel experiences are not good predictors of countries' location and crops grown for export. In examining college of agriculture and non-college of agriculture undergraduate students knowledge about international agriculture and related factors, Moore, Ingram, and Dhital (1996) concluded: 1) both groups were reasonably knowledgeable about some of the geographic characteristics of Michigan but less knowledgeable about the geographic characteristics of the USA and world; 2) students were reasonably knowledgeable about international agriculture, particularly issues related to the U.S., and less knowledgeable about world agriculture issues; and 3) college of agriculture students were more knowledgeable about international agriculture than the non-college of agriculture students. Redman, Schupp, and Richardson (1999; 1998) reported that having graduating seniors to participate in a series of workshops on international agriculture increased the students' awareness of global agriculture issues, interest in learning more about the subject, and a willingness to work abroad.

Mason et al. (1994) discovered that various majors at the University of Nebraska who enrolled in agronomy courses needed more exposure to international topics and therefore a "crop production in a global market" was instituted in a sophomore-level crop management course as a step to increase international content of the curriculum. Findings from a study by Bruening, Moran, and Averianova (1999) and the impact on U.S. college students as a result of an international experience revealed: 1) the program broadened their ideas, and was a good opportunity to understand another culture; 2) the experience made them more receptive to different ideas and ways of seeing the world; 3) the study abroad experience increased their interest in studying language, and helped them adapt to new situations, and learning was more interesting because of the format used; 4) first and second year university students should not be included in the program; and 5) students developed more tolerance.

Andreasen and Wu (1999) valued utilizing the study abroad program as a capstone course and based upon their study reported, "when learning activities and instructional techniques based upon the principles of experiential learning are applied in the capstone setting, the quality and benefits within these courses are improved." Tritz and Martin (1997) suggested that, "an international experience is a worthy educational tool. However, it must be approached with a clear set of criteria to judge its potential value." Wachenheim (2001) found that using the

internet to expand participation in an international study experience has a number of benefits including: 1) increases awareness and participation; 2) changes how students view their surroundings and activities in which they participate; 3) increases learning; 4) extends the number of participants; and 5) results in a written and visual documentary.

There has been some debate relative to faculty overseas assignments and the impact on college programs. Rogers (1994) stated, "there is evidence that international travel, particularly long term assignments, will increase the international content of courses and that faculty with one or more long term assignments perceive that they are better able to teach their subject matter. Universities and colleges of agriculture seeking to further internationalize their programs should enhance the opportunities for faculty to participate in long term overseas activities." Woods and Miller (1995) indicated that international short-term technical training programs provides the opportunity for facilitating internationalization efforts in two-year college curriculum.

Cooperative Extension in a number of states have attempted to internationalize their respective programs. In light of findings regarding 823 Extension professionals in Ohio, Ludwig (1999) found that over 60 percent of the professionals were interested in internationalizing there programs, but some of the barriers were lack of time, not knowing whether globalizing the program was a high priority in the organization, lack of information and expertise. Based upon another study, Ludwig (1995) revealed that an internationalized U.S. Extension System consisted of:1) clientele understanding of global and national interdependence; 2) programs which emphasize the impact of global events on markets; 3) incorporated global perspectives in program activities; 4) personnel understanding relationships between global issues and the mission of Extension; and 5) an evaluation system that rewards international programming. In order to understand the complexity of global issues, Ludwig (1996) revealed that, "issues that might be initially targeted include human health, the environment, diversity, renewable resources, and the agricultural market." Lev (2001) was of the opinion that an international sabbatical could have a tremendous impact in that he stated, "living in a different culture gets you out of your comfort zone and into a whole new mode of experimentation." As a result of an international experience in Belize, Marsden (2001) commented, "I will resume my Extension responsibilities in the United States with more resolve to reach underserved populations and a little more confidence in my ability to do so."

Stapper and Finley (1993) investigated the perceptions of selected agricultural education administrators regarding the enhancement of international studies and opportunities for students and faculty. They reported: 1) most administrators were not internationally experienced, but expressed an interest in developing expertise in this area, and ultimately teaching and serving as a consultant; 2) the administrators did not speak a foreign language, but valued internationalizing the curriculum, and expressed the need for more internationalization efforts; and 3) insufficient resources for implementing an international requirement at the secondary or post-secondary level. Martin and Elbasher (1994) and Elbasher (1996) discovered that as part of an international young farmer program in Iowa, the respondents expressed an interest in topics related to livestock, crops, and agribusiness education (marketing, pests, and diseases, and new varieties in

other countries); global outreach program; travel abroad program; and skills that will enhance their abilities to compete and function more effectively in the international marketplace.

