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ABSTRACT

The following are among the 42 papers and 8 poster sessions included: "Association of Methodology and Student Learning Style on Student Perception of a Collegiate Leadership Course" (McNulty, Townsend); "Learning Styles and Cognitive Performance of Secondary School Pupils" (Cox, Connors); "Effect of Style-Specific Instruction on Achievement and Satisfaction of Field-Dependent and Field-Independent Learners" (Miller, Honeyman); "Suburbanites' Perceptions about Agriculture" (Thomson); "Attitudes toward Agriculture of Urban Students Enrolled in High School Agricultural Education by Gender and Ethnicity" (Talbert); "Native American High School Student Knowledge and Perception of Agriculture" (Frick, Wilson); "Case Analysis of a Website for an Agricultural Education Course" Terry, Briers); "Assessment of the Introductory Unit of an Applied Environmental Science Curriculum" (Garton, Birkenholz, Thompson); "Learning Styles of Secondary Agriculture Teachers and Students" (Garton, Thompson, Cano); "Perception of Agriculture as a Context for Elementary Science Teaching" (Trexler, Sudvedi); "Computer Integration by Agriculture Teacher Educators" (Miller, Connors); "Science Credit for Agriculture" (Johnson); "Critical Issues Facing Secondary Agricultural Education Programs" (Connors); "Enhancing the Agricultural Communications Curriculum" (Terry); "History of Graduate Programs in Agricultural/Extension Education in the United States" (Key, Oyawiri); "Current Status of Collegiate Agricultural Education Organizations" (Connors); "Subject Matter Topics Researched in Education and Extension Education" (Radhakrishna, Xu); "Method for Determining Equivalence between Science and Education Competencies" (Schmidt, Cox, Elliot); "Utilizing Two Approaches to Identify the Inservice Needs of Beginning Teachers of Agriculture" (Garton, Chung); "Block Scheduling's Impact on Instruction, FFA (Future Farmers of America), and SAE (Supervised Agricultural Experience) in Agricultural Education" (Kirby, Moore, Becton); "New Methodology to Assess Safety Conditions in Agriscience Laboratories" (Melendez et al.); "Influence of Instructors' Computer Proficiency on Achievement and Changes in Student Attitudes in a World Wide Web Based Technical Writing in Agricommunication Course" (Raven, Newman, Day); and "Comparison of Cognitive Performance of Distance and Resident Classroom Agricultural Education Graduate Students" (Jackson, Raven, Newman). (MN)

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Proceedings

1996
National Agricultural Education Research Meeting

"Partnerships for Success Through Research in Agricultural Education"

December 4, 1996
Cincinnati, Ohio

Editors

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Overview and Procedures for Peer Review Process

The National Agricultural Education Research Meeting (NAERM) provides a national forum for research related to agricultural education. The meeting is held annually, usually in early December, in conjunction with the national meetings of related professional organizations. As the selection of the papers for inclusion in the meeting and its proceedings is through a blind peer review process, each of the selected papers has been professionally "refereed."

For the 1996 meeting, there were 88 papers submitted for consideration. A panel of 57 researchers served as reviewers for the papers. Each paper was reviewed and rated by three of the peer researchers from the panel in the blind review process. Each reviewer rated each paper on several professional and research criteria using a numeric rating scale. Additionally, each reviewer indicated their recommendation of whether the paper should be accepted for inclusion in the meeting.

After receiving reviewer ratings for each paper, the papers were rank ordered by numerical rating and acceptance recommendation. The top 36 papers were selected for presentation at the NAERM and inclusion in the meeting proceedings, while the next six papers were selected as alternates for inclusion in the meeting Proceedings. This process resulted in an acceptance rate of 41 percent for papers presented and 48 percent for publication in the Proceedings.

Preface

The theme for the 1996 National Agricultural Education Research Meeting, "*Partnerships for Success Through Research in Agricultural Education*," was inspired by the 1996 theme for the annual meeting of the AVA. Upon reflection on this theme, one realizes that continued success in agricultural education is highly dependent on strong partnerships among the various groups which constitute the profession. Research for the future of the profession is a critical component of that partnership.

The annual National Agricultural Education Research Meeting was established in 1974 as a means to communicate critical research in the profession in a timely and efficient manner. Publication of the Proceedings enhances that goal and provides for distribution of the research across the profession. A new addition to the Proceedings for 1996 is the inclusion of the abstracts of the Poster Session conducted by the American Association for Agricultural Education in conjunction with the national professional meetings in agricultural education. It is hoped that NAERM participants will find this a helpful addition.

The following individuals were instrumental in the success of the National Agricultural Education Research Meeting since its inception:

NAERM Chair, Institution	Year	Location of NAERM
Hollie Thomas, Florida State University	1974	New Orleans, LA
Hollie Thomas, Florida State University	1975	Anaheim, CA
Glen Shinn, Mississippi State University	1976	Houston, TX
William Richardson, Purdue University	1977	Atlantic City, NJ
Bennie Byler, Mississippi State University	1978	Dallas, TX
Ronald Brown, Mississippi State University	1979	Anaheim, CA
L.H. Newcomb, The Ohio State University	1980	New Orleans, LA
Maynard Iverson, North Carolina State University	1981	Atlanta, GA
Dale Oliver, Virginia Tech State University	1982	St. Louis, MO
Paul R. Vaughn, New Mexico State University	1983	Anaheim CA
Jimmy Cheek, University of Florida	1984	New Orleans, LA
Bob Stewart, University of Missouri	1985	Atlanta, GA
Alan A. Kahler, Iowa State University	1986	Dallas, TX
Alfred J. Mannebach, University of Connecticut	1987	Las Vegas, NV
Edgar. P. Yoder, Pennsylvania State University	1988	St. Louis, MO
Michael F. Burnett, Louisiana State University	1989	Orlando, FL
Robert A. Martin, Iowa State University	1990	Cincinnati, OH
Larry R. Arrington, University of Florida	1991	Los Angeles, CA
John P. Mundt, University of Idaho	1992	St. Louis, MO
Dennis Scanlon, The Pennsylvania State University Thomas H. Bruening, The Pennsylvania State University	1993	Nashville, TN
David E. Lawver, Texas Tech University Robert Terry, Jr., Texas A & M University	1994	Dallas, TX
Leon G. Schumacher, University of Missouri Robert J. Birkenholz, University of Missouri	1995	Denver, CO

Acknowledgments

The National Agricultural Education Research Meeting requires the efforts of hundreds of individuals. Most notable among these are the paper reviewers, paper discussants, session chairs, and session facilitators, as well as each of the paper authors who submitted their work for consideration. Appreciation is extended to each of these individuals.

The 1996 Co-Chairs would also like to acknowledge those among the faculty and staff of the Department of Agricultural and Extension Education at the University of Arkansas who directly supported or assisted in the work of preparing for NAERM.

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1996 Papers Presented

1996 Papers Published - Alternates for Presentation

THE ASSOCIATION OF METHODOLOGY AND STUDENT LEARNING STYLE ON STUDENT PERCEPTION OF A COLLEGIATE LEADERSHIP COURSE

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Introduction and Theoretical Framework

Leadership education has a rich history in the Departments of Agricultural Education throughout the United States. Unlike most leadership educators who began leadership programs after World War II, agricultural educators have been teaching leadership since the early 1900s. Education to prepare leaders in 4-H and FFA have been in place for most of the century. Over time, the objectives of leadership education have broadened to include adults as well as youth. College courses have been developed to appeal to larger audiences and programs for adults have been organized.

Leadership is of particular interest to other groups including those working with university undergraduates through activities such as residence hall programs, curriculum clubs, and university government. Residence Hall Advisors, student organization advisors, and others involved with students observe, on a regular basis, leaders who are both ineffective and effective. These leadership observers may be curious to ascertain why certain people follow someone to the "ends of the earth," while other people do not even begin the trip. Were the successful leaders endowed with great traits at birth or did they learn these skills? How can leaders be nurtured, trained, or inspired?

It is critical, then, to discover if leadership can be taught and, if it can, to ascertain the best methodologies for leadership education. According to Warren Bennis (1989, 1), "the study of leadership isn't nearly as exact as, say, the study of chemistry. For one thing, the social world isn't nearly as orderly as the physical world, nor is it as susceptible to rules. For another, people, unlike solids, fluids, and gases, are anything but uniform and anything but predictable" (Bennis, 1989, 1). Although difficult, Bennis and others support the notion that leadership can, in fact, be taught (Bennis, 1989; Bass, 1990; Kouzes and Posner, 1987; Cohen, 1990; Dodson, 1995; Cummins, 1995).

Since leadership programs existed and factions agreed that leadership could be taught, it was critical to define the components of successful teaching and learning aspects of leadership education. Understanding the learners was a part of the leadership education equation that required investigation. Discovery of how a student learned could impact the success of leadership education. Therefore, awareness of a student's learning style was a component in the creation of the optimal leadership learning situation.

Learning style was defined as that consistent pattern of behavior and performance by which an individual approaches an educational experience (Messick, 1970). Students and teachers should understand their style of learning and the implications that come with each learning style. This knowledge would help explain why students excelled in some classes and failed in others. Frequently, students blamed a professor for students' lack of understanding of the subject matter. However, the situation may have been that the student's learning style and the professor's teaching style did not match. This incongruency could cause the student to become frustrated, reduce their motivational level, or fail.

A review of literature suggested that two learning styles gained prominence in the field of education. The two learning styles identified were: Kolb's learning style based on Lewin's cycle of experiential learning and Witkin's learning style based on the field-dependence/independence dimension. In 1976, Kolb developed his original version of the Learning Style Inventory (LSI) to measure individual learning styles derived from the experiential learning theory. Kolb (1976) identified the four learning abilities as Concrete Experience (CE), Reflective Observation (RO), Abstract Conceptualization (AC), and Active Experimentation (AE). Witkin, often called the father of learning styles (Kirby, 1979), whose work was the most extensive and in-depth research on the cognitive (learning) styles conducted in the last 50 years (Garger & Guild, 1984), focused on the field-dependent and field-independent dimensions of learning styles. These dimensions had the widest application to educational problems (Witkin, 1976).

Coupled with the concern for how students learn was the need to utilize appropriate teaching methodologies. Many studies had been conducted that compared the effectiveness of learning resulting from simulations versus other instructional methods, particularly cases (Miles, Biggs, & Schubert, 1986). The merits of experiential education were positive to several educational researchers (Newman, 1985; Boyer, 1987). Frequently, discussions on the effectiveness of various techniques compared the hands-on techniques of experiential learning and business simulation to the more traditional case methodology (Whiteley & Faria, 1989) and lectures (Van Eynde & Spencer, 1988).

From the investigation of the literature, it was determined that much research in the area of learning styles and the effectiveness of instructional methodologies had been completed but no studies had been conducted to this point combing these two aspects in the area of leadership education. By investigating a course in leadership, the researcher had an opportunity to research a population who was studying a course that included lecture, discussion, simulation activity, role play, and other methods of instruction. Students were studied to better understand how those with various learning styles responded to the different methods of instruction used in leadership education.

Purpose of the Study and Objectives

The purpose of this study was to compare the efficacy of various instructional methodologies between field-independent and field-dependent students in a collegiate leadership course. The following objectives addressed in this study sought to determine:

1. the learning style of the students.
2. the relationship between perceived effectiveness of specific instructional methodologies and student's age, gender, ethnicity, and student's learning style.
3. the relationship between student's perceived facilitation effectiveness and students' perceived real world application for the various instructional methodologies.

Based on the purposes and objectives of this study, three hypotheses were formulated. The following research hypotheses were established and tested statistically:

H_1 = There is a negative correlation between learning style score and perceived effectiveness of high involvement activities.

H_2 = There is a difference in learning style between gender types.

H_3 = There is a difference in students' perception of facilitation effectiveness and real world application.

Methods and Procedures

The design of this research was an ex-post facto design, with both correlational and causal-comparative elements. For this design, **X** = Treatment: participation in leadership instructional methodologies, $\mathbf{O_1}$ = GEFT Score, $\mathbf{O_2}$ = activity evaluation scores, and $\mathbf{O_3}$ = selected demographics (age, gender, ethnicity).

$$\begin{array}{ll} \mathbf{X} & \mathbf{O_1} \\ & \mathbf{O_2} \\ & \mathbf{O_3} \end{array}$$

Ex Post Facto Correlational Design

The population for this study was students who enroll in a collegiate leadership course for which they receive academic credit. The sample for this study consisted of subjects who registered for an academic and credited leadership course conducted by a major university during the Fall Semester, 1995. Although normally considered a population, this group was treated as a Time/Place sample. Inferential statistics were used to analyze the responses of this Time/Place sample as this sample of students was similar to typical students who register for collegiate leadership courses. Before each instrument was administered, the subjects were informed of the intent to collect data from the leadership course students. Subjects were informed of their rights in accordance with the guidelines of the Institutional Review Board of the institution (National Commission for the Protection of Human Subjects of Biomedical and Behavioral Research, April 18, 1979). The data collection period encompassed eight weeks of the Fall Semester, 1995. 53 students completed both instruments used in the study. Some students chose not to participate, which was their right. Other students did not participate because they were absent on one of the days that the instruments were administered. Therefore the response rate for this study was 44.50%. Respondents were compared with non-respondents according to their score on the GEFT. The non-respondents' GEFT mean was 12.46 as compared to 13.11 for the respondents. An independent t-value of -.71 (p = .47) showed that there was no difference between these two groups.

Two instruments were used in this study. The first instrument, Group Embedded Figures Test (GEFT), was developed by Witkin, et al. (1971). The GEFT score was a measure of the extent to which individuals were able to overcome effects of distracting background elements as they attempted to disembed a simple geometric figure (Dembo, 1988). The more independent the individual was of the distracting elements, the more analytical, or field-independent the person was. The more dependent on or incapable of ignoring the distracting elements, the more global, or field-dependent the person was. Because the GEFT was a speed test, internal consistency was measured by treating each scored section as split-halves. Witkin, et al. (1971, pg. 28) reported a corrected Spearman-Brown reliability coefficient of .82 on the GEFT for males and females combined. This reliability coefficient was considered acceptable for the instrument to be utilized for this study.

The Activity Evaluation Instrument was an evaluation questionnaire developed by the researcher. This instrument was based on the standard university class evaluation instrument used to evaluate all classes at the institution. This instrument was given to a panel of experts to be analyzed for content validity. The instrument employed a Likert-type scale to ascertain the subjects' perceptions regarding instructional methodologies utilized in the leadership class.

The instructional methodologies used for this study (and the course) were based on the theory that simulations and active methods were successful in leadership education. The specific methods were selected from numerous sources and were activities that had been used for 3-4 years in the course (McNulty, 1996). The methodologies were analyzed for student involvement by a panel of experts and were categorized as follows:

High Student Involvement Methodologies

Murder one- Student groups decide who is the suspect to be arrested. Goals are to demonstrate the need for information sharing in a task-oriented group.
Pins & straws- Groups build a sculpture which will be judged for strength, height, and design. Group leaders use one of the four assigned leadership styles.
Toxic waste- The object of this activity is to use the supplied materials to get a canister of toxic waste (water) out of the center of a circle to demonstrate group development.
Unequal resources- The object of this activity is for groups to complete certain tasks correctly, using the resources which have been distributed unequally.
Win as much as you can- Competition/collaboration game where teams compete or collaborate to earn points. Students to experience the impact of trust on team success.

Medium Student Involvement Methodologies

A good leader is- On index cards, students finish the statement "A Good Leader Is..." Then the students are asked to turn in their index cards and break into discussion groups.
Bricks- Students are given the scenario that they are stranded on a deserted island for two weeks with 2000 bricks. They are to brainstorm on different and creative uses for the bricks.
Maytown in-basket- A case study in which students are to play the part of the director of a governmental agency.
Values, goals & potential- Students answer a list of questions that will help increase their self-understanding and self-awareness of their values, goals, and individual potential.