In order to assess the attitudes of Ohio county leaders, state level agriculture leaders, and metropolitan leaders toward international concepts, Ludwig (1993) stated: 1) the groups general agreed with concepts related to third world development/poverty, international trade, and sensitivity to other cultures; 2) metropolitan leaders exhibited the most positive attitudes while county agriculture leaders held the most negative attitudes; 3) all groups needed education about competing in global markets; and 4) Extension had a role to play in helping clientele understand global issues, global marketing, and the role of agriculture development in third world countries. Place, Andrews, and Crago (2000) reported that the impact of the Polish-American overseas Extension Project included: 1) Extension staff from 26 states with new knowledge, attitudes, and perspectives that raised their status and functioning within Extension and within their communities; 2) family members with new skills and commitments to international development: 3 Extension organizations with greater experience in interacting with international dimension for Extension; 4) community members with increased enthusiasm for international interaction and increased awareness and support for an international dimension within Extension and among citizens and governmental agencies.

Conclusions

Prior to 1989, agricultural education involvement in the international arena was primarily in developing countries. In 1989, the profession made a special effort to globalize agricultural education programs in the U.S. with limited initiatives in the Cooperative Extension. During the mid 1990s, land grant colleges of agriculture began to internationalize their programs. For the most part, in the last ten years, agricultural education and related disciplines have attempted to assess the impact of these globalization efforts. To a large extent, research consists of descriptive studies which focused on awareness, attitudes, perceptions, support, and value of globalization efforts. Collectively, research suggests the following conclusions:

1. Internationalization of agricultural education programs and related disciplines has positive effects on secondary and college students, university personnel and a variety of stakeholders.
2. The internationalization of agricultural education programs and related disciplines has been limited in scope.
3. The internationalization of agricultural education programs and related disciplines is both a response to, and a reflection of, globalization.
4. Teaching and learning in agricultural education and related disciplines now assumes a global classroom: one which connects teachers and learners from a myriad of locations; a classroom which is virtual as well as real; a classroom which makes cultural difference familiar.

Implications and Recommendations

Literature on internationalization of agricultural education programs and related disciplines is clearly needed and represents a gap in our thinking and research. Findings from this study will provide disciplines with a clear understanding of the nature and scope of past internationalization research. Moreover, it will assist various professional groups in clearly identifying a research agenda addressing the internationalization of agricultural education and related disciplines. Future research in this area could answer the following questions:

1. What should be the future role of colleges of agriculture in internationalizing various programs for its stakeholder groups?
2. What, when, where, and how should internationalizing programs be offered for students who have career interests in agriculture and related disciplines.
3. To what extent are the attitudes toward internationalizing programs changing among university personnel and stakeholders?
4. What is the capacity of colleges of agriculture relative to preparing a variety of stakeholder groups for succeeding in a changing global society?
5. How has the focus of internationalizing agricultural education programs and related disciplines changed over time?
6. What are the consequences of the internationalization of agricultural education programs and related disciplines?

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Internationalization of Agricultural Education and Related Disciplines: A Review of Research

Eddie A. Moore and Michael D. Woods

Critique by: Carol A. Conroy, SRI International

Moore and Woods conducted a review of the literature and research on the internationalization of agricultural education and related disciplines. Their goals were to not only describe the trends identified in the literature, but to determine if there were important areas not yet being investigated. This study provides a source of information and recommendations to the field and the authors are to be commended for conducting this timely review of the literature.

The Introduction was well written and would have been enhanced with some more in-depth consideration of the literature. I would envision a more broad discussion of globalization and the impacts on education in the US, followed by a more in-depth treatment of why this study was needed and is important for agricultural education within that broader framework. In other words, what difference does it make whether agricultural educators conduct research in this area or not? How and why does it benefit faculty, staff, extension professionals, and students? How and why does it benefit the collaborating international community? What in the world might change as a result?

The purpose and objectives were well written and clearly stated, as was the Procedures section. I appreciate the care and attention that the authors gave to ensuring the reliability of their review criteria – many of us could learn a lesson from their diligence. These procedures certainly give credibility to their findings.

Identifying major themes for presentation of the findings was helpful and made the paper easy to read and follow. It would have been helpful to identify several sub-themes and incorporate those into the narrative, as well. In general, this section was well written.

The authors provide a set of conclusions that are logically presented, supported by their findings, and compatible with the theme of the paper. The Implications and Recommendations section is also well written and organized well. In this section the authors present a set of questions developed as a result of their study and designed to inform the field regarding needs for research. My only regret is that the authors didn't take the opportunity to put more of "themselves" into a discussion of the relevance and the implications for international work and research in agricultural education and related disciplines.

Developing Fundamental Skills And Knowledge In Preservice Extension Educators: An Internship Approach

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Abstract

The purpose of this study was to determine the fundamental skills and knowledge that graduate students gained through their participation in an Extension Education internship program and their perceptions of the best methods for obtaining these skills. A total of 14 Extension Education interns participated. The data was collected through a series of focus group interviews. A transcript-based analysis was conducted using a phenomenological approach. The study revealed that participants identified interacting with people, preparation skills, communication skills, teamwork skills, and rules and policies during the internship program as skills and knowledge fundamental for beginning Extension Educators. Interns stated that working with people both inside and outside of the office was the skill that they struggled with most in their internship. Interns specifically stated they struggled with being professional in different situations, making connections in the community, and working with an established staff within the Cooperative Extension Service office. Other fundamental skills that interns struggled with during their program involved organization and time management. The interns identified several ways to help future interns gain these skills including sessions at a summer training and intentional exposure to these skills and knowledge areas during the internship program.

Introduction/Theoretical Framework

"The Cooperative Extension System (CES) is a public-funded, non-formal, educational system that links the education and research resources of the United States Department of Agriculture (USDA), land-grant universities, and county administrative units" (Seevers, Graham, Gamon, & Conklin, 1997; p.1). The Smith-Lever Act established the Cooperative Extension Service in 1914 with the intent to create a partnership between the USDA and the land-grant universities (United States Department of Agriculture, 1914). The mission of the Cooperative Extension Service is to enable people to improve their lives and their communities. This mission is fulfilled by providing programs in the areas of agriculture, 4-H/youth, consumer and family sciences, and community development.

Extension Educators are expected to be educated in a variety of different skills and basic knowledge. Today, the minimum education required in order to be employed by the Cooperative Extension Service as an Extension Educator at the county level is a Bachelor's of Science degree. However, many state programs now require a Master's of Science degree. Because the Cooperative Extension Service is strongly centered around Consumer and Family Sciences and Agriculture, it is strongly suggested that individuals pursuing a career in Extension Education

possess a degree in one of these two areas. However, the educational training of Extension Educators now includes degrees in Education or any related area (Seevers et al., 1997).

As a result, some universities and colleges now offer either a Bachelor of Science or a Master of Science degree in Extension Education. The coursework in these programs focuses on the competencies and skills that an Extension Educator needs in order to be successful. According to Seevers et. al. (1997):

> Typical course offerings include program planning, teaching methods, extension philosophy and organization, administration and supervision, program evaluation, adult and non-formal education, youth program development, management of volunteer programs, and trends and issues in extension education. Many undergraduate and graduate programs also provide internships and supervised field experiences to allow the student first-hand experience in the profession (Seevers et. al., 1997, p. 56).

The wide variety of tasks included in the job description for Extension Educators requires certain fundamental skills and knowledge to be successful. Many state Cooperative Extension Service stakeholders develop core competencies for their Extension Educators. These skills include competency in areas such as communication, technology, program planning and implementation, and organizational leadership (The 10 Core Competency Areas for MSU Extension, 2002). In addition, a cluster of skills exists that Hahn (1979) identified as important for Extension personnel to possess. They include commitment to the job, communication skills, interpersonal skills, positive attitude, program development and direction, problem solving, and self-confidence (Hahn, 1979). Whether these core competencies are developed at the national, state, or local level, many of the same areas are consistent and identified as important for Extension Educators to acquire.

Once students graduate and are hired as Extension Educators many state Cooperative Extension Services offer an orientation or training. This training usually covers areas of Cooperative Extension Service philosophy, structure, policies and program development, delivery and evaluation (Seevers et al., 1997). In addition, throughout the career of an Extension Educator, many opportunities are provided for professional development. These opportunities can include: in-service training, participation in professional organizations, personal readings, computer networks, and mentoring programs (Seevers et al., 1997). These training opportunities provide services such as subject-matter training, workshops, seminars, subscriptions to the *Journal of Extension,* and mentoring. These opportunities can help train and keep staff up to date on new information.