Low Student Involvement Methodologies

Abilene paradox- A video narrated by Jerry B. Harvey. He introduces the leadership situation in which group decision making breaks down due to failure to manage agreement.
Lead self- A questionnaire asking students how they would act in each of the 12 different leadership scenarios. Based on the students answers, a preferred leadership style is identified.
Satisfaction survey- A questionnaire based on Maslow's hierarchy of motivational needs.
The business of paradigms- A video narrated by Joel Barker, who introduces viewers to paradigms and illustrates how paradigms effect our lives.
Workteams and the wizard of oz- A video narrated by Ken Blanchard discussing the seven keys to effective teamwork using the film, Wizard of Oz, for examples of each of the keys.

Results and Findings

The first objective of this study was to determine the learning styles of the students in the sample. 26.4% of the students scored between 3-10 on the GEFT. These students were characterized as being Field-dependent. According to Torres (1991), students could be characterized as Field-neutral and in this study 15% of the students were Field-neutral. The largest number of students (58.5%) were characterized as Field-independent. In relation to this objective and the second hypothesis, each activity perception score was compared by gender to ascertain the difference in scores between men and women. There were no statistically significant differences on any activity perception score between the genders. Men and women had the same perceptions of the effectiveness of each activity.

The second objective was to investigate the relationship between perceived effectiveness of specific instructional methodologies and student's age, gender, ethnicity, and student's learning style. There were no statistically significant relationships between perceived effectiveness of an instructional methodology and student's age. There were no statistically significant relationships between perceived effectiveness of an instructional methodology and the GEFT among the high and medium-involvement activities. There was, however, a slightly positive relationship (r=.28) found between the low involvement activity, Wizard of Oz Video, and the GEFT. See Table 1. For this relationship, the higher the GEFT score (toward field-independent), the higher the effectiveness rating by students.

Table 2 illustrates that there was a significant difference between ethnic groups in relationship to the medium involvement activity Values, Goals, and Potential. The non-white group rated the activity statistically significantly lower in its effectiveness than the white group. There were no statistically significant differences found between ethnic groups as compared to perceptions of effectiveness of the high and low-involvement activities. There were no statistically significant differences found between females and males as related to their perceived effectiveness of the activities.

Table 1.
Pearson Product Moment Correlation Coefficients Between GEFT and Activity Evaluation: Low Involvement Activities

	GEFT	
Activity	r	p
Situational Leadership Questionnaire	-.02	.89
Maslow's Questionnaire	-.02	.44
Lecture	-.03	.82
Wizard of Oz Video	.28	.04*
Paradigms Video	-.05	.74
Abilene Paradox Video	-.16	.27

Note: * indicates a statistically significant difference

Table 2
Analysis of Variance Measuring Activity Evaluation and Ethnicity: Medium Involvement Activities

	Mean Score by Ethnicity[1]			
Activity	Whites N=39	Non-Whites N=5	F	Prob
Bricks	21.86[b]	20.20[b]	.36	.55
Values, Goals, and Potential	21.97[c]	14.20[b]	7.03	.01*
Maytown	23.43[b]	21.20[b]	1.03	.31
A Good Leader Is...	20.85[b]	24.00[b]	1.16	.29

Note.[1] Means having letter designations in common are not significantly different at the .05 level. Means were adjusted for missing values. Scores based on 4 questions which were summed from the original responses: 1=Not Applicable, 2=Do Not Remember Activity, 3=Strongly Disagree, 4=Disagree, 5=Neutral, 6=Agree, 7=Strongly Agree. [2*] indicates a statistically significant difference.

Objective Three was to investigate the relationship between student's perceived facilitation effectiveness and students' perceived real world application. There was one statistically significant difference between the students' perception of the facilitation and their ability to see the real world applications of the high-involvement activities. The activity was Pins & Straws. See Table 3.

Table 3.
t-Test for Paired Samples: High-Involvement Activities

Activity	Number of Pairs	Corr	Mean[1]	SD	t-value	Prob[2]
Pins & Straws						
Facilitation			6.13	1.07		
	53	.69			3.34	<.01*
Real World			5.73	1.13		
Toxic Waste						
Facilitation			5.85	1.55		
	53	.81			.44	.66
Real World			5.79	1.47		
Win As Much As You Can						
Facilitation			5.51	1.79		
	53	.73			-1.07	.29
Real World			5.70	1.69		
Unequal Resources						
Facilitation			5.71	1.62		
	52	.88			.00	.55
Real World			5.71	1.56		
Murder One						
Facilitation			5.90	1.69		
	53	.91			60	.55
Real World			5.85	1.66		

Note: [1] Means were adjusted for missing values. [2] * indicates a statistically significant difference

Students rated the facilitation effectiveness higher than their rating as to the activity's application to the real world. There were two medium-involvement activities which had a statistically significant difference between the student's perceptions. The activities were Values, Goals, and Potential and A Good Leader is.... Students rated the facilitation effectiveness higher than their rating as to the activity's application to the real world. The results of this analysis are illustrated in Table 4.

There were two low-involvement activities which had a statistically significant difference. These activities were the Situational Leadership Questionnaire, and the Wizard of Oz Video. For each of these activities, students rated the facilitation effectiveness higher than their rating as to the activity's application to the real world. See Table 5.

Table 4.
t-Test for Paired Samples: Medium-Involvement Activities

Activity	Number of Pairs	Corr	Mean[1]	SD	t-value	Prob[2]
Bricks						
Facilitation			5.78	1.47		
	51	.83			1.95	.06
Real World			5.55	1.46		
Values, Goals & Potential						
Facilitation			5.46	1.75		
	52	.82			2.26	.03*
Real World			5.13	1.77		
Maytown						
Facilitation			5.87	1.47		
	53	.86			.90	.37
Real World			5.77	1.41		
A Good Leader is...						
Facilitation			5.66	1.56		
	53	.92			3.62	<.01*
Real World			5.36	1.49		

Note: [1]Means were adjusted for missing values. [2]* indicates a statistically significant difference.

Table 5.
t-Test for Paired Samples: Low-Involvement Activities

Activity	Number of Pairs	Corr	Mean[1]	SD	t-value	Prob[2]
Situational Leadership Questionnaire						
Facilitation			5.06	2.00		
	53	.86			2.02	.05*
Real World			4.89	1.91		
Maslow's Questionnaire						
Facilitation			5.21	1.84		
	52	.89			.84	.40
Real World			5.11	1.72		
Lecture						
Facilitation			6.54	.67		
	52	.63			-1.30	.20
Real World			6.63	.56		
Wizard of Oz Video						
Facilitation			5.44	1.90		
	50	.89			2.16	.04*
Real World			5.18	1.75		
Paradigms Video						
Facilitation			5.21	2.00		
	52	.89			1.67	.10
Real World			5.00	1.95		
Abilene Paradox Video						
Facilitation			5.72	1.43		
	51	.89			-.21	.84
Real World			5.74	1.47		

Note: [1] Means were adjusted for missing values. [2] * indicates a statistically significant difference

Conclusions

The conclusions for this study are based on the findings related to the purposes of the study and the theoretical base established in the review of literature. Little empirical research has been completed in regard to learning styles and methodology in a collegiate leadership class. This study revealed several interesting findings in relationship to this subject.

Reject H_1: There is a negative correlation between learning style score and perceived effectiveness of high-involvement activities. A low GEFT score would indicate a field-dependent learner. A high effectiveness activity score would indicate that the student was comfortable with interactive activity -- a trait of field-dependence (Witkin & Goodenough, 1981). In contrast, this study found no relationship between learning style and perceived activity effectiveness. However, there was a statistically significant positive relationship between the GEFT and a low involvement activity (Wizard of Oz Video). Therefore, it was concluded that students, regardless of learning style, perceived certain leadership activities as effective and others as not being effective.

Reject H_2: There is a difference in learning style between gender types. This study found that females were field-independent (GEFT mean = 13.04) and so were the males (GEFT mean = 13.17). There was no statistically significant differences between the genders. This result differed from what Witkin (1976) found. He stated that women, on the average, tended to be more field-dependent than men. Therefore, it appeared that teachers of collegiate leadership courses should realize that students, by gender, are more alike in their learning styles then they are different. An instructor need not teach females differently than males in a collegiate leadership class.

Accept H_3: There is a difference in students' perception of facilitation effectiveness and real world application for particular instructional methodologies. This study showed that there were some statistically significant differences between the students' perception of facilitation effectiveness and real world application. Where statistically significant differences occurred, the facilitation effectiveness was rated higher than real world application. A major part of effective facilitation was to debrief the students at the end of the activity and discuss how this activity mirrored the "real world." According to Sprect & Sandlin (1991), testing the principles learned by applying them to new situations was often eliminated from a classroom application because of time constraints.

Recommendations for Practice

The results of this study had implications for leadership educators. First, males and females who enroll in collegiate leadership courses are field-independent learners. As learners, they are analytical and learn well on their own without social interaction. In the leadership class, however, all of the students responded positively to the effectiveness of the instructional methodologies. Additionally, it was shown in this study that age and gender were not a factor in student perceptions of activity effectiveness. Therefore, leadership educators may plan their instructional methodologies with reduced sensitivity to learning style, age, and gender differences.

A second result from this study indicated that there is a difference between whites and non-whites in the effectiveness ratings of certain instructional methodologies. Specifically, the non-white group rated a goal-setting exercise lower than the white group. It is critical that leadership educators become sensitive to differences in cultures when developing instructional methodologies. The results of this study indicate a different goal-setting exercise be implemented to gain effectiveness across ethnicities.

Finally, the results from this study indicate a need for instructor-training in facilitation skills. The educators in this study were effective, according to the students, in delivering quality instruction. However, a critical aspect of leadership education is applying classroom-developed skills to real leadership situations and differences, in this study, indicated the application aspect lower than the classroom effectiveness. Therefore, for successful leadership education, instructors need training in application techniques. Interestingly, according to previous learning style research, field-independent students should have been able to relate classroom-developed skills to real world applications easier than field-dependent students. However, there were no differences by learning style; both styles rated the methods the same. Both field-dependent and field-independent students had difficulty in real world application for certain methodologies.

Recommendations for Additional Research

The completion of this study left some questions unanswered and uncovered some new possibilities. These unanswered questions suggest topics for additional research as follows:

1. Why are most collegiate leadership education students field-independent? Are they different from other college students as earlier research indicates? A study should be conducted to ascertain if students who elect leadership courses are different from other students.
2. Does the application of the classroom-developed leadership skills become more apparent when students have experienced real leadership situations? It is recommended that follow-up studies be performed on leadership students in this study to determine how the application effectiveness of learned leadership is effected time and experience.
3. Do cultures and ethnic groups view leadership differently? Are some leadership instructional methodologies inappropriate or more appropriate for different groups? How does one's background and previous education effect response to leadership education? To answer these questions, the relationship between ethnicity and methodology should be investigated. Especially, since the sample in this study lacked extensive diversity, due to the institution's population, more study is needed to answer questions concerning ethnicity, culture, and leadership education.

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THE ASSOCIATION OF METHODODOLOGY AND STUDENT LEARNING STYLE ON STUDENT PERCEPTION OF A COLLEGIATE LEADERSHIP COURSE

Discussant Remarks
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The researchers provided an extensive theoretical framework for leadership education and for learning style research. They were clear in formulating their objectives and hypotheses and the designed used in study.

The researchers were through in their description of the procedures used. The researchers provided a good rationale for using the students as a Time/Place sample to explain their use of inferential statistics. The use of standardized instruments in addition to researcher developed instruments strengthened the study. The methodologies used as factors at the various levels of involvement were clearly identified. The findings in the study were appropriately presented and clear.

The recommendations for practice section was one of the strengths of the study. To often we present findings and leave the reader to figure out what to do with them. The authors of this study provided specific recommendations to leadership educators in the use of the methodologies in classes. The researchers' recommendation on instructor facilitating skills was warranted according to the study and should provide some area for discussion among those who teach leadership courses.

It is difficult to find areas of improvement needed in this study. The authors raise questions for further research that deserve discussion. Is there research already completed in other disciplines that could be reviewed and find adequate answers to many of these questions? Are students in agricultural disciplines and students of leadership different enough from other populations to warrant further research? The authors suggested following up the course participants to determine if their perceptions of the use of the information presented in the class translate to the real world. To often we provide leadership education at all levels and then guess at the use students make of the information. It would be interesting to see if the learning styles make a difference in later real world application.

The study was well grounded and well presented. The information should be of value to those involved in teaching leadership development on all levels.

LEARNING STYLES AND COGNITIVE PERFORMANCE OF SECONDARY SCHOOL PUPILS

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Introduction/Theoretical Framework

Formal vocational education in agriculture, as taught in public schools in America, has survived a recent metamorphosis and emerged as a viable, science-based, instructional program in public schools. Increased emphasis upon the science of agriculture and its applications through biotechnology has solidified agricultural education's position in the curricula of many school districts in the United States. Agricultural education today is far different than it was even five years ago.

The predominant mode of instruction in vocational education in agriculture formerly employed methodologies based upon the demonstration method of teaching and "hands-on" practice on the part of pupils. Not all instruction, but certainly a large portion of instructional modalities utilized by teachers of agriculture employed this strategy. Such instructional modality has been employed based upon two general premises of the program in vocational education in agriculture. The first premise was curricular; most of the content of the curriculum was psychomotor in nature, that is, the development of specific skills associated with entry level employment in an agricultural occupation. The second premise was pedagogical; the teachers were taught using similar modes of instruction and therefore they used those same instructional modalities in their teaching. This is a common occurrence in teacher education, that is, students (potential teachers) mimic those instructional modalities modeled by teachers and teacher educators.

This emphasis upon "hands-on" teaching and learning, as it became known, is a historic hallmark of vocational education in agriculture known formerly as vocational agriculture. It is clear that such a predominant "teaching style" was (and still is) widely used due to the traditional curricular modality as well as the modeling done by teacher education.

However, as programs of agricultural education modernize curricular modalities, enroll non-traditional students, increase emphasis upon scientific applications in agriculture, and de-emphasize selected traditional psychomotor and manipulative activities, instructional modalities must also be enhanced. Agricultural education recently adopted a broadened mission which encompasses instruction in agricultural science and technology as well as agricultural literacy. Implicit in meeting this broadened mission is the utilization of curricular materials of a scientific nature, as well as serving a more academically diverse group of students who, in all likelihood, may not be best served by traditional instructional and curricular modalities.

Intuitively, it could be surmised that if a teacher recognizes as the pupil population becomes more diverse, and curricular materials emphasizing scientific concepts and applications are utilized, previously used instructional and curricular approaches may not be as effective. It could also be surmised, that decreased pupil academic achievement may result from a lack of appropriate teaching methods or inappropriate curriculum content selection. This may be more easily recognized than corrected by the teacher. If such a situation exists, it must be the responsibility of a teacher to modify curriculum content or attempt other teaching techniques rather than to expect pupils to adapt their learning to "fit" the teacher.

An area of research in education, which deals with learning styles and teaching, has received attention by researchers and practitioners in agricultural education. Research has indicated that students, irrespective of age, gender, socioeconomic status, or intelligence, learn differently. This difference in the way students learn has been termed learning style. Some learning style factors may change as students develop over time, yet other characteristics remain fairly constant and affect the academic achievement of individual students. Preliminary investigations indicate that certain instructional modes and resources (curriculum modes), and programs may complement certain learning styles. By matching instructional modalities, curricular modalities, and programs to learning styles, academic achievement may increase. Several studies have been conducted which focus on the relationships between learning styles and teaching styles (Cano & Garton, 1994; Whittington & Raven, 1995). Little research has been reported which attempted to analyze other aspects of academic achievement, such as curricular modality and its relationship to learning style, particularly with secondary school pupils in agricultural education.

The purpose of this study focused on student cognitive performance in a specific curricular modality and its relationship to learning styles of students in agricultural science. Utilization and application of learning styles in the educational process is relatively new, and in vocational education, very recent. Learning styles have been described as the way each person absorbs and retains information and/or skills (Dunn, 1984) and as stable and pervasive characteristics of an individual, expressed through the interaction of one's behavior and personality as one approaches a learning task (Garger & Guild, 1984).