Although many different opportunities exist for Extension Educators to participate in training, the training is not always sufficient to meet the needs of the educator. Manton and van Es studied why Extension [Educators] in Illinois resign. They discovered high levels of dissatisfaction with the training that both the current and former Extension Educators received (Manton & van Es, 1985). And, according to a study performed by the Texas Cooperative Extension Service, researchers discovered that most of the employees of the Texas Cooperative Extension Service

articulated they were dissatisfied with the areas of achieving balance, strategic planning, professional development, and employee involvement (Boltes, Lippke & Gregory, 1995).

The theoretical framework for this study was based upon phenomenology. According to Patton, "phenomenological inquiry focuses on the question: 'What is the structure and essence of experience of this phenomenon for these people?' The phenomenon may be…a job. The phenomenon may be a program, an organization, or a culture" (Patton, 1990, p. 69). The phenomenon identified in this study was the Cooperative Extension Service internship program, and the interns' perceptions of experiences that either led to, or hindered, their acquisition of fundamental skills and knowledge important for success as an Extension Educator.

Purpose/Objectives

The purpose of this study was to determine the perceptions of individuals participating in a Cooperative Extension Service internship program towards the acquisition of fundamental skills and knowledge needed in Extension Education. The specific objectives of the study were:

To identify major fundamental skills and knowledge that Cooperative Extension Service Interns gained during an internship program.

To determine participating interns' perceptions for how best to obtain these fundamental skills and knowledge.

Methods/Procedures

This study utilized qualitative research methodology based upon a phenomenological theoretical framework. Focus groups are one of the most utilized qualitative methods. The participants, who usually possess similar characteristics, are asked to reflect on questions from the interviewer and answers from other participants and provide additional comments. Morgan (1988) adds "the hallmark of focus groups is the explicit use of the group interaction to produce data and insights that would be less accessible without the interaction found in a group" (Morgan, 1988, p.12).

The Cooperative Extension Service (CES) of a mid-western state started offering an internship program during the summer of 2000. During the first two years of the program 18 interns participated (three in 2000, and fifteen in 2001). The internship was a paid experience requiring each intern to be immersed in a county CES office for 40 hours a week for a minimum of 10 weeks. To maximize the experience, all interns were expected to participate in activities in each of the four program areas: Agriculture and Natural Resources, Consumer and Family Sciences, 4-H/Youth Development, and Leadership and Community Development. In addition, each intern was required to work on a self-determined project over the course of the summer that would benefit his or her county. The purpose of the self-determined project was to give each intern more comprehensive experience with one specific area of the Cooperative Extension Service.

During the orientation session for the CES internship program in 2001 the interns were informed that a study was being conducted on the internship program and they were asked to participate. A date was selected for focus group data collection that would accommodate all participants. The focus group was scheduled to coincide with the State Fair for ease of data collection since all interns would be present at this event. Because focus groups are best administered with groups between six and eight (Morgan, 1988) two groups were formed. For purposes of selection the interns who worked in counties closest in proximity to the State Fair site were asked to attend a morning session and those who worked further away were asked to participate in an afternoon session. Of the fifteen total interns participating in 2001, fourteen participated in the focus groups.

The intern focus groups took place in August 2001. Two administrators of the study were present for each focus group. One administrator was responsible for administering the questions and the other took notes on flip charts. The room was set up to insure that everyone (participants and administrators) appeared on the videotape, could easily be heard on the audio tape, and could easily see the notes being taken on the flip charts. Research methods used for this study were approved by the Institutional Review Board governing the use of human subjects for research at the institution where the researchers are employed.

At the conclusion of the focus group meetings the audio and video tapes were transcribed and pseudonyms were given to the participants and the counties involved. In addition, transcriptions were coded to ensure confidentiality. Next to each participant's comments in the transcripts the fundamental skill that was discussed was identified. Then, a summary of the paragraph was written to be used later in the analysis. Once all statements were coded, they were analyzed and grouped. A panel of experts in coding qualitative data examined the procedures and made slight modifications to the original coding procedures. The statements were then grouped based upon overall themes, and both focus groups' responses were collapsed into a single case. From there, further analysis was performed to identify themes as fundamental skills and knowledge.

Results/Findings

The first objective of the study was to identify major fundamental skills and knowledge that Cooperative Extension Service interns gained during their internship experience. Each intern was asked to identify five fundamental skills and/or areas of knowledge that they felt they gained during the Cooperative Extension Service Internship Program. The skill most often mentioned was how to work and interact with people. Eighteen responses were coded into this category. Responses included delegating, listening, working with volunteers, and cooperation. Responses in this category also included general respect for the office staff, working with the office staff, listening to others, working with volunteers, working as a member of a team (both in and out of the Cooperative Extension Service office), and communicating with both the office personnel and individuals in the community. Specific responses included:

> *I really learned quite a bit more about interacting with people. I mean, I love being around people but it was just amazing to sit back and watch how each individual*

Educator interacted with people. Some are really accepted by the people around them and what they say is almost as good as gold in that person's eyes. It is interesting because if you have the respect of those in your community, it is amazing what you can get done. You're in with the Chamber of Commerce, with your area plan commission, everybody. You're in with everyone, but if you aren't as respected, you may not be able to achieve as many goals to get activities going (Connor).

Probably one of the most important things that I saw this summer [was] making sure you give everyone the attention they need. If you want to lose volunteers or motivate them not to work just ignore them when they're trying to talk to you or give you ideas (Hailey).

How to work with volunteer., Not just how to work with them, but to recognize when volunteer work is being counter productive and to be able to see when what they're doing is really volunteering help and when it's not. See if it's hurting the program in any way (Emma).

You have to be very careful you don't pit the office against itself. You may have different dynamics in your office. The secretaries don't get along with someone else or whatever, and they may come at you because you're a new ear. Everybody else has heard this story five times or more and so I found this very important just to listen, smile, nod and keep my mouth shut because we're just in that office for three months. I tried to make the transitions of having an intern as smooth as I possibly could for them. I tried not to nose in where I was not wanted and I tried to keep my mouth shut when I learned a little too much information and that sort of thing. You know, you can really create extensive problems in the office if you start adding your two cents worth or you start pitting one person against another (Connor)

The second most important fundamental skill that the interns felt they acquired during the internship program was preparation and program planning. This category received thirteen responses. The responses discussed in this category included preparation, flexibility and organization. Specific responses included:

When it comes to actual work, my educator always said, "Make sure you know how you're going to arrange the room once you get there and start figuring out where you're going to put things and how long it's going to take." That, and just a lot of thought put into it before you get to an actual place of the presentation (Olivia).

I was told on my first day that preparation is the most important part of extension work and the set up of tables and chairs. I mean every place we went we set up tables and chairs. We set up so many table and chairs. You have to know your audience. Also, for pork quality assurance, the whole audience is basically 12 years old. I don't like 12 year olds. They were 12 years old and the book's not really set up for 12 year olds. It's set up for people 25 or something and so they had to sit down and teach it in a different manner. I think that's an important part of preparation, to realize you have a bunch of 4-H kids

who are going to take this class. I never really thought about it. I read this book and thought 'that's pretty good'. When I got there I thought, 'well, I couldn't explain that because I wasn't ready for 12 year olds'. So I think preparation with both material and just the general (Amanda).

Communication was the third most important fundamental skill the interns in the Cooperative Extension Service gained during the internship program. This category received twelve responses. It was emphasized in this category that Extension Educators are communicating with many people in the County, therefore, the Educators need to be able to communicate effectively in order for everyone in the county to understand the intent of statements that were made. For example, how a disciplinary action was handled is included in this category. Specific responses for this category included:

I think communication within the office staff is definitely aided with regular office conferences. I don't know if folks at [the state office at the land grant university] could perhaps require that these host counties have office conferences at least every other week. Something so the interns can sit down with everybody and find out what's going on with the calendar so that the intern can pick and choose some more activities to participate in (Sydney).

[Y]ou communicate with so many people, even with your volunteers. The thing you say is going to reach everyone, honestly, by fair time. Everyone is going to hear what you said so make sure you say it and you say it clearly and you mean to say it (Marcy).

I found out that communication is very important in terms of the office and within the community and within the volunteers, knowing what their role is and getting rewarded for that (Austin).

Teamwork was the fourth most commonly stated fundamental skill interns acquired during the Cooperative Extension Service Internship Program. Teamwork was perceived to be important for interns because they were required to partner with a variety of others in planning and conducting programs. Specific teammates included Extension Educators, volunteers, and community members. Specific responses for this category included:

I learned the importance of cooperation with the Educators, being able to work well with their support staff and with all the many volunteers that makes extension programming possible. Cooperation is very important (Sydney).