Several techniques have been developed to identify, analyze, and interpret student learning styles (Dunn & Dunn, 1978; Kendall & Sproles, 1986; Gregorc, 1982; Kolb, 1976, 1984). Additionally, several studies have been reported which utilized measures of cognitive performance to assess utilization of higher order mental abilities (Chance, 1981; Lochead, 1981; Newcomb & Trefz, 1987; Pickford, 1988; Cano, 1988; Rollins et. al., 1988). These studies generally indicate that most students show little evidence of using higher order mental abilities, and in fact function as "concrete" learners. Findings such as these, are consistent with results of the pioneering work in the area of learning styles in vocational education as reported by Kendall and Sproles (1986). In their study, six learning styles were identified as characteristic of vocational home economics education students. The Kendall and Sproles study was extended and replicated with a larger, more diverse sample of students in vocational education in agriculture (Sproles, Cox & Sproles, 1987). Results of both studies were consistent. A study designed to identify factors associated with variations in learning styles (Cox, Sproles & Sproles, 1988) became a pivotal piece of research in this area within agricultural education.

Subsequently, several studies in agricultural education have been reported which examined a variety of aspects of learning styles. These studies have predominately dealt with preservice teacher education candidates in agricultural education. The majority of these studies utilized the Group Embedded Figures Test, termed GEFT (Oltman, Raskin, & Witkin, 1971). This assessment of learning style has been extensively used in agricultural education (Cano et.al., 1992; Cano & Garton,1994; Marrison & Frick, 1994; Torres &Cano, 1994) and is widely accepted for such purposes.

The GEFT is an instrument which identifies preferred learning style by clustering subjects into two categories; field dependent or field independent learners, using a simple figure embedded in a more complex figure. Field dependent learners, as identified by the GEFT, tend to perceive their environment globally. They are usually socially oriented, learn best in group settings, and perceive material in a social context. These learners typically require externally defined goals and do best when provided an organizational framework. Such pupils usually need guidance in problem-solving learning. Field independent learners typically take a more analytical world view. They excel in self structured environments, and usually are more subject matter/technically oriented. These pupils place emphasis on cognitive and analytical/problem solving aspects of learning.

Little research in learning styles has been done using secondary school students in agricultural education with application and utilization of learning style assessment in making direct educational decisions relative to instructional modality.

Purpose/Objectives

This study was to assess the relationship between learning styles of students and cognitive performance utilizing a prescribed curricular modality.

Objectives

1. To determine subjects' cognitive performance on a criterion referenced unit evaluation instrument.
2. To determine if differences exist between cognitive performance and learning style of subjects.

Methods/Procedures

Population and sample

This study used purposeful sampling techniques with a one-group, post-test only design. The population was all secondary school freshmen and sophomore students enrolled in agricultural education in the state. The target population was all secondary school freshmen and sophomore agricultural education students from schools in which the teacher volunteered participation. The sampling unit was students, and the sample size was 375 individuals from 18 different schools. A final sample of 323 subjects completed this study and took both the GEFT and the unit evaluation instrument. The researchers contacted all teachers of agriculture in the state to request their participation. From those who volunteered, participants were purposefully selected in an attempt to obtain a variety of schools based upon factors such as school size, rural/urban location, ethnic diversity, time of the year in which the unit in plant growth and development was taught, and single or multiple teacher programs.

Instrumentation

To conduct this study, several instruments were utilized. The student reference entitled "Plant Growth and Development", which served as the basic text for the instructional unit was written in 1993 by experts in the Department of Plant Sciences at the state land grant university. This text of 88 pages, is made up of five chapters including: major plant parts and their function; plant classification; plant physiology; plant reproduction; and plant nutrition. The content of the text covers the plant science competencies and competency indicators included in the state approved curriculum entitled "Applied Biological Systems," which constitutes entry level into the agricultural education curriculum sequence and meets the requirement for a biological science for admission to the state universities.

From this text, the researchers prepared a teacher resource which contained educational objectives, written in performance terms, questions for study with correct answers, and suggested student activities.

A unit of instruction, including 15 lesson plans to teach the subject matter content, was developed to facilitate the teaching and to serve as a control mechanism for the teacher variable. Lesson plans followed the format utilized in the teacher education program in the department, and included identification, competency, need, objectives, introduction including an interest approach, questions for study, including answers based upon the text, suggested activities for supervised study and discussion, a summary and conclusion, and suggested student 4activities for application of the subject matter. Also included were masters for handouts and transparencies, as appropriate.

A criterion referenced unit evaluation instrument, based upon the information contained in "Plant Growth and Development" and the developed unit of instruction was designed and pilot tested during the 1994-95 school year, a year prior to conducting the study reported here. The questions included in the unit evaluation instrument were multiple-choice, using a stem or direct question and four distractors, one of which was correct. The pilot instrument was administered to 299 freshmen and sophomore students enrolled in agricultural education, after they received non-controlled instruction in a unit on plant growth and development, provided by their teacher of agriculture. Table 1 depicts the information which describes the characteristics of the instrument from the pilot test.

Table 1.
Plant growth and development instrument characteristics, pilot test

Instrument Characteristic	Norm
Number of items	75
Number of students	299
Mean	35.45
Standard Deviation	11.51
Test Reliability	.88
Difficulty	52.73

The mean score on the 75 items contained in this unit evaluation instrument was 35.45 correct responses. This represents a difficulty factor of 52.73 percent which indicates the average student incorrectly answered 53% of the questions. Since the desired difficulty factor in testing is 50%, this instrument was judged to be slightly difficult. Reliability was measured by using the Statistical Package for the Social Sciences (SPSS for Windows) to calculate a Kuder-Richardson (KR-20) estimate of internal consistency of the unit evaluation instrument. Since the test reliability was greater than .80, it was considered highly reliable (Martuza, 1977). An item analysis was performed on each question, and those results are available from the researchers. This instrument was considered to be effective by the researchers, and was subsequently used to measure the dependent variable.

The Group Embedded Figures Test (Oltman, Raskin, & Witkin, 1971) which was used to ascertain the learning style of subjects. Those subjects who score above the national mean of 11.4 are said to be field independent learners, while those scoring below the mean are field dependent learners. The GEFT has a reported reliability of .82 (Witkin, Oltman, Raskin & Karp, 1971).

Data collection and analysis

The eighteen teachers who were selected to participate were contacted to ascertain the time of year in which the unit of instruction would be taught and the number of students to be included. Researchers provided each teacher with the prepared lesson plans in the unit of instruction and enough copies of the student reference (text) to complete a classroom set. In an attempt to somewhat control for the variable of the teacher, participants were instructed to follow the prescribed lesson plan format, and not deviate from the methodology. Teachers then began to teach the unit at the time appropriate for their curriculum. No conditions as to time of year during the 1995-96 school year were established by the researchers. After two weeks of teaching time, copies of the GEFT were sent to the teacher for administration to subjects. Subjects were kept anonymous from the researchers by utilizing an identification number. Upon administration of the GEFT, teachers returned completed instruments to the researchers for scoring and recording. Approximately one week prior to the end of the unit, sufficient copies of the unit evaluation instrument were mailed to the teacher for administration. Subjects used the same assigned identification number to be coded on the instrument, so the researchers who graded the instrument had no information as to the identity of the subjects, yet could match the score for the dependent variable to that of the GEFT. The teachers were provided the score, based upon number of correct answers, for each subject by identification number.

Data collected on each subject included selected demographic information, a numerical score on the GEFT, and a numerical score on the unit evaluation instrument. Selected demographic information was used to describe the sample. Subject's score on the GEFT was used to categorize them as field dependent or field independent based upon the national mean, and the unit evaluation instrument score was used as the dependent variable for correlational purposes. T-tests were conducted to ascertain differences between the two groups on the dependent measure. An alpha level of 0.05 was established *a priori*.

Results

Objective one

The sample in this study was predominately secondary school freshmen and sophomore students enrolled in agricultural education. Of those subjects who reported demographic information, the mean age was 15 years (43.5%), although 29.9% of the subjects were 14 years, and 18.3% reported they were 16 at the time the study was conducted. The vast majority, 81.5% had not completed a biology course at their high school. Female students accounted for 44.7% of the sample, while 55.3% was male.

With respect to the Group Embedded Figures Test, results by gender are shown in Table 2 and compared to the national mean of eleven (11.4), which delineates field dependent and field independent learners. The subjects in this study included 229 (61.07%) who scored below the the national mean (11.4), and were classified as field dependent, and 146 (38.93%) who were classified as field independent learners, due to scoring above the national mean. These data are based upon the total number of subjects who took the GEFT.

Table 2.
Preferred learning style by gender (n=375)

	GEFT			
Gender	Field-dependence		Field-independence	
	n	%	n	%
Female	102	27.20	62	16.53
Male	127	33.87	84	22.40
Total	229	61.07	146	38.93

Results of the unit evaluation instrument are shown in Table 3. The overall mean score, based upon number of correct responses, was 37.63 for the 355 subjects who completed the unit evaluation instrument. The difference between the number of subjects who completed the GEFT and those completing the unit evaluation instrument is attributed to absenteeism on the days each instrument was administered.

Table 3.
Unit evaluation instrument results (n=355)

Instrument characteristic	Result
Number of items	75
Mean	37.63
Standard Deviation	11.90
Range	0 - 68

The variation in numbers between Tables 3 and 4 is due to the GEFT and the unit evaluation instrument being administered at different times by the participating teachers of agriculture. The authors acknowledge some extraneous influences may impact the results in studies of this nature, but for this study the focus was soley on isolating the effect of learning styles on the Plant Growth and Development unit evaluation.

Objective two

The second objective was to examine the difference between cognitive performance, as measured by subjects score on the unit evaluation instrument, and learning style. This was done using a t-test. Table 4 displays the mean unit evaluation instrument score by learning style. The data in Table 4 indicate to the reader a significant difference between mean scores on the unit evaluation instrument based upon the two learning styles. Subjects who were field independent learners, although smaller in number in this study, scored significantly higher than those who were field dependent.

This difference indicates that high school freshmen and sophomores in agricultural education who are field independent learners did, in fact, score higher on the dependent measure than did those subjects who were field dependent. This finding is consistent with other studies in which field independent learners have been found to be more analytical in their view of subject matter and approach learning from a subject matter and technical way in which emphasis is placed upon cognitive learning as well as analytical and problem solving techniques.

Table 4.
Mean score on unit evaluation instrument by learning style (n=323)

variable	number of cases	mean score	SD	t-value	significance	95% confidence interval for the mean difference
field-dependent	195	35.31	11.68	5.32	.000	4.37-9.50
field-independent	128	42.25	11.10			
Mean difference		6.94				

Conclusions/Recommendations/Implications

Analysis of data from secondary school students in this study indicated the majority were field dependent learners. This finding differs from others reported in agricultural education. It is concluded by the authors this difference is attributed to the age and grade in school of these subjects. Other researchers have studied college level students, typically in the upper division classes. Those subjects tended to be predominately field independent learners. It has been reported that secondary school agricultural education instruction is dominated by field independent teachers. Since students likely self select in elective programs, and those who remain through high school and into college are those who are likely to prefer the field independent style employed by those teachers.

Those subjects who were field independent learners scored higher on the cognitive measure than did the field dependent learners. The subject matter content of the unit of instruction utilized in this study was scientifically focused in plant science, specifically basic botany. Since the content was analytical in nature, those pupils who prefer the field independent style of learning performed better than those who were field dependent learners.

It is clear there is a relationship between students preferred learning style and performance on cognitive measures. It is unclear, from this study, as to why the younger subjects were predominately field dependent. Irrespective of reasons as to why field dependent learners may or may not remain in agricultural education, it is evident they exist in large proportions in the freshmen and sophomore years. Therefore, this implies that learning style of pupils must be known and considered when making educational decisions with respect to instructional content and modality.

Although the field independent learners in this study performed better than field dependent learners on the cognitive measure, the field dependent pupils represented a larger percentage of students in this sample. If teachers, who may be field independent in their learning style, consistently select curricular and instructional modalities which are associated with field independence, it is predictable the field dependent learners may likely withdraw from agricultural education prior to completing the program.

Results of this study are somewhat different than other data reported on the GEFT. For example, Cano and Garton (1994) found 41.5% were field dependent and 58.5% field independent in an Ohio study preservice teachers of agriculture, while Whittington and Raven (1995) discovered 25.8% were field dependent and 74.2% of their subjects were field independent. Further analysis reveals more male subjects than females were included in both learning styles in the study reported herein. This differs from other studies in which females tended to dominate the field dependent style. The study reported here dealt with a larger and more diverse sample of subjects who were younger in age, which may account for this difference.

Agricultural education teachers must be vigilant in selecting and employing curricular and instructional modalities which relate to a wider array of learning styles. This may be of particular concern when teachers make such decisions for freshmen and sophomore students in secondary schools.
Teacher educators should use these results in preservice and inservice programs to prepare teachers to make curriculum and instructional decisions.

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LEARNING STYLES AND COGNITIVE PERFORMANCE OF SECONDARY SCHOOL PUPILS

Discussant Remarks
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The researchers in this study approached the topic of learning styles from the secondary student point of view. This is a clientele group not extensively studied by agricultural education researchers. The objectives of the study were clear.

The authors thoroughly discussed the instrumentation and the procedures used. The use of the standardized learning styles instrument added strength to the study and allows the readers to compare results of similar studies. It might have helped the reader to understand the findings to have had the norms for high school students and by gender presented in the theoretical framework.

The authors indicated that they purposefully selected the participating teachers from those who volunteered in order to obtain variety in school size, rural/urban location, ethnic diversity, and single and multiple teachers departments. Random selection of the schools would have added strength to the research design and should have provided the diversity desired, if we accept the principle of random selection. The authors made an effort to control as many variables as possible by standardizing the materials developed for instruction and pilot testing the evaluation materials. The researchers appropriately acknowledged that extraneous influences could impact a study of this nature. It would help the reader to have discussed the extraneous influences recognized rather than allow readers to wonder or develop their own list.

The findings were clearly presented based upon the objectives. The findings also seemed to clarify that the instructional materials were designed support the field independent learners. The findings supported the intent of the instruction.

Some of the findings were different from those in previous studies of agricultural education students. These findings should provide some areas for discussion and further study by the profession.

The recommendation supported the findings and highlighted the importance of this type of study to secondary teachers and pre-service teachers. The information reported in the study can be useful in preparing instructional materials and selecting teaching strategies. It is important that this type of data be made available to the secondary teachers for practical application.

The study was well done and appropriately reported. Perhaps we need apply this research design to some of our other clientele groups engaged in non-formal education. How would some of these principles and findings be applied to 4-H Youth and other Extensions programs?

THE EFFECT OF STYLE-SPECIFIC INSTRUCTION ON ACHIEVEMENT AND SATISFACTION OF FIELD-DEPENDENT AND FIELD-INDEPENDENT LEARNERS

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Introduction /Theoretical Framework

Learning styles is an area of inquiry that has received much attention of late from researchers in agricultural education. Learning style may be defined as "the characteristic cognitive, affective, and psychological behaviors that serve as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (DeBello, 1990, p. 203). Agricultural education researchers have generally focused on the field-dependence / independence psychological dimension that concerns a learner's perception of the learning environment (Miller, 1995). This line of inquiry has given clues to how agriculture students learn. Garton (1993) provided a thorough literature review on field-dependent and field-independent learner preferences. This review emphasized the extremes of the continuum of learning styles, and not all learners of either learning style preference will necessarily exhibit all characteristics and behaviors associated with their style. Table 1 summarizes the characteristics and behaviors associated with the field-dependent and field-independent learning styles.

Several studies (Cano, Garton, & Raven, 1992; Cano & Metzger, 1995; Miller, 1995; Raven, Cano, Garton, & Shelhamer, 1993; Torres & Cano, 1994; Whittington & Raven, 1995) have been conducted with the primary aim of describing the learning styles of a particular population of agricultural learners. Most of these studies imply that knowledge of learning styles may be used by teachers to improve instruction. Exactly how this information should be used has not been made clear.