I think one of the things that I saw that was most valuable for me was just the amount of teamwork that goes on between the educators. The county that I was in was very meshed between the responsibilities and it just seemed to flow and work really, really well. Since they got along so well, [they] really incorporated the volunteers to do more. Just the personalities and the overall attitude and atmosphere in the office were wonderful (Jordan).

The teamwork thing definitely. Don't be afraid to ask your volunteers for help if you need more help and be sure to stand your ground. (Clarissa).

The fifth most commonly stated fundamental skill or knowledge that the interns perceived they gained in the Cooperative Extension Service Internship Program was an understanding of rules and policies, such as risk management, governing policies, and volunteer management. A specific response in this category was:

I think that the reason I first suggested the rules and polices with this summer, in my county we had a grievance that had to be dealt with. The 4-H council made a decision, the 4-H family [that was involved] didn't like that decision and that decision got brought back to the county extension board. I felt bad for the family that had to be involved in this grievance, but that was probably an excellent learning opportunity for me to realize that these various processes in a grievance are in place. If you have a problem in your future as an educator, you're not just going to have to deal with it yourself. You have your council and your boards and your grievance policies to go with and the extension board was the final say in this grievance. The youth educator presented all the information to me and said, "What would you do?" This was a case study-type exercise for me and as an Extension Educator. I couldn't do a whole lot except present the facts to the extension board for their decision. But I really believe that getting to witness all that was a good learning experience (Sydney).

The second objective of the study was to determine participating interns' perceptions for how best to obtain these fundamental skills and knowledge. For the skill concerning how to work and interact with people, suggestions included role-playing activities to assist in learning how to deal with various types of people, invite past interns to the trainings and discuss their interactions with volunteers, and learn the procedures for working with volunteers (for example understanding the limits of volunteers and how to reward them for their work). Finally, other responses included having a clear definition of what the volunteers are capable of and what to do for disciplinary action when volunteers worked outside the recognized parameters of the program. Specific responses in this category included:

I think it's good that past interns share. I think it's good to hear their stories and their interactions with volunteers. That was nice to hear their stories and it kind of made it more real. It was good (Austin).

Maybe even hypothetical Extension situations could help because everyone could do a hypothetical situation. If it was an Extension Educator situation, maybe one that has happened before and had to be dealt with, when they encounter it at their county then they will think "Oh, this is exactly what they were talking about" (Connor).

Interns had many different ideas on how to best teach preparation and program planning. One suggestion was to utilize past interns to train current interns in the organizational techniques helpful in Extension Education. Also, the use of an internship notebook was suggested in order to help teach and learn organizational skills. Within the internship notebook it was suggested that log sheets could be used to document intern time-on-activity and to keep track of various activities performed throughout the week. A further suggestion included having the CES intern program administrators send out questionnaires periodically to the interns to see if they can identify and accomplish the tasks they need to be doing.

Finally, when discussing overall preparation, interns suggested that a checklist be created of what needs to be done in preparation for a presentation. This would include information about audience demographics, the facilities being used, the materials needed, the specific educational needs of the group, and if any of the material being used required approval by an institutional review board responsible for research using human subjects:

> *I think a good idea is to have a checklist of things you have to do to make sure you ask the people that you're giving the program to, what exactly they want, what age group, how many, that type of thing and how big, what facilities you'll be using. And create [a] checklist (Olivia).*

There were several methods the focus group participants felt that could develop communication skills during the internship program. One suggestion was to have the interns play an active role in teaching a program such as a Junior Leader workshop. It was stated that this would force them to get in front of a large group. Other suggestions included having a communication workshop with the staff in the county office. This would help everyone in the office learn each other's communication styles and help them work more efficiently as a staff. One of the interns stated that they felt a lack of communication with their County Extension Director and a communications workshop could help alleviate communication problems. Lastly, one of the interns suggested that the office personnel have regular office meetings. This could serve to communicate the schedule of activities for all office personnel for that week, hopefully reducing misunderstanding due to communication lapses.

> *Maybe require they play an active role in teaching a workshop or make them get up in front of a large group and do things throughout the summer (Sydney).*

> *I think it would be nice to have a communication workshop with your staff, so all of you can discuss what kind of communication styles everyone has so you can work with the local staff (Olivia)*

When asked how to address teamwork in the Cooperative Extension Service Internship Program to ensure that the interns obtain this skill participants suggested an activity to build teamwork skills could be used at the orientation session at the beginning of the internship program. A specific participant responded to this question by stating:

I think skills should be brought up like this at the intern training. I think that some kind of activities about teamwork obviously, but some type of activities to show the importance of that. Something to effectively get that [message] across (Marcy).