Literature cited by Doebler and Eicke (1979) suggests that matching students and teachers who share the same cognitive style may be wise. Agricultural educators seem to favor sensitizing instructors to learning styles information with the idea that instructors would be more apt to adapt instruction to student learning styles. In either case, the implication seems to be that instruction that is in harmony with an individual's learning style will improve the student's performance, shorten study time, and improve the student's attitude toward learning (Chinien & Boutin, 1993). Yet, empirical evidence in favor of matching instruction to cognitive style is lacking (McKenna, 1990; Mayer, 1987).

Students can be categorized as to their learning styles, and several generalizations about their approach to learning can be made. However, can agricultural educators use this information in practical ways? Based on an understanding of student learning styles, can agricultural educators design instructional methods that make a positive difference in the achievement and satisfaction of students? Torres and Cano (1994, p. 65) wrote that "research should be conducted to determine if students taught in their preferred learning style score higher on tests, assignments, and attitude than those taught in a manner dissonant from their orientation."

Table 1.
Characteristics and Behaviors Associated with the Field-Dependent and Field-Independent Learning Styles

Learning Style	
Field-Dependent	Field-Independent
Find it difficult to learn when the learning task involves several steps.	Able to accomplish learning tasks that involve several steps.
Experience difficulty in problem-solving situations.	Good at analytical problem-solving.
Prefer to have answers provided by the instructor.	Prefer an inquiry approach to learning.
Prefer externally defined goals and organization.	Can provide their own structure for learning activities.
Prefer a spectator approach to learning.	Prefer trial and error as opposed to being shown how.
Value positive reinforcement from the teacher.	Do not typically respond to positive reinforcement offered by teachers.
Have well-developed social skills and are more attuned to social cues.	Have poorly developed social skills and are more socially independent.
Favor extrinsic motivation.	Are intrinsically motivated.
Prefer collaboration	Prefer competition.

Purpose and Objectives

The purpose of this quasi-experimental study was to determine if instruction designed to match a student's preferred learning style would result in higher levels of student achievement and satisfaction. The research hypotheses were as follows:

1. There will be no significant three-way interaction between teaching approach, laboratory section, and learning style regarding student achievement and satisfaction.
2. The effect of teaching approach will not significantly interact with laboratory section regarding student achievement and satisfaction.

3. Students will attain higher levels of achievement and satisfaction when taught with methods that support their preferred learning style.

4. Overall, students will attain higher levels of achievement and satisfaction when taught with a combination of methods preferred by both field-dependent and field-independent learners.

Procedures

The sample consisted of 42 students enrolled in a senior-level university class in swine management during the fall semester of 1995. This three-credit course consisted of two 50-minute lectures and one 110-minute laboratory session each week. Students enrolled in the course were divided into three laboratory sections during registration. The three laboratory sections met on Wednesdays at 10:00 a.m., noon, and 2:00 p.m.

A counterbalanced design (Campbell & Stanley, 1963) was used to test the research hypotheses. The researchers used three different teaching approaches (field-dependent, field-independent, and combination) with each of the three laboratory sections. The order of treatment was determined randomly for the first week; for the remaining weeks, the treatments were ordered to balance the design. This was done to ensure that the treatment effects would be demonstrated across laboratory sections and subject matter. After each experimental laboratory, an achievement test and a lesson satisfaction instrument were completed by all students.

Teaching approach was the active independent variable in this study. For each of the three laboratories involved in the study, the instructor and the researcher worked collaboratively in designing three distinct lesson plans. One lesson plan emphasized teaching methods that should appeal to field-dependent learners, another was designed to appeal to field-independent learners, and the third was a combination of the former two approaches. The instructor focused on three primary areas of difference between field-dependent and field-independent learners in developing the instructional approach. The three focal areas included motivation of the learner, social aspects of learning, and a spectator vs. inquiry approach to learning. Sessions taught with a field-dependent emphasis included learning activities such as student role playing, consensus building, and team reports of readings. Field-independent activities included individual student competitions, individual reporting, and individual defense of opinions. When emphasizing the field-dependent approach, the instructor provided recurring positive feedback to students, led discussions, and highlighted information. The field-independent approach was emphasized by reducing positive feedback, allowing students to work on their own as much as possible, using voting to decide issues, and limiting comments to answering student questions.

An important nonmanipulated independent variable in this study was learning style. Learners were categorized as either field-dependent or field-independent by using their score on the Group Embedded Figures Test (GEFT)(Witkin, Oltman, Raskin, & Karp, 1971). The GEFT is a standardized instrument with a reliability estimate of .82. Also, concurrent validity with the Embedded Figures test was .82 for males and .63 for females. The GEFT was administered after all achievement and satisfaction data had been collected and entered into the computer. Therefore, the instructor was not informed of student learning styles until after the experiment was complete. A median split was used to place students into learning style groups (Spanier & Tate, 1988; Thompson & Knox, 1987). Students who scored below the group median of 12.5 were labeled field-dependent, and those with scores greater than the median were labeled field-independent.

The dependent variable achievement was measured with instructor-made tests. For each experimental laboratory, a measure of achievement was developed. The tests were content valid in that each was designed to measure student learning of important concepts taught during a particular laboratory. Students were not told that they were participating in an experiment, and the scores for these measures of achievement were counted as part of the students' grade. All test scores were reported as a percentage of items correctly answered.

The learner satisfaction measure was developed by the researchers. Students enrolled in a senior level agricultural education course were asked to think about teaching methods that suited their style of learning and then write statements that would represent a positive perspective on this instruction. These statements were used as a basis for constructing the instrument that consisted of 13 Likert-type items with response categories ranging from strongly disagree (1) to strongly agree (5). Agricultural faculty and staff determined that the instrument possessed content and face validity. The learner satisfaction instrument had a Cronbach's alpha reliability coefficient of .86.

All data were analyzed with the SPSS/PC+ personal computer program. Means and standard deviations were used to describe achievement and satisfaction levels of the teaching approach by learning style groups. Repeated measures factorial analysis of variance was used to test the treatment and interaction effects. The alpha level was set at .05 for determining statistical significance.

Results

Results are reported by teaching approach, learning style, and laboratory section for achievement (Table 2) and satisfaction (Table 3). Results indicate that the effect of the teaching approach by laboratory section by learning style interaction was not statistically significant relative to student achievement (Table 4) or satisfaction (Table 5). This result supports the first research hypothesis.

The two-way interaction involving teaching approach and laboratory section was statistically significant for achievement (Table 4) and satisfaction (Table 5). Therefore, the second research hypothesis was not supported. The interaction effects for achievement (Figure 1) and satisfaction (Figure 2) are displayed graphically. For achievement, this interaction is consistent with the interaction between teaching approach and learning style (Figure 3). In section one, more than twice as many learners tended toward a field-dependent learning style rather than toward a field-independent style. In section three, however, the distribution was seven to one in favor of field-independent learners. Also, the lowest achievement scores for each section were obtained with the teaching approach that they experienced first. Figure 2 demonstrates that student satisfaction with a particular teaching approach depended on the section in which they were enrolled. However, this interaction is also consistent with the interaction between teaching approach and learning style (Figure 4) when the learning style distributions of sections are considered.

The two-way interaction between teaching approach and learning style was not statistically significant for achievement (Table 4) or satisfaction (Table 5). This finding does not support the third research hypothesis. The interactions for achievement (Figure 3) and satisfaction (Figure 4) are presented graphically. While the interaction for achievement is not statistically significant, the results are of practical significance. Figure 3 shows that students attained higher achievement scores when taught with methods designed to satisfy the preferences of the opposite style. Figure 3 further shows that field-independent learners attained a 6% advantage in achievement when taught with the field-dependent teaching approach as opposed to the field-independent approach. Field-dependent learners attained higher achievement scores when taught with the combination approach. For field-dependent learners, the advantage of the combination approach was 21.9% over the field-dependent teaching approach and 13.8% over the field-independent teaching approach.

Overall, field-dependent and field-independent learners were satisfied with all three instructional approaches. On a five-point scale, both groups of learners provided mean satisfaction scores above 3.50 for all three teaching approaches. Figure 4 shows that field-independent learners were most satisfied with the combination teaching approach and were equally satisfied with the field-dependent and field-independent teaching approach. However, the field-dependent learners were most satisfied with the field-dependent teaching approach followed by the combination approach and the field-independent approach.

There was a statistically significant main effect for teaching approach on achievement (Table 4). Overall, the combination teaching approach resulted in achievement scores that were 8.68% higher than the field-independent approach and 9.73% higher than the field-dependent approach. Differences of this magnitude are of practical significance. This main effect should be considered in light of the interaction effects, however. The combination approach was effective for both learning style groups, but field-dependent learners realized the greatest benefit from this instructional approach. The main effect of teaching approach on satisfaction was not statistically significant (Table 5) nor was it of practical significance.

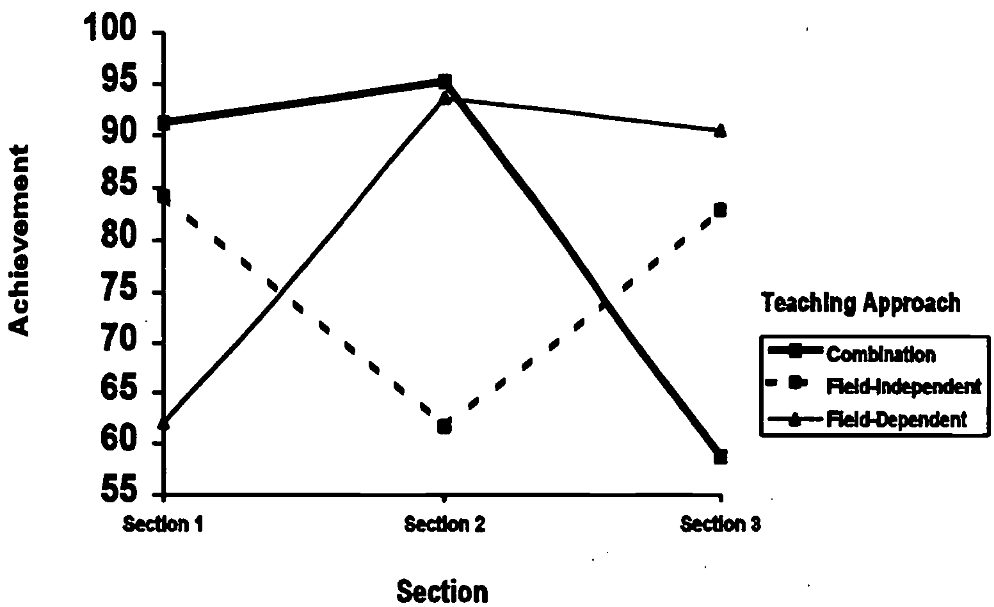

Figure 1. Interaction of teaching approach and laboratory section.

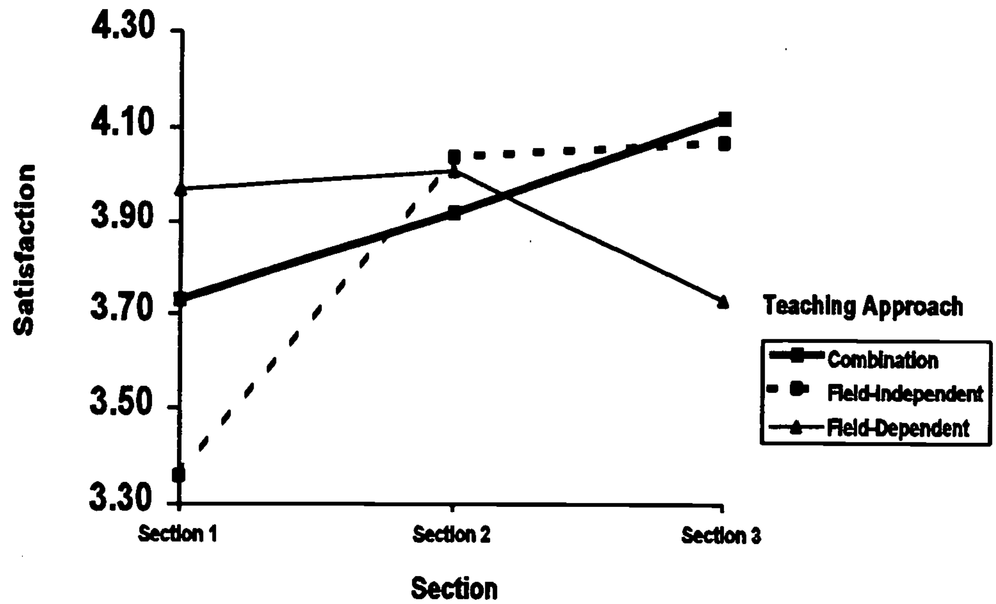

Figure 2. Interaction of teaching approach and laboratory section.

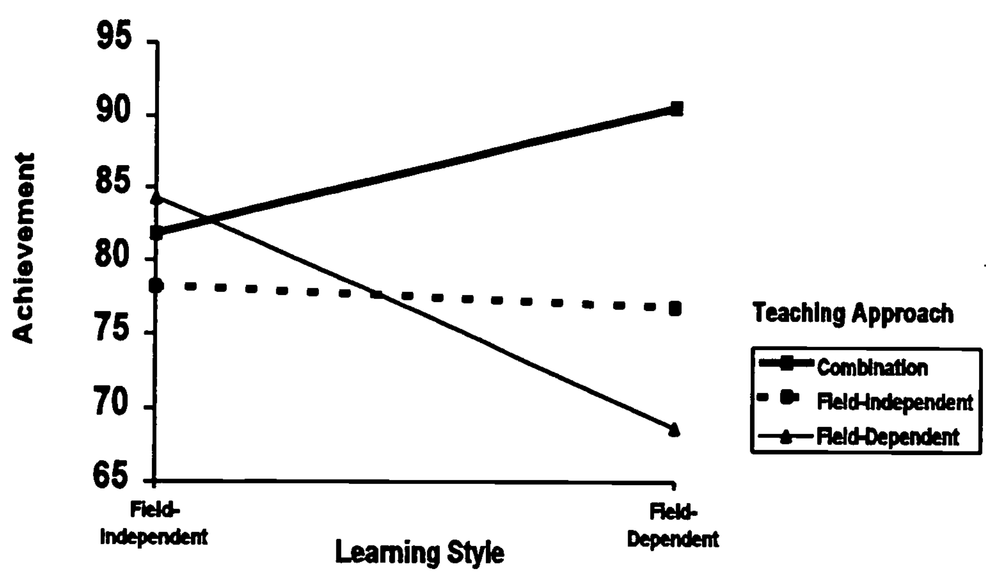

Figure 3. Interaction of teaching approach and learning style.

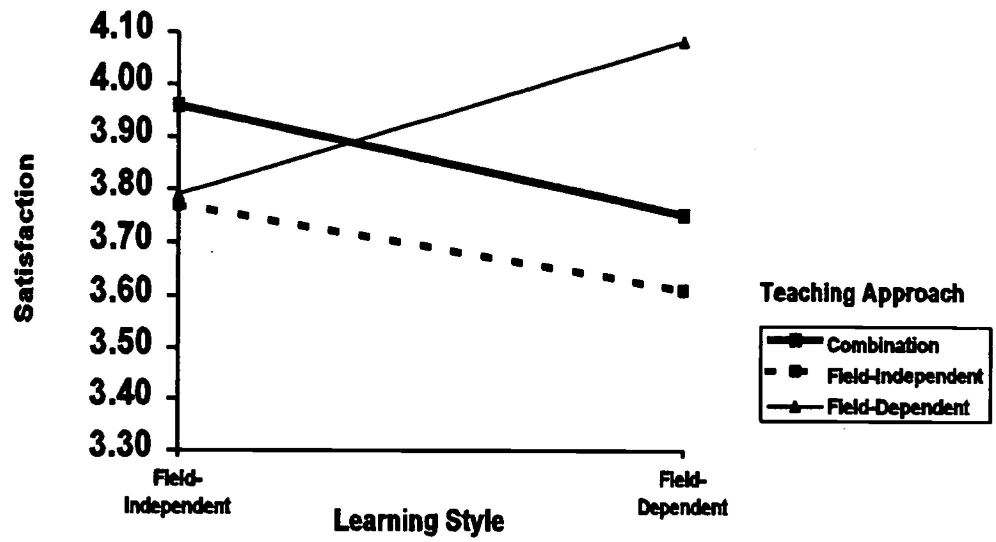

Figure 4. Interaction of teaching approach and learning style.

Conclusions / Recommendations / Implications

In this study there was a significant interaction between laboratory section and teaching approach for achievement. This interaction may be attributable to the learning styles composition of the sections. However, it may also be plausible to conclude that the interaction resulted from a need of the instructor to become comfortable with three different teaching approaches. Another possibility could be the nature of the content for the first week of the experiment. In future studies, each group should experience all treatments on two or more occasions. This would allow potential extraneous effects like content and laboratory section to be averaged out. These extraneous variables must be controlled for the interaction of teaching approach and learning style to be reliably interpreted.

The teaching approach used by the instructor made little difference to field-independent learners but mattered significantly to their field-dependent counterparts. Students were more satisfied with instruction designed to meet their learning style preferences but attained higher levels of achievement when the teaching approach did not match their learning style preference. This implies that matching teaching methods to learning styles may result in more satisfied learners. Yet the challenge of being confronted with teaching methods dissonant to a learner's preference may result in greater cognitive effort and gains in achievement.

A combination of teaching methods suited to field-dependent and field-independent learners was most effective for students involved in this study. This suggests that individualized instruction based on students' learning style preferences is not necessary and will not yield the positive achievement results suggested in the learning styles literature. A more practical and effective approach is for instructors to select a combination of teaching methods suited to both styles on a consistent basis. Using a variety of teaching methods is one of five promising teaching behaviors for influencing student achievement (Rosenshine & Furst, 1971).

This study should be replicated across agricultural disciplines at the university level to determine if the results have broader applicability. This type of research is needed in high school agriculture programs. Additional learning style applications research could be the basis for effective practical teaching approaches for agricultural educators.

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Table 2.
Descriptive Data for Learner Achievement by Teaching Approach, Learning Style, and Section

	Teaching Approach											
	Field-Dependent			Field-Independent			Combination			Overall		
Learning Style	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Field-Dependent	68.69	20.85	21	76.79	17.20	21	90.59	7.22	21	78.69	6.94	21
Section 1	58.80	15.54	15	83.17	7.82	15	89.75	6.95	15	77.24	5.82	15
Section 2	94.00	6.52	5	58.00	25.88	5	95.24	5.83	5	82.41	9.71	5
Section 3	90.48	.00	1	75.00	.00	1	80.00	.00	1	81.83	.00	1
Field-Independent	84.24	14.06	21	78.22	14.91	21	81.81	22.39	21	81.42	7.25	21
Section 1	68.86	14.46	7	86.39	6.97	7	94.46	3.22	7	83.24	6.31	7
Section 2	93.38	5.53	7	64.29	18.13	7	95.24	2.75	7	84.30	6.82	7
Section 3	90.48	.00	7	83.98	4.51	7	55.71	21.49	7	76.72	7.04	7
All Learners	76.46	19.25	42	77.51	15.91	42	86.19	17.02	42	80.06	7.14	42
Section 1	62.00	15.61	22	84.20	7.55	42	91.25	6.34	22	79.15	6.49	22
Section 2	93.64	5.68	12	61.67	20.82	12	95.24	4.06	12	83.51	7.79	12
Section 3	90.48	.00	8	82.86	5.25	8	58.75	21.67	8	77.36	6.76	8

Table 3.
Descriptive Data for Learner Satisfaction by Teaching Approach, Learning Style, and Section

	Teaching Approach											
	Field-Dependent			Field-Independent			Combination			Overall		
Learning Style	Mean	SD	n	Mean	SD	n	Mean	SD	n	Mean	SD	n
Field-Dependent	4.08	.35	21	3.61	.68	21	3.75	.54	21	3.81	.44	21
Section 1	4.04	.38	15	3.42	.71	15	3.67	.59	15	3.71	.45	15
Section 2	4.15	.29	5	4.00	.22	5	3.92	.38	5	4.03	.29	5
Section 3	4.31	.00	1	4.46	.00	1	4.12	.00	1	4.30	.00	1
Field-Independent	3.79	.43	21	3.77	.56	21	3.96	.36	21	3.84	.33	21
Section 1	3.82	.28	7	3.21	.52	7	3.85	.33	7	3.63	.21	7
Section 2	3.91	.48	7	4.08	.15	7	3.91	.15	7	3.97	.19	7
Section 3	3.65	.53	7	4.01	.47	7	4.12	.51	7	3.93	.44	7
All Learners	3.94	.42	42	3.69	.62	42	3.86	.47	42	3.83	.38	42
Section 1	3.97	.36	22	3.36	.65	22	3.73	.52	22	3.68	.39	22
Section 2	4.01	.41	12	4.04	.18	12	3.92	.26	12	4.00	.23	12
Section 3	3.73	.54	8	4.07	.46	8	4.12	.47	8	3.97	.43	8

Note: Based on scale: 1 = strongly disagree; 2 = disagree; 3 = undecided; 4 = agree; 5 = strongly agree.

Table 4.
Multivariate Tests of Significance for Within Subjects Effects on Achievement

Effect	Pillais	F	Sig. of F
Teaching Approach	.19	4.10	.03
Teaching Approach X Learning Style	.10	1.97	.15
Teaching Approach X Section	1.04	19.44	.00
Teaching Approach X Learning Style X Section	.12	1.13	.35

Table 5.
Multivariate Tests of Significance for Within Subjects Effects on Satisfaction

Effect	Pillais	F	Sig. of F
Teaching Approach	.03	.50	.61
Teaching Approach X Learning Style	.10	2.01	.15
Teaching Approach X Section	.35	3.85	.01
Teaching Approach X Learning Style X Section	.07	.63	.65

THE EFFECT OF STYLE-SPECIFIC INSTRUCTION ON ACHIEVEMENT AND SATISFACTION OF FIELD-DEPENDENT AND FIELD-INDEPENDENT LEARNERS

Discussant Remarks
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The authors of this paper provided an excellent theoretical framework for their study . The also provided and excellent table that defined field dependence and independence as they were using it in their study. It is important to remember that our readers may not be as familiar with our subject as we are as researchers and it is important to bring them up-to-speed.

The objectives of the study were clear and the procedures represented a good experimental design. However, because laboratory section was one of the factors considered in the study and one later found to be significant, the reader needed to know more about how the laboratory sections were determined. The paper says students were divided during registration, does that mean they self-selected the sections or were they assigned in some way?

The authors used senior-level agricultural education majors to help develop the learner satisfaction measure. This activity was probably a good learning experience for the students involved and should have reinforced what the students had learned about learning styles and teaching methodology.

The discussion of the findings concerning field-independent and field-dependent got a little confusing because of the similarity of the terms. This was a problem when the figure being discussed was on another page (in the copy I received for review). This reinforces the importance of layout and keeping graphics close to the corresponding text in published materials when the opportunity is available to do so.

Laboratory section seemed to be the most striking difference in the study the authors might have strengthened the study by providing more discussion about this finding. Questions came to mind about the time of day, and the unequal number of students enrolled in the various sections.

The authors were able to support long standing research and principles of learning with their finding that variety of methodology had a positive effect of achievement. To often is our search for new knowledge we forget to refer back to the principles that have been part of knowledge base for many years.

Overall the study was well done and informative and should be of special interest to teacher educators.

SUBURBANITES' PERCEPTIONS ABOUT AGRICULTURE: THE CHALLENGE FOR AGRICULTURE EDUCATION

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Introduction

The concept of "sustainable agriculture," in which food and fiber can be produced indefinitely and justly while regenerating the natural environment, is the subject of much discussion in the agricultural and research communities (Dunlap, et al, 1992; Schwarzweller and Lyons, 1995). Little, if any, evidence exists, however, that the general public identifies with the principles of sustainable agriculture, let alone the relationship of specific production practices to future agricultural productivity or availability of food.

As urban dwellers become more and more isolated from the original sources of their food, their dependence on agriculture becomes less vivid, and agriculture becomes of peripheral importance to their own, more immediate needs (Merrill, 1988). Despite this change in perception, urban communities do, in fact, depend on agriculture. Consequently, a change in the availability of land and natural resources, skilled farmers, viable rural communities, and agricultural support services may have long term implications for the quality of urban life in a region.

Until recently, the primary focus for achieving a sustainable agricultural system has been from a micro, or on-farm, perspective, particularly on-farm production or management strategies (Wilkins, 1995). In other words, strategies are being developed for implementing production practices which regenerate our natural resources such as soil or water while maintaining or improving farm profitability. Such practices may include the use of cover crops, composting, a reduction or elimination of agrichemical or external inputs, integrated pest management, and rotational grazing.

Sustainable agriculture also includes social issues of land ownership, the working and living conditions of farm laborers, the needs of rural communities, food safety, and nutrition (Feenstra, Ingels, and Campbell, 1991). Through a macro-perspective, sustainable agriculture should be restated as a "sustainable food system," encompassing the social, economic, and environmental implications of the transfer of food from the field to the consumer (Wilkins, 1995). Ultimately, it is the widespread acceptance of the interconnectedness of these issues that is at the crux of sustainability.

The development of a marketing infrastructure to support such a food system is contingent upon communications among all of those involved with the production, processing, distribution, and consumption of food. A sustainable food system restores the link among rural and urban communities so that the consumer puts context and relevancy to choices made in the marketplace.

Evolving from the current globalized food system to one that incorporates more locally responsive food preferences presents both a challenge and an opportunity for those in agriculture education. Agricultural educators have the potential to contribute significantly to these discussions and to the outcome of the debate regarding a sustainable food system within a region. Only if consumers substantially increase their demand for regionally produced agricultural products can a viable community-based food system evolve. But first consumers must become both more interested in and knowledgeable about a region's agricultural capacity, thereby strengthening the link among producers and consumers Wilkins, 1995). Simultaneously, those who produce food and fiber need to understand the diverse perceptives on issues of social equity, ethics, natural resource capacity, linkages between food selection and diet, and environmental and nutritional criteria (Wilkins, 1995). For many, the dialogue has yet to begin.

Purpose and Objectives

The purpose of this study was to understand how consumers in Southeastern Pennsylvania view themselves in the context of their food system and the importance they place on sustaining regional agriculture. Specific objectives were:

1. To determine consumer produce buying preferences;
2. To determine consumer preference for locally grown produce;
3. To determine consumer preference in knowing how produce is grown; and
4. To document consumer perceptions toward agriculture in the region.

To focus the study, a survey was designed to document consumer attitudes about purchasing locally grown fresh fruits and vegetables and how consumers perceive some of the social, economic, and environmental aspects of regional agriculture.

Procedures

Documenting Consumer Perceptives

During a four-week period between mid-September and mid-October, 1993, 1,214 consumers were interviewed in 23 different markets in 8 counties in Southeastern Pennsylvania. Twelve urban market sites were funded by the Cooperative State Research Service through the Penn State/Rodale Institute SANRUE (Sustaining Agricultural and Natural Resources in Urbanizing Environments) Center, and 11 market sites were added to expressly include a mix of rural, urban, and suburban market types, representing geographic and cultural diversity in the region. Support for these additional sites was in conjunction with the initial needs assessment of RISA (Regional Infrastructure for Sustaining Agriculture), a collaborative project[1] designed to address the threats to sustaining agriculture in Southeastern Pennsylvania. Another Penn State project, *Attitudinal Change as a Consequence of Food Policy Education at the Rural/Urban Interface,* funded by the Pennsylvania Department of Agriculture (PDA), also utilized components of the survey. The synergism among these three projects strengthens the data base for each.

Interviews were conducted in three different types of markets—independent supermarkets, chain supermarkets, and farmers' markets. The multi-step process used to select the markets is described in the project's final report (Thomson and Kelvin, 1994). At each market, interviews were conducted in-store during two different time blocks in the same week. The intent was to maximize the mix of shoppers surveyed, yet minimize the likelihood of reinterviewing the same individual. Interviews were carried out in or near the produce section of the market; each interview took from 5 to 15 minutes. For each store visit, two interviewers conducted up to 18 interviews each.

The survey consisted of three major components. The first questions consumers were asked were structured to provide respondents with multiple opportunities to mention a preference for locally grown foods and/or

[1] Funded for three years by the W.K. Kellogg foundation, the collaborating organizations participating in RISA include The Pennsylvania State University, the Rodale Institute, the Pennsylvania Association of Sustainable Agriculture, the Atlantic Dairy Cooperative, the Reading Terminal Farmers' Market, and the League of Women voters.

an interest in knowing how the fresh fruits and vegetables (produce) they purchase were grown. Fresh fruits and vegetables were chosen as a focus for this study because they are the least processed and packaged foods that are readily available in most supermarkets. The second component of the interview involved a series of "agree or disagree" statements regarding various economic, social, and environmental issues relating to farming and the food system in Southeastern Pennsylvania. In the final section, respondents were asked to provide demographic information.

To ensure that the questionnaire solicited the information intended, the instrument was initially reviewed for content and face validity by the Project Advisory Committee. Subsequently, it was pretested in different market types at different locations. Project personnel trained nine interviewers, many of whom were interns working at Rodale, to conduct the interviews. Two individuals carried out more than one-half of the interviews (58.6% of 1,214).

Descriptive statistics were used to summarize the data. Data were analyzed using the Statistical Analysis System (SAS). Several questions were open-ended, allowing consumers to offer responses without any prompts. Using this approach, consumers could offer as many responses as they wanted; multiple responses were accommodated in data entry. As a consequence, responses were mentioned for which response categories had not been created. Therefore for some questions, responses for the "other" category as a percentage of all responses for an open-ended question ranged from zero (question 3) to 26.4% (question 10a).

Although the results of this study are limited to the population interviewed, this project provides the first systematic information on perceptions about regional agriculture in Southeastern Pennsylvania from those who live in Southeastern Pennsylvania. And the number of consumers interviewed is substantially greater than that for previously conducted similar studies in other regions of the United States (Bruhn, Vossen, Chapman, and Vaupel, 1992; Lockeretz, 1986).

Results

Demographic Profile of Population

Among the 1,214 consumers interviewed, 7 of 10 (71.6% of 1,183) had the primary responsibility for buying food for their households and 7 out of 10 were female (70.5% of 1,183), similar to other findings (Progressive Grocers, 1992). Respondents reflected a mix of educational attainment. Approximately one-third had completed high school; another 15% had less than a high school education; over 54% had some education beyond high school.

The income distribution among consumers surveyed covered a wide range; one in five lived in a family earning less than $20,000. in before tax income during 1993 while one in four was part of a family whose income totaled $50,000. or more during the same year.

More than 16% of those surveyed identified themselves as a racial minority. In fact, the study population was more diverse than the population of the Commonwealth. For Pennsylvania as-a-whole, 87.7% of the population is white, non-Hispanic, and 9% is Black, non-Hispanic (U.S. Department of Commerce, 1992).

Most of the consumers surveyed ranged in age from 30 to 49 (46.8% of 1,187); one-fourth were 60 or older. Over one-third (36.1% of 1,179) indicated that they had lived on a farm at some time. Yet just 49 of 1,173, less than 5%, indicated that they belonged or had belonged to an agriculture organization.

Objective 1. Consumer Produce Preferences

After agreeing to be interviewed, the first question each consumer was asked was: *When buying fresh fruits and vegetables, what is important to you?* As an open-ended question, no prompts or other cues were provided. Consequently, responses reflected the first thoughts that the respondents verbalized. Regardless of the market-type in which consumers were interviewed, freshness was the most frequently mentioned characteristic, 29% of 2,609 responses. The intent of this initial question was to ascertain if, and with what frequency, respondents would, on their own, indicate locally grown as an important characteristic—few among them did, but those who did so were more often interviewed at farmers' markets.