If somehow the staff was brought into it, brought into the training, they looked at this and saw, well, here are the main points we are trying to get across with these interns please try to put them in situations where they're going to see teamwork or something, some type of guideline. Something so you can assure yourself that every intern is going to get good experiences. I know that it would be very hard (Marcy).

It was also suggested to have real-life examples of teamwork presented at the training. Interns suggested that real-life examples make teamwork seem more important and more realistic. It was also suggested that County Extension Directors be utilized in the activities during the training. This idea would give each party a better chance to know each other and the intern would be able to learn how their County Extension Director and the other County Extension Directors in attendance would handle certain situations.

When asked how rules and policies could be addressed in an internship program, the interns suggested the Extension Educators give the intern case studies. An example of such a case study could be how to handle a grievance by one of the parents of a 4-H member before a fair board meeting. A further suggestion was to have a session at the training on rules and policies:

[H]ave a little session about rules because I know you have general rules, but there's also probably rules about the kind of contact you can have with 4-H'ers and make[the interns] sign something. I know you have to sign the adult behavioral expectation form (Alexis).

Conclusions/Recommendations/Implications

The fundamental skills and knowledge that interns perceived they gained through participating in a Cooperative Extension Service Internship program were working with people, preparation and program planning, teamwork, communication, and rules and policies. Of those five areas, three (working with people, teamwork, and communication) can be linked directly to the need to interact with people. Whether it is other Extension Educators, administrators, volunteers, program assistants, or elected officials, it can be concluded that interns realize that a career in extension education is a career in working with people. During the course of the internship, CES interns were immersed in situations that forced them to deal up front with issues involving personal interactions with others. Situations such as working with all office staff and working with volunteers were routine responsibilities for the interns. The nature of the experiences forced interns to work closely with office staff, sometimes being placed in the middle of office politics. More than one intern reported that they were also forced to work within a structure of a team, relying on the County Extension Directors for direction in working with specific educators. Working with so many different personalities allowed the interns to witness first hand the people

skills necessary to work with volunteers and program participants. Interns also discovered the importance of listening to others.

County CES offices are small when considering the number of people employed. This can create situations where conflicts can arise. A number of interns were exposed to inter-office conflict. In addition, interns were exposed to interactions with various volunteers during the internship program. Some interns did not feel confident in their understanding of the roles of volunteers. The interns questioned how much responsibility volunteers have when working with specific programs. They also expressed concern about what the interns' responsibility was when working with the Extension Educator in coordinating the volunteers involved in various programs.

Therefore, it is recommended that interns continue to be immersed in a variety of opportunities to interact with people within the community, specifically volunteers, and the CES office staff. Interns should be included in various activities and meetings with the Extension Educators in order to be exposed to different people and groups within the community. This should be a time when the interns are exposed to the various methods that Extension Educators use to handle difficult situations. In addition, a session on conflict management should be held at the internship training program. Case studies about conflict management should be used as examples. The interns could discuss how they would handle situations. Feedback should be given by program administrators. During this session, a section should also be devoted to discussing how to work in small office settings. Information addressed in this session should include; keeping office information private and working with different personalities. The Extension Educators should use conflicts in the office as teachable moments. This should provide an opportunity for the Educators to discuss with the intern what happened and how it should be handled. And, policies regarding the Educator/Volunteer relationship and workload should be addressed at the beginning of the internship placement.

Intern responses concerning preparation as a fundamental skill indicate they were forced into a schedule requiring organizational skills while participating in the internship program. The interns also had a difficult time balancing their schedules when it came to spending time with all of the Extension Educators and their respective projects. When the interns were organized, they faced times when they had to be flexible because of unexpected issues that arose. Finally, the interns did not perceive they were adequately prepared in the area of program planning.

It is recommended that interns be provided materials to aid them in being organized. Materials that should be utilized include an intern log sheet for the interns to keep meeting dates, project outlines, etc. These log sheets should then be shared with the county and program administrators to make sure the intern is staying on track and utilizing time effectively. In addition, a session at the intern training on program planning should be conducted. At this session, information should be covered to indicate the things that need to be done to be prepared for a meeting. Once the intern is in the county, the Cooperative Extension Director or Extension Educator should work closely with the intern on helping them develop and plan programs.