After determining where these consumers preferred to purchase their produce, they were asked to indicate their reasons for preferring this market type. For those who preferred to purchase their fresh fruits and vegetables at a farmers' market or roadside stand, freshness remained the most frequently mentioned characteristic, see Table 1. In contrast, convenience was most frequently mentioned by those who most often purchased their produce at supermarkets. Supermarkets also were the primary location at which the majority of those interviewed preferred to purchase their produce (60% of 1,195). Although produce is used interchangeably with fresh fruits and vegetables in this report, fresh fruits and vegetables was the terminology used throughout the interview to maximize consumer understanding of the questions.

It is interesting to note that 76.6% of all respondents were in the produce section of a supermarket when being interviewed, but only 60% (N=1,195) cited the supermarket as the place where they most often buy their fresh fruits and vegetables. Correspondingly, 23.4% of all respondents were actually at a farmers' market when interviewed, yet 39% cited a farmers' market, roadside stand, or farm/orchard as their primary location for buying produce.

For those who preferred to purchase their produce at farmers' markets, roadside stands, or farms/orchards, supporting local growers was mentioned frequently enough to be among the top five reasons for shopping at these locations, see Table 1. Yet the proportion of consumers surveyed who specifically preferred roadside stands or farms/orchards was small, just 7.1% and 4.2% of 1,195, respectively.

Table 1.
Major reasons for buying produce at consumers' preferred market type (Top five reasons are bolded.).

	Most often buy produce* at			
Preferred reasons**	Super market N=718	Farmers' market N=342	Roadside stand N=85	Farm/ Orchard N=50
Convenience-location/hours	**39.9%**[1]	7.7%[2]	2.6%[3]	4.3%[4]
Combine with other shopping	**13.8**	0.8	- [5]	-
Price	**12.0**	**17.0**	**15.9**	**15.2**
Freshness	**9.4**	**30.5**	**35.0**	**27.2**
Selection	**7.1**	**6.9**	2.6	2.2
Quality	5.6	**9.8**	**7.0**	**8.7**
Support local grower	0.6	**6.9**	**8.9**	**10.9**
PA grown produce	0.3	2.5	**5.7**	3.3
Deal directly with grower	0.3	2.4	4.5	**8.7**
	89.0%[6]	84.5%	82.2%	80.5%

*Type of market at which 1,195 respondents most often purchase produce.
**Multiple responses allowed.
[1]Total responses equal 1,030.
[2]Total responses equal 594.
[3]Total responses equal 157.
[4]Total responses equal 92.
[5]No response.
[6]Each column totals less than 100% because consumers offered other reasons as well.

Objective 2. Preference for Locally-Grown Produce

In addition to determining over-all produce buying preferences, these initial questions also were able to determine a preference for locally grown produce among consumers interviewed. Respondents were given four opportunities to mention a preference for locally grown fresh fruits and vegetables. The first two opportunities were the initial open-ended questions previously discussed. The first, as indicated earlier, asked the respondent, *When buying fresh fruits and vegetables, what is important to you?*

In the second question, respondents were asked to identify where they most often buy their fresh fruits and vegetables and their reasons for doing so. Respondents were considered to have indicated a strong preference (9.9% of 1,214) for locally grown produce if "locally grown" or "Pennsylvania grown" or "want to support local growers/farmers" was mentioned when asked either of these two initial open-ended questions, see Table 2.

Table 2.
Preference for locally grown produce (N=1,214).

Opportunity	N	Percent	Preference
Opp 1: No prompt	50	9.9	Strong
Opp 2: No prompt	70		
Opp 3: Indirect prompt	308	25.4	Moderate
Opp 4: Direct prompt	490	40.3	Weak
Total expressing preference	918	75.6%	

A third opportunity introduced the concept of origin in their purchasing decisions. This question asked, *Does it make any difference to you where the fresh fruits and vegetables you buy are grown?* If yes, *What difference does it make?* Respondents were considered to have a moderate preference (25.4% of 1,214) for locally grown produce if they mentioned "locally grown" after being prompted about the importance of origin.

Finally, respondents were given a direct opportunity to mention a preference for locally grown foods. They were asked, *If you knew the markets where you shop sold locally grown fresh fruits and vegetables, would you be more interested or less interested in shopping there, or would it not make a difference?* At this point, respondents were considered to have a weak preference (40.3% of 1,214) for locally grown produce if they responded "more." Respondents were considered to have no preference if they indicated that it would make no difference to them if a market at which they shopped sold locally grown produce or that they would, in fact, be less interested in shopping there, or they did not respond to the question (296 respondents; 24.4% of 1,214).

Although three-quarters of the population interviewed expressed some preference for locally grown produce, the preference was generally weak. Less than 10% volunteered in the open-ended questions that purchasing locally grown produce was an important factor in their decision making process. Yet most consumers offered no reasons (78% of 1,299 responses) why they would not buy locally grown produce. These results are similar to Bruhn, et al, (1992) which tested how to increase the sale of locally grown produce through supermarkets.

Objective 3. Preference for Knowing How Produce Is Grown

A similar strategy was used to determine if a preference exists among consumers for knowing how the produce they buy was grown. This time respondents were given three opportunities to express a preference. Even fewer expressed any preference for knowing how their food was grown, see Table 3.

Again, when asked the initial two open-ended questions regarding what is important to them when buying produce, the opportunity existed for respondents to mention that they wanted to know "how produce is grown." In the first open-ended opportunity, 5.8% of respondents mentioned this preference, see Table 3. In the second open-ended opportunity, an additional 1.2% mentioned this preference. In total, only 7%

percent of the study population had a strong preference for knowing how the produce they purchased was grown. Most often, these responses were in reference to the use of or lack of use of agrichemicals by farmers.

Table 3.
Preference for knowing how food was grown (N=1,214).

Opportunity	N	Percent	Preference
Opp 1: No prompt	70	7.0	Strong
Opp 2: No prompt	15		
Opp 3: Direct prompt (citing actual production practice)	611	50.8	Moderate
Direct prompt (uncertain as to production practices)	18	1.0	Weak
Total expressing preference	714	58.8	

The third opportunity was a direct prompt, asking *Is it important to you to know how the fresh fruits and vegetables you are buying were grown?* When asked directly, an additional 51.8% of the respondents answered "yes." When a follow-up question, *What information are you interested in knowing?* was asked to gauge the strength of this preference, two types of answers resulted and were categorized as moderate or weak preferences. A respondent that cited an actual production practice was considered to have a moderate preference (50.8%). Respondents that expressed they were uncertain as to what type of information they would like were considered to have a weak preference for knowing how their food was grown (18 respondents).

Objective 4. Perceptions About Agriculture

When asked, most consumers indicated that "yes," they are concerned about keeping farms in Southeastern Pennsylvania (95% of 1,207), see Table 4. Respondents next expressed the extent of their concern. Most indicated that they were "somewhat" or "very" concerned (90.5% of 1,144). Among these individuals "don't want more housing development" was the concern most frequently voiced (33.4% of 1,569 concerns expressed). Almost as many indicated that they considered keeping profitable farms, family farms, and farmland important (31% of 1,569 concerns expressed).

Consumers were then asked a series of questions about farming in Southeastern Pennsylvania. Their responses reflect the dilemmas facing agriculture today. Although consumers perceived that "farming creates many jobs" (78% of 1,205), they did not perceive that the "children of today's farmers...are likely to continue farming," (29% of 1,201). Yet their responses implied that farming should be retained, for they perceived that we can't (57% of 1,198) always rely on getting "food from other places." They also perceived that their purchasing patterns do influence farming (81% of 1,204) as well as the food choices available in the market (82% of 1,205).

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Table 4. Consumers' perceptions about agriculture in Southeastern Pennsylvania.

Socio-economic issues	N[1]	SA/A[2]	D/SD[3]	DK[4]
Farming creates many jobs, both on and off the farm, in SE PA.	1205	78.0%	12.5	9.5
Children of today's farmers in SE PA are likely to continue farming.	1201	28.7%	59.5	11.7
I influence what is in the grocery store by what I buy.	1205	81.9%	13.8	4.4
I influence farming in SE PA by the foods I buy.	1204	81.4%	11.7	6.9
I think the fruits and vegetables available in stores are safe to eat.	1205	65.1%	16.7	18.1
Perceptions about regional agriculture				
I enjoy seeing open farmland in SE PA.	1202	98.4%	0.8	0.8
I have a say in the way land is used and developed in my community.	1206	49.0%	43.4	7.7
We don't need to rely on farms in SE PA for food because we can always get food from other places.	1198	40.7%	57.2	2.1
Most of the fruits and vegetables we eat in PA are grown in PA.	1195	20.8%	61.7	17.6
Environmental issues				
Price we pay for food includes the impact of farming on the environment.	1189	63.5%	15.9	20.5
Farming affects the quality of drinking water.	1204	61.4%	18.3	20.2
Government agencies regulate farming in order to protect the environment for future generations.	1202	44.0%	39.3	16.6
Pesticides are necessary to grow food.	1200	36.4%	53.3	10.3

[1]N=Number of consumers responding
[2]SA/A=Strongly agree/agree responses combined
[3]D/SD=Disagree/strongly disagree responses combined
[4]DK=Don't know or undecided

Close to two-thirds of those interviewed perceived that the produce available in the store "is safe to eat." However, a majority did not agree (53.3% of 1,200), that "pesticides are necessary to grow food." For these statements as well as for the statements on the effect farming has on "drinking water quality" and the role of the government in regulating the environmental impact of farming, anywhere from 10 to 20% did not choose to respond to the statement, see Table 4. Such significant numbers of nonrespondents as well as the lack of specificity in the terminology respondents used to articulate their perspectives (Thomson and Kelvin, 1994) suggest that today's consumers have limited knowledge about the food system and how it may or may not impact on their individual lives. Although they indicated that their choices influence what food is available, it seems as though they really didn't know how.

Conclusions / Recommendations

Today's consumers have increasingly moved away from the intimate relationship their forefathers had with the land. This study suggests that many consumers:

1. Are not knowledgeable about the relationship between food and the land; for example, the difference between valuing land for the open space it provides vs. the goods it produces;
2. Lack language to discuss the complex issues associated with a sustainable food system;
3. Express a diversity of perspectives regarding issues related to farming and the food system;
4. Do not hold strongly held opinions about locally grown produce and how such produce is rown; yet
5. Believe their buying practices influence farming in the region and what is available to purchase.

As the public has less firsthand knowledge and experience with an issue, the more likely they are to look to generalized mass media for information about that issue (Ball-Rokeach and DeFleur, 1976). Through such media, the public acquires its understanding of such issues. Those in agriculture, especially those in agriculture education, must provide as well as interpret information on issues related to a sustainable food system for those in the media. This information should be targeted to multiple audiences for multiple purposes.

Media, especially generalized mass media, within a region concerned about the continuing viability of a sustainable food system at the rural/urban interface needs to facilitate the dialogue across all sectors of the community. But those in the media must know the issues. Educators can help, especially those knowledgeable about sustainable food systems.

Furthermore, agricultural educators can support K-12 education on sustainable food systems, working to see that such education becomes an integral component of the core curriculum. In addition, those in agricultural education need to be involved in community education as well as other outreach initiatives in learning partnerships with other institutions of higher education within a region. Land-grant institutions are among many institutions preparing food systems professionals as well as providing community-based education.

To maintain a sustainable food system within a region, the public must see beyond the value of open space to the "value-added" for themselves as well as for the grower through an economically viable food system. Public policy alternatives need to be evaluated for their impact on the viability of agriculture in a region. All issues have a local impact. Consumers, as individuals, will more likely become engaged in an issue when they perceive its relevance to them personally; that implies understanding.

Within the agricultural community, the challenge for agriculture education is no less formidable. The development of a marketing infrastructure to support a sustainable food system is contingent upon communications among those involved in the production, processing, distribution, and consumption of food. Whether or not agriculture remains at the rural/urban interface will be determined by those in the region.

Those in agriculture must participate as partners in this process. Doing so may mean leadership education programs will need to be initiated to provide people with the skills to be articulate and effective in the public arena.

As agriculture at the rural/urban interface changes (Pfeffer and Lapping, 1995), those in agriculture must respond proactively to these changes in order to survive. Being viable means optimizing market opportunities often through product diversification and market niches as well as promoting greater regional self-sufficiency in food production. As production changes so do the sources of income change. Previous practices must give way to alternative methods. Having direct access to consumers can mean both greater risks and higher return (Pfeffer and Lapping, 1995).

Today's challenge for agricultural educators is two-fold. Those in education must 1) encourage dialogue about a sustainable food system among those involved in the production, processing, distribution, and consumption of food as well as 2) better prepare those whose economic livelihood depends on such a food system to be proactive participants in this process. These recommendations are consistent with those proposed by RISA (Hammer, et al, 1996) to address barriers which must be overcome in order for a viable food system in Southeastern Pennsylvania to thrive in the future. Articulating the relationship between the food consumers purchase and issues relating to regional agriculture is both a challenge and opportunity. Will agriculture educators respond?

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SUBURBANITES' PERCEPTIONS ABOUT AGRICULTURE: THE CHALLENGE FOR AGRICULTURAL EDUCATION

Discussant Remarks
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Studies that focus on consumers, their needs, desires and perceptions, are both interesting and necessary. Although studies of this nature need to be reviewed with caution, the author has attempted to describe consumer views as they relate to items they buy for personal and family use. These items happen to be fruits and vegetables in this study and they provide a means to gather information from buyers/consumers at the point of purchase. This provides a convenient data source.

The author provided a good review of the literature, although the connection to agricultural education could be strengthened. It is not clear what concepts provided the basis of the study other than consumer education issues. It was a bit confusing bridging the gap between sustainable agriculture and the purposes of the study. In addition, the title of the paper appears to be somewhat misleading. The study seems focused on buying preferences for the most part with part of the study asking consumer perceptions about "farming" not the broader context of agriculture. This concern may appear to be making something out of nothing, but actually it makes the point exactly. Agriculture is more than farming. To imply otherwise compounds the challenge of educating the public. In addition, it was confusing to this reader when the author used terms like preferences, perceptions and attitudes almost interchangeably. It was not clear how the three research projects mentioned in the paper worked together so data was collected. Some of the tables were somewhat confusing. Tables should stand on their own and not require extensive elaboration. Finally, the paper requires some editing.

The study draws some interesting conclusions that merit further discussion. There are also a number of questions raised by this study. Agricultural professionals seem really concerned about the issues surrounding consumer education. Consumers do not seem to be as concerned. Why should the public be concerned where food comes from in this "society of abundance?" Have we provided a need to know from the consumer's perspective or agriculture's perspective? The recommendation related to education takes a leap from where the information was acquired to the formal education system. There is no indication that such a connection would work. "Ag in the Classroom" programming has been in existence since 1980, but do we have any indication that the public is more informed about agriculture now than ever? Have we given consumers a reason to care? What is their need and how do we fulfill it? So what do we have with this study? Where do we go from here? What research should follow up this study? What are the critical agricultural education research questions that need to be answered related to consumer education?

ATTITUDES TOWARD AGRICULTURE OF URBAN STUDENTS ENROLLED IN HIGH SCHOOL AGRICULTURAL EDUCATION BY GENDER AND ETHNICITY

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Introduction

In 1988, the National Research Council in Understanding Agriculture: New Directions for Education proposed establishing urban "magnet" schools for the agricultural sciences. These schools would serve to attract more urban, minority, and non-traditional students into agricultural education. The National FFA Organization (1993) reported that for the 1992-1993 school year, National FFA membership was 73% male and 88% White. An encouraging note of the report was that the proportion of minority and female students in lower grades was higher, possibly indicating the start of a trend. The minority agriculture teacher pipeline must be renewed (Bowen, 1994) and urban, agricultural magnet schools may be that pipeline.