Statements made by interns concerning communication imply they were confronting situations requiring communication skills on a regular basis. The interns had to communicate with the Extension Educators, the office staff, and members of the community. This also implies that communication skills were not only important for the interoffice working environment but also for presenting to large groups. It is recommended that office staff conduct regular meetings that include the intern and the Extension Educators. During this time the Extension Educators could present their calendars and discuss their expectations for the intern for upcoming activities. This could also be a chance for the Extension Educator and intern to discuss if the intern needs more exposure to a specific program area. Finally, during the office meetings, the intern could discuss any problem or concerns they may have and what progress has been made on their individual projects. It is also recommended that interns have an active role in presenting at least one program during their internship experience. This program could be to any group associated with the county office, such as the Extension Homemakers, Livestock Committees, or 4-H Council.

Statements made by interns regarding teamwork as a fundamental skill indicate they were faced with situations requiring the ability to work together and function as a team. Interns stated they were required to work with Extension Educators, volunteers, and community members on a regular basis pooling their efforts in order for programs to be successful. Therefore, it is recommended that the need for strong teamwork be stressed at the internship training. This emphasis could take the form of activities to help develop teamwork. The Extension Educators and County Extension Directors should be involved in this training so the Educators, Directors, and the interns have an early opportunity to work together and identify how each other works within a group. Finally, past interns could discuss issues where teamwork was critical in the success or failure of specific programs.

Statements made by participating interns suggested that they experienced situations where information on rules and policies was needed and where rules and policies needed to be enforced. This could have been in the form of a formal grievance filed by a parent or a 4-H member, or it could have been working with volunteers and trying to determine specific boundaries of responsibilities when working with the 4-H program. Regardless of the specific situation, it is recommended that formal training on the rules and policies of the Cooperative Extension Service be held. This training could include information on how to work with volunteers, what to do when someone files a grievance and what to do when someone is hurt on the fairgrounds. It is also recommended that County Extension Directors share information with interns concerning the CES rules and polices as stated for their respective office and county. Additionally, in as much as is possible, each time an incident arises requiring knowledge of rules and policies the Extension Educator or County Extension Director should discuss the specific protocol with the intern at the time of the occurrence. Finally, as the interns involved in this study transition into careers with the Cooperative Extension Service it is recommended that a follow-up study be conducted within five years to focus on perceptions of the interns concerning the benefits of the internship program and suggestions for improvement.

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Developing Fundamental Skills and Knowledge in Preservice Extension Educators: An Internship Approach

Bethany E. Mosely and Mark A. Balschweid

Critique by: Carol A. Conroy, SRI International

Mosely and Balschweid are to be commended for undertaking this study to examine the success of a cooperative extension internship program. There are many stressors on cooperative extension in most of the United States, with the need to shift priorities and create collaborations to work with a set of issues and problems not dealt with previously. The extension educator of the 21st century will be prepared and look dramatically different from his/her counterpart of the last century and quality preparation programs will be essential.

The Introduction and Theoretical Framework section was well written and provide a good opening for the paper. It would have been helpful to have additional information on the theory behind the study design – phenomenology—and how the authors used this as they conceptualized their work.

The purpose and objectives were also clearly written, as was the Methods/Procedures section. The authors note that an ideal focus group contains 6-8 persons (Morgan, 1988), yet other sources suggest 15 as easily workable (Schensul and LeCompte, 1999). In addition, more detail is needed as to how or if the participants were divided into groups, and whether there was a formal interview protocol based on a literature review. There is also no mention of use of standard methods for ensuring reliability and validity with qualitative research such as cross-member checks.

The authors have done a good job of sorting and reporting on the specific data as collected. The Results/Findings section was organized somewhat in a "quantitative reporting" mode, which is fine, and would have been enhanced with some of the numerical references presented in a table (or tables) and followed by interpretive discussions of the "meanings behind the words." In other words, what were several key themes that emerged from the data regarding the success or the internship program, or issues as perceived by the participants, and how do those items coincide with the goals of the internship program? Some of this confusion that I had might have been due to formatting; use of some headings and subheadings might have helped with this.

I particularly appreciate the thoroughness with which Mosely and Balschweid developed the Conclusions, Implications and Recommendations section. Their in-depth thoughts really aided meaning to the data reporting. Perhaps calling the "results" the Results and Discussion section would have permitted these great discussions as the data were being presented. At any rate, the authors provide good ideas for using the results of this research to improve programs, and that is what it is all about, after all