In a benchmark survey, Mallory and Sommer (1986) found that high school students in California thought that agriculture offered a limited number of career opportunities which were low-paying, hard work, with little career stability. Luft and Giese (1991) in their study and from the literature found that the agriculture teacher had an influence on how students perceived agriculture and whether they enrolled in agriculture courses. Sutphin and Newsom-Stewart (1995) found no gender nor ethnicity differences in students' rationale for selecting high school agriculture courses, therefore they recommended that recruitment efforts can be single-focused. Wardlow, Graham, and Scott (1995) in a qualitative study conducted in a rural community in Arkansas concluded that minority agricultural professionals believed that exposure to careers in high school influenced students' career decisions and that role models of the same ethnicity can also have an influence. One interesting conclusion of this study was that the professionals believed that younger students tended to follow the same academic and career paths as older peers. If this holds true in urban settings, then agricultural magnet schools can be a pipeline for minority agriculture teachers and minority agricultural professionals.

Theoretical Framework

The theoretical framework is based on the career decision-making models from sociology and psychology. From these models we have a base for explaining why people choose to enroll or not enroll in a specific activity such as secondary agricultural education courses. People make decisions, including enrollment decisions, based on self characteristics and environmental factors (Herr & Cramer, 1992). Herr and Cramer (1992) summarized the Social Learning Theory of Krumbotz and his associates into four areas: genetic endowment and special abilities, environmental conditions and events, learning experiences, and task approach skills. Ethnicity is a consideration under the genetic endowment and special abilities area; therefore, ethnicity theoretically plays a role in decision-making. Lipsett (1962) stated that people make choices partially based on the factors of social class membership, home influences, school, community, pressure groups, and role perceptions. Each of these influence the decision to join or not join an activity, group, course of study, or occupation.

Crites (1969) summarized the psychological approaches to career decision making by stating that people make decisions because of motivation or personality variables. Career development can be divided into life stages and substages (Super, Crites, Hummel, Moser, Overstreet, and Warnath, 1957). In the tentative substage of the exploration stage, ages 15 to 24, adolescents examine career possibilities through fantasy, school classes, and part-time work. Super (1957) concluded that youth perform self-exploration as a result of the environment and situations in the home. He discussed the school as a place that allows for formal exploration of careers through courses, clubs and organizations, and other activities.

Purposes and Objectives

The purpose of this study was to assess the perceptions toward agriculture of students in an urban agricultural magnet school. The specific objectives of the study were to:

1. Describe selected demographic and situational characteristics of first year agricultural science and business students.
2. Compare these students using the above characteristics on reasons for enrolling, perceived barriers to enrolling, and personal opinions toward agriculture.

Procedures

The population of this study consisted of all first and second semester agricultural science and business students in an urban magnet school in a midwestern state during the Spring Semester, 1995. There were 26 first semester students and 28 second semester students. Because the population was so small, a census study was conducted. A survey packet was mailed to the agriculture teacher with instructions on administering the survey. Although the response rate was 100%, not all of the students answered all of the questions; however, all surveys were deemed to be complete enough to be useable.

The students were surveyed using a five-part questionnaire previously used in studies identifying factors influencing minority and nonminority students to enroll in agriculture courses (Talbert and Larke, 1995). That instrument had been pilot tested and reviewed for clarity and content validity. Using factor analysis and Cronbach's coefficient alpha, Talbert and Larke developed scales to measure attitudinal and enrollment constructs. There were eleven scales with a range of Cronbach's alphas from .67 to .86 and with three to 12 items per scale. The scales were grouped into the construct areas of reasons for enrolling, barriers to enrolling, and personal opinions toward agriculture. Students answered individual items using the Likert-type scale 1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree. Therefore, the higher the scale score the greater the student perceives that particular scale as a reason for enrolling, a barrier to enrolling, or more strongly agrees with the personal opinions scale. Internal consistency was measured for the scales using data from this study with Cronbach's alphas ranging from .71 to .94.

The reasons for enrolling scales were called Agriculture, Influential Persons, Disavowance, and Agricultural Career. The Agriculture scale measured the influence of the agriscience course and agriculture in general on the student's decision to enroll. Most of the items in this scale related to the traditional aspects of agriculture and agricultural education, such as animals, fairs and shows, and hands-on learning. The Influential Persons scale measured the influence of family members, friends, and school personnel on the decision to enroll. The Disavowance scale measured the influence on the enrollment decision of those things that the student perceived as out of his/her control such as the counselor placed the student in the course. The Agricultural Career scale measured the effect of vocational aspects of agriculture on the enrollment decision.

The barriers to enrolling scales were called Personal Negative, Teacher Negative, Course Negative, and Agriculture Negative. The Personal Negative scale involved negative interaction with students or influential persons. These items addressed such issues as not being like the other students in class, having negative experiences with other students, and receiving peer pressure not to enroll. The Teacher Negative scale involved negative interactions with the agriculture teacher. This scale contained items such as teacher discrimination, the teacher not being like the student, and the teacher being indifferent. The Course Negative scale measured the degree of incompatibility between the student and perceived qualities of the course. This scale included items about the FFA, course difficulty, and career preparation. The Agriculture Negative scale measured the negative perceptions of the student toward the field of agriculture. These items were related to the status, pay, and physical demands of agriculture.

The personal opinions toward agriculture scales were called Personal Career, Agricultural Occupations, and Occupational Requirements. The Personal Career scale measured the student's attitudes toward his/her entering an agricultural career. The Agricultural Occupations scale measured the student's perceptions regarding the variety and scope of the agriculture industry. These items related to parts of agriculture besides livestock and crop production such as natural resources, horticulture and landscaping, and agribusiness. The Occupational Requirements scale measured the student's perceptions regarding the requirements needed to obtain a career in agriculture. This scale included items related to the level of training, basic skills, education, and expertise needed for an occupation in agriculture.

Analysis of Data

The data were analyzed using SPSS/PC+ on an IBM-compatible desktop computer. Frequencies, percentages, and measures of central tendency and variance are reported. Inferential statistics, though normally used in sample studies, were used to develop a slice-in-time composite of past, present, and future urban, magnet school students. When used with a random sample, inferential statistics provide a mechanism for generalizing to the population represented by the sample. In this study, the use of inferential statistics does not mean that the findings can be generalized beyond the population of agricultural science and business students at this one urban, agricultural magnet school. However, the findings can be used to draw implications for other urban, agricultural magnet schools. Correlations were computed with an alpha level of .05 selected a priori. For this study, Davis' (1971) conventions for describing measures of association were used. Correlation coefficients of .70 or higher were described as very strong, .50 to .69 as substantial, .30 to .49 as moderate, .10 to .29 as low, and .01 to .09 as negligible. A correlation between two variables does not imply a cause-and-effect relationship. However, it can allow the development of a plausible causal hypothesis and plausible rival hypotheses which should then be further tested (Isaac & Michael, 1981).

Results

Table 1 shows the demographic characteristics of the population displayed by minority status. Students were classified as minority if they considered themselves to be Black, Native American, Asian-American, or Hispanic and classified as nonminority if they considered themselves to be White. There were 29 (53.7%) minority students and 25 (46.3%) nonminority students. Of the students classified as minority, 26 considered themselves Black and three as Native American. Almost two-thirds of minority students were female, while a majority of nonminority students were male. Almost all of the students were from an urban area or city of more than 50,000 population. For this study, it was assumed that students who received free or reduced lunch had parents or guardians with lower incomes and lower socio-economic status (SES) than students who did not receive free or reduced lunch. A majority of all students received free or reduced lunch, while close to three-quarters of minority students did. Greater than 85 percent of the students had no 4-H experience. One-fourth of the students planned to enter an agricultural career upon high school or college graduation and close to one-third planned to enter such a career within their working career. One-half of the minority students were unsure of their immediate agricultural plans and approximately one-third were unsure of their lifetime agricultural career plans. For nonminority students, 60% were unsure for both immediate and lifetime agricultural career plans.

Table 1.
Demographic Characteristics

Characteristic		Minority n*	Minority %	Nonminority n*	Nonminority %
Gender	Female	18	62.1	11	44.0
	Male	11	37.9	14	56.0
Location Where Live	Farm	0	0.0	0	00.0
	Rural	1	3.0	0	00.0
	Suburb	0	0.0	1	14.0
	City	28	97.0	24	96.0
Receive Free or Reduced Lunch	Yes	21	72.4	13	54.2
	No	8	27.6	11	45.8
Membership in 4-H	Yes	4	13.8	1	4.0
	No	25	86.2	24	96.0
Immediate Ag Career Plans	Yes **	7	25.0	6	24.0
	No	7	25.0	4	16.0
	Unsure	14	50.0	15	60.0
Lifetime Ag Career Plans	Yes **	9	31.0	8	32.0
	No	9	31.0	2	8.0
	Unsure	11	38.0	15	60.0

* n = those respondents who answered that item
** The categories of Probably Yes and Definitely Yes and the categories of Probably No and Definitely No were combined for reporting purposes in this table.

Tables 2 through 4 show the correlation coefficients for selected variables with the scales as described under the Procedures section of this paper. Table 2 shows the correlations between the reasons for enrolling scales and selected variables. There were no statistically significant relationships between gender, minority status, free lunch status, nor 4-H enrollment and the reasons for enrolling scales. However, there were moderate to substantial associations between probability of both an immediate and lifetime agriculture career and the scales of Agriculture, Influential Persons, and Agricultural Career.

agriculture career and the scale of Personal Career and a moderate association between these variables and the scale of Agricultural Occupations. There were no statistically significant relationships between any of the variables and the scale of Occupational Requirements.

Table 4.
Correlation of Selected Variables with Personal Opinions Scales

Scale[e]	Gender[a]	Minority[b]	Free/Reduced[c] Lunch	4-H[c]	AgNear[d]	AgLife[d]
Personal Career	.08	.01	.24	.17	.60***	.62***
Ag. Occupations	.24	.10	.33*	.40*	.46**	.40*
Occupational	.04	.02	.09	.24	.28	.28

* $p < .05$ ** $p < .01$ *** $p < .001$
a 1=Male 2=Female; [b] 1=Minority 2=Nonminority, [c] 1=No 2=Yes d 1=Definitely Not 2=Probably Not 3=Unsure 4=Probably Yes 5=Definitely Yes [e] 1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree

Students were split by class into those who first took agriculture classes during the first semester of the 1994-1995 school year and those who enrolled during the second semester to determine whether differences existed between the two groups (Table 5). There were no statistically significant relationships using class as a variable except for the two variables of probability of an agricultural career. There was a moderate association between both immediate and lifetime agriculture career and the variable of class. For both, second semester students were more likely to see themselves in an agricultural career than first semester students. There were no statistically significant relationships between the variable class and any of the scales.

Table 5.
Correlation of Students' Class with Selected Variables

Variable	Gender[a]	Minority[b]	Free/Reduced[c] Lunch	AgNear[d]	AgLife[d]
Class[e]	.10	.10	.21	.41**	.35*

* $p < .05$ ** $p < .01$ *** $p < .001$
[a] 1=Male 2=Female; [b] 1=Minority 2=Nonminority, [c] 1=No 2=Yes d 1=Definitely Not 2=Probably Not 3=Unsure 4=Probably Yes 5=Definitely Yes [e] 1= First Semester 2=Second Semester

Conclusions

The population studied was diverse in gender, ethnicity, and SES, while almost all of the students were from an urban environment with little prior agricultural experience. Despite their non-agricultural backgrounds, one-fourth of the students indicated that they saw themselves in an agricultural career after graduation while almost one-third saw themselves in an agricultural career sometime within their lifetime. Nonminority students were more likely to be unsure about both an immediate agricultural career and one within their lifetime. On the other hand, minority students were more decisive about their agricultural career plans, especially within their lifetime.

Minority status was not significant for any of the constructs. This confirms findings of Sutphin and Newsom-Stewart (1995) and White, Stewart, and Linhardt (1991), yet confounds findings of Talbert and Larke (1995). The Talbert and Larke study contained schools in which minority students constituted a small percentage of the sample, and contained only 26.5% minority students overall, which may explain the difference in findings. In addition, for nine of the 11 scales gender and SES were not significant. This may indicate that the shared life experiences from an urban environment were a greater influence on attitudes than these variables. The gender findings confirm those of Sutphin and Newsom-Stewart (1995).

The associations between whether a student saw themselves in an agricultural career and the reasons for enrolling scales of Agriculture, Influential Persons, and Agricultural Career were moderately to substantially strong. In addition, students who saw themselves in an agricultural career were more likely to have a higher opinion of their ability to enter an agricultural occupation. These students were also more likely to view agricultural occupations as diverse. Although correlational research does not indicate which variable influences which nor whether one or more other variables are involved, this finding does imply that students who believe they will enter an agriculture career are attracted to enroll in agriculture classes because of the field of agriculture itself, influential persons encouraging them to enroll, or vocational interests for which the course can prepare them. Students who did not see themselves in an agricultural career viewed the other agriculture students as a barrier to enrolling. These students also viewed the format and content of the course itself as a barrier. One conclusion is that negative peer influence can occur when students view other students as not wanting to be involved. Peer pressure can be both a strong positive or negative force. Maybe agriculture teachers can encourage positive peer interactions with students not interested in an agricultural career rather than letting negative influences push those students farther away.

Recommendations

For urban students in an ethnically diverse school, recruitment efforts for agricultural education and agricultural careers can be single-focused and not targeted to specific ethnic groups. These efforts should be aimed toward the students themselves and influential persons in their lives and should be designed to encourage students to see themselves in an agricultural career. Positive student-to-student interactions should be encouraged with inclusion rather than exclusion being the primary focus.

The population for this study was more than 50% minority. The Sutphin and Newsom-Stewart (1995), White, Stewart, and Linhardt (1991), and Talbert and Larke (1995) studies contained varying percentages of minority students. Is there a point at which above that percentage of minority students, those students feel more comfortable in an agriculture class and have more positive attitudes towards agriculture? This is an area in which more theoretical research needs to be conducted.

A follow-up study should be conducted using a random sample of students from all urban agricultural magnet schools in the country. This will allow the results to be generalized to a larger population.

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ATTITUDES TOWARD AGRICULTURE OF URBAN STUDENTS ENROLLED IN HIGH SCHOOL AGRICULTURAL EDUCATION BY GENDER & ETHNICITY

Discussant Remarks
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Studies focused on the urban student and his/her relationship to agricultural education should be encouraged. As a leader in urban agricultural education recently said "Urban programs of agricultural education are the future, wake up!" (Proctor, 1995). The author provides an example for agricultural educators to follow in gathering information about students in so-called urban programs.

The author provides an introductory statement to justify the investigation and goes on to frame the study using theory from sociology and psychology. This appears to be an appropriate foundation for the study. A statement directly connecting the theory to agricultural education would have provided a good transition to the purpose of the study. Referring back to this theory at the end of the paper would be helpful.

The purpose and objectives of the study appeared to be clear. It is not clear why only one school was used in the study. Did the researcher really study "attitudes" as the title indicates? When the title of the paper is compared to the substance of the paper there doesn't seem to be a close connection. It would depend on the definition of attitude.

Apparently, the author used an existing instrument. A lengthy description of the instrument was included in the paper but it seemed to be more complicated than it had to be.

The study seemed to be weakened by the small number of participants and the researcher seemed to continually stretch the potential implications as well as draw parallels to other studies which appeared to have larger data sources, although that fact is never made clear. How much of an impact did the agriculture teacher have on the results of the survey? What is meant by a survey packet with instructions?

The findings do not appear to be all that surprising. Career opportunities attract recruits. Significant others influence decisions. What is new here? Minority students have needs. We seem to be surprised these needs are the same as other people's needs.

There are a number of questions raised by this study?

1. What would the author do differently if this study were to be followed up with another study? What is the next step in this study? Where to from here?
2. What did we learn that can be used today/tomorrow in our programs?
3. What is the long term impact of this study?
4. What other studies should be conducted focused on urban programs? And how should they be conducted?
5. What are the critical research questions regarding urban programs in agricultural education?

Forum on Agricultural Education in Urban Schools: Final Report (1995). Iowa State University.

NATIVE AMERICAN HIGH SCHOOL STUDENT KNOWLEDGE AND PERCEPTION OF AGRICULTURE

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Introduction / Theoretical Framework

Agricultural literacy is based on the belief that every person should possess a minimum level of knowledge of the industry which produces and markets food needed for human survival. The rationale to support the development of agricultural literacy is based on the assumption that as societal awareness of problems and issues facing agriculture and food production increases, public pressure will increase for the development of policies which are mutually beneficial for both consumers and producers. Mawby (1990, p. 72) noted that by ". . . educating Americans in the wise management of food supplies and related renewable resources, we can anticipate more knowledgeable decision-making about agriculture in the future."

Men and women of all ages and ethnic groups have a vested interest in agriculture (Law and Pepple, 1990). Consumers as well as policy makers need to be "agriculturally literate" in order to respond appropriately as issues arise. Most Americans, whether young or old, have limited knowledge about agriculture and food production. While it may be difficult for the general public to define the term "agricultural literacy," many would agree with the need for a basic understanding of agriculture, the agricultural industry, and its importance to our country and citizens.

To address the problem of a society which has become increasingly illiterate (in an agricultural sense) with each passing generation (Birkenholz, 1990), there was a need to assess the knowledge and perceptions of United States citizens regarding agriculture, food, and food production. Tribal colleges have recently received land grant status from the United States Department of Agriculture. These new land grant colleges are uniquely situated to address the agricultural needs of the Native American population. Identifying shortfalls and misconceptions about agriculture is prerequisite to charting an appropriate course of action.

Purpose and Objectives

The purpose of this pilot study was to assess the agricultural literacy level of Native Americans in the west. Since this study was a pilot project, this subgroup of the U.S. population was assessed to provide baseline data reflecting the knowledge and perceptions of Native American high school students regarding agriculture and the food industry.

Three objectives were specified for this study as follows: 1) To assess the level of agricultural knowledge among Native American high school students; 2) To assess the level of agricultural perceptions among Native American high school students; 3) To describe the demographic variables of Native American high school students that may influence their agricultural literacy.

Procedures

A data collection instrument organized in three sections was developed for this study. The instrument included a knowledge section, perceptions section, and demographics section. The instrument was developed using Frick's (1990) Delphi study as the basis. However, for this study, Frick's eleven agricultural literacy concept areas were collapsed into seven areas. The concept areas were: (a) Societal and Global Significance of Agriculture, (b) Public Policy in Agriculture, (c) Agriculture's Relationship with the Environment and Natural Resources, (d) Plant Science, (e) Animal Science, (f) Processing of Agricultural Products, and (g) Marketing and Distribution of Agricultural Products.

A pilot test of the data collection instrument was conducted using four class sections of a World Food and Society course taught at a university during fall semester, 1992. The reliability of the knowledge section of the instrument was assessed by calculating a Kuder-Richardson 20 (KR-20) coefficient over all knowledge statements. The KR-20 computed for the knowledge section of the instrument was .85. The perception section of the instrument was assessed by computing a Cronbach's alpha coefficient as a measure of instrument reliability. The Cronbach's alpha coefficient computed for the items included in the perception section was .90. A national panel of experts in agricultural literacy reviewed the instrument for content validity and judge it as valid. Students at three high schools near a reservation were surveyed for this study. According to counselors at the three schools, the Native American population at two schools was 30% and at the third it was 70%. The instrument was administered to all students in each school. The data were collected on a single day at each school. There was no attempt to secure data from students who were absent on the day of collection.

The knowledge section directed respondents to answer either "True," "False," or "Don't Know" to each of 35 statements (i.e., five statements for each knowledge concept area). The second section of the data collection instrument (perceptions) consisted of 35 perception statements (i.e., five statements for each perception concept area) to which respondents were directed to use a Likert-type response scale ranging from Strongly Agree (1), to Neutral (3), to Strongly Disagree (5).

Demographic variables in section three included: gender, race, tribe, home location, population of nearest town, acreage of parents who farm, if relatives worked on a farm, if relatives worked in an agribusiness, agricultural courses taken, membership in FFA, and membership in 4-H.

Analysis of Data

The data were on the survey which instructed respondents to indicate their responses. Data analysis was completed using procedures available on the Quattro Pro Version 6 spreadsheet.

Results

Data will be presented to indicate demographic characteristics of the respondent group. Of the 115 respondents, 78 (60%) were female and 52 (40%) were male. The largest tribe was represented by the Sioux with 56 (43%) respondents. Other major tribes with respondents represented Sioux-Assiboine with 16 (12.3%), Assiboine with 16 (12.3%), and Sioux-Chippewa with 3 (2.3%). Fifteen respondents (11.5%) did not indicate a tribe. Other tribes represented by one or two respondents included, Chippewa, Mohican, Navajo, Apache, Cheyenne, Cherokee, and Blackfeet (19.7). Only 15 (11.5%) of the respondents noted that they were from a farm and 93 percent indicated that they lived nearest a community with a population under 10,000. Only 6 percent of the respondents indicated that they were also FFA members whereas 11.5 percent were 4-H members. Only 14.6 percent of the respondents had taken an agricultural education course in high school.

Table 1.
Demographic Characteristics of Native Americans at 3 High Schools in the West

Gender	Female	60.0
	Male	40.0
Tribe	Sioux	43.0
	Sioux-Assiboine	12.3
	Assiboine	12.3
	Sioux-Chippewa	2.3
	Other	19.3
	No Tribe	
Home	Farm	11.5
	Rural Area	16.1
	Town/City	71.5
Population	<2,500	43.0
	2,501 - 10,000	50.0
	10,000 - 25,000	7.0
	25,001 - 100,000	0
	>100,000	0
Size of Farm	No Farm	78.4
	10 - 50 acres	3.8
	51 - 200 acres	4.6
	200 - 750 acres	3.8
	>750 acres	6.1
Relatives on Farm	Yes	64.6
	No	35.4
Relatives in Agribusiness	Yes	56.9
	No	43.1
High School Agriculture	Yes	14.6
	No	85.4
FFA Member	Yes	6.1
	No	93.9
4-H Member	Yes	11.5
	No	88.5

N=130

Knowledge and Perceptions of Agriculture

Analysis involved the computation of means and standard deviations for the knowledge of agriculture and perception of agriculture scores for all respondents. Scores are reported for the overall knowledge and perception scale in addition to each of the seven concept areas comprising agricultural literacy.

The first objective was to assess the level of agricultural knowledge among Native Americans high school students. The Native American high school students produced a mean knowledge of agriculture score of 23.07 with a standard deviation of 3.21. The highest group mean knowledge score for the seven concept areas was found to be the Natural Resources concept area whereas the lowest group mean knowledge score was the Plant concept area. Table 1 presents the mean scores and standard deviations for the seven subject areas represented in the knowledge section of the instrument. Collective responses to some of the Knowledge items by the Native American respondents were considered worthy of noting by the researchers, but are not included because of lack of space for this proceedings. For instance, 50 percent of the respondents indicated "true" to the statement "Homogenization kills bacteria in milk with heat."

The second objective was designed to assess the level of agricultural perceptions among Native American respondents. The overall mean perception of agriculture score was for the Native American high school students was 107.07 with a standard deviation of 3.86. Lower perception scores reflected more positive perceptions of agriculture. The Native American high school group produced lower (most positive) perception mean scores for the Marketing and Plants concept area, whereas the highest (least positive) score was in the Natural Resources concept area. The mean perception scores and standard deviations for the seven subject areas are presented in Table 2. Collective responses to some of the Perception items by the Native American respondents were considered worthy of noting by the researchers, but are not included because of lack of space for this proceedings. For instance, 68.1 percent of the respondents "strongly agreed" or "agreed" that "Farmers and ranchers take good care of their animals."

Table 2. Means and Standard Deviations of Agriculture Knowledge Scores by Native Americans at 3 High Schools in the West

Domain	Concept Area	Native American Knowledge Scores (n=130)
Knowledge:	Total	23.07 [b] / 3.21 [a]
	Significance	2.21 [c] / .87
	Policy	2.23/.92
	Natural Resources	2.96/.86
	Plants	1.82/.93
	Animals	2.90/.90
	Processing	2.12/.89
	Marketing	2.23/.89

[a]Mean / Standard Deviation.
[b]Total Knowledge scale ranged from 0 to 35.
[c]Knowledge concept scales ranged from 0 to 5.

Table 3.
Means and Standard Deviations of Agriculture Perception Scores by Native Americans at 3 High Schools in the West

Domain	Concept Area	Native American Perception Scores (n=130)
Knowledge:	Total	107.07/3.86[b]
	Significance	13.21 [c] /1.03
	Policy	13.7/1.11
	Natural Resources	14.1/1.14
	Plants	12.9/1.05
	Animals	13.7/1.23
	Processing	14.1/.943
	Marketing	11.5/1.09

[a] Total Perception scale ranged from 35 to 175.
[b] Mean / Standard Deviation.
[c]Perception concept scales ranged from 5 to 25.

Conclustions and Recommendations

The following conclusions were based on the findings of this study:

1. The overall mean level of knowledge of agriculture concept areas held by Native American high school students in this study is moderate to high but concept area means varies widely.

2. Although the Native American high school students' overall mean level of knowledge of agriculture is moderate to high, responses to particular items by the entire group did not parallel the overall knowledge score.

3. Native American high school students' were most knowledgeable about the Natural Resources and Animal concept areas, whereas the lowest group mean knowledge score was the Plant concept area.

4. The overall mean level of perceptions toward agricultural literacy subjects held by Native American high school students is positive but varies by concept area.

5. Although the Native American high school students' overall mean perception score is moderate; however, responses to particular items by the entire group did not parallel the overall perception score.

6. The Native American high school students' group produced lower (most positive) perception mean scores for the Marketing whereas the highest (least positive) score was in the Natural Resources concept area. This observation is noteworthy since it does not correspond with the high Natural Resources knowledge score of the respondents. One explanation worth researching may be that their

indigenous knowledge and culture that has been handed down for generations form an attitude toward natural resources that would be unlike those who assisted in formulating the survey.

This study provides evidence of the need to further educate a population who primarily live near reservations that are devoted, in most cases, to agricultural uses. It should be recognized that the data collected from respondents cannot be generalized to any population on a statistical basis. However, the findings may have practical implications for food and agriculture policy makers, and should direct researchers to further examine the issue of agricultural literacy in this country, especially with other Native American populations.

A relatively low knowledge concept mean score was produced in the area of Plants in Agriculture. This concept area appears to be a target area for future educational efforts to enhance the knowledge and understanding of U.S. citizens. However, there is sufficient room for improvement in the knowledge levels of each of the seven concept areas included in this study. A study should be conducted to determine Native American students interest in the subject areas and topics used in the instrument.

Inservice programs should be developed to assist educational personnel in their efforts to increase the agricultural literacy level of Native American students. Special attention should be given to those concept areas which receive the lowest Knowledge scores and the highest Perception scores.

Agricultural Literacy is a concept founded on the premise that citizens of the United States should possess a basic understanding of the industry of agriculture. This study provides evidence of the need to further educate the general public regarding the industry which produces and markets the food needed to sustain human life. It should be recognized that the data collected from respondents cannot be generalized to any population on a statistical basis. However, the findings may have practical implications for food and agriculture policy makers and should direct researchers to further examine the issue of agricultural literacy in this country.

Relatively low knowledge concept mean scores were produced in the areas of Plants in Agriculture, and Agricultural Policy for both groups. These areas appear to be target areas for future educational efforts to enhance the knowledge and understanding of U.S. citizens. However, there is sufficient room for improvement in the knowledge levels of each of the seven concept areas included in this study.

Teachers in elementary and secondary schools should be encouraged to develop a greater understanding of the importance and significance of agriculture in this country and the world. Instructional assistance should be provided through pre-service and inservice programs which would facilitate the use of agricultural examples in elementary and secondary school classes. Graduates of our secondary school systems should not be considered to have received a "well-rounded education" if they lack an understanding and appreciation of the significance of agriculture in their daily lives.

With the USDA recently giving tribal colleges land grant status, more agricultural literacy efforts directed toward native American populations could be centered out of the tribal colleges facilities. Formalized agricultural education programs at high schools that service large segments of Native American students should be considered as a means to increase agricultural literacy. Working with tribal councils and tribal college administrations is the first step in establishing such programs. Therefore, it is recommended that the USDA investigate the possibility of implementing a national initiative directed toward enhancing the agricultural knowledge of all Native Americans through tribal colleges.

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NATIVE AMERICAN HIGH SCHOOL STUDENT KNOWLEDGE AND PERCEPTION OF AGRICULTURE

Discussant Remarks
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Studies in Agricultural Education involving the Native American student and the various indigenous cultures of this country are long overdue. The authors attempt to gather information that can help us understand more about perceptions regarding agriculture held by diverse populations.

The authors set the stage with an introduction that provided a reason to study agricultural literacy issues. However, it is not clear what theory base or framework the study had as its foundation.

The purpose and objectives were clear, however it appeared that there was going to be some discussion of impact of demographics but there never was. The procedures were clearly stated, however it was not clear why the eleven concept areas were collapsed to seven. It was also not clear why these 3 schools were selected. Was a new panel of experts used for the new instrument or was information from the first review used? The data analysis description did not appear to be very clear, however it appears the authors attempted to do what they set out to do.

The conclusions appeared to be a repeat of the findings. There were several sentences that were used more than once in the paper. The paper needed more editing and review. It appears a lot of data was left out of the paper but should have been included based on specifications followed by other papers in this session.

Having reported all of the above mentioned information, the paper does raise a number of questions that give reason for researchers to consider further investigation of the issues surrounding "agricultural literacy."

1. What constitutes literacy? With all due respect to panels of experts, it is not likely these panels included anybody outside of agriculture or education with ties to minorities, or were there?
2. How "much" does one need to know to have an understanding and an appreciation for agriculture? Who says so? Who sets the limits?
3. Why should American citizens have a basic understanding of agriculture? Whose understanding and to fill what need?
4. Are we trying to force an understanding of agriculture for our (agriculture's) purposes and needs or are we interested in the needs of those we are trying to educate?
5. Since nearly three-fourths of these respondents considered themselves urban (town/city), why are these results any different than what we would expect? How will enhancing the agricultural knowledge of Native Americans help them? It appears that proceeds from casinos have a far more powerful influence on these people than agriculture will ever have.
6. So what do we have as a result of this study? What can we use? Where do we go from here? What do these results contribute to the big picture?
7. What is the next level of study regarding literacy? What are the big research questions in this area?

The study has raised far more questions than it has answered. Perhaps this fact is appropriate. It depends however on what we are willing to do with what was learned and how we attempt to answer the questions that were raised.

CASE ANALYSIS OF A WEBSITE FOR AN AGRICULTURAL EDUCATION COURSE

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Introduction and Theoretical Framework

Applications of the Web in Higher Education Classes

The Internet has become a popular and useful tool for teachers and students in higher education. As Pool, Blanchard and Hale (1995) stated, "A connection to the Internet offers electronic access to many forms of information, including document (text and graphical) browsers, general communications systems, electronic mail, newsgroups, and hypertext retrieval systems" (p. 24). According to Newman, Raven & Day (1996), the World Wide Web (WWW or Web) is the most user friendly and fastest way to share such information on the Internet.

The opportunities and benefits for using the Web seem limitless. Dyrli (1995) opined that because of the many capabilities of the Web, it actually lives up to its "hype." He further stated that the Web "has the potential to change the nature of teaching and learning significantly" (p. 51). Colleges and universities across the nation have worked diligently to develop a presence on the Web. The Web U.S. Universities website (TeamWeb, 1996a) lists 1069 American universities with websites. These sites include information ranging from photos and sounds from the campus (Academic Computing Services, 1996) to news for alumni and supporters (WebMaster, 1996). But, the greatest application of the Web may very well be for graduate and undergraduate classes.

On-line learning is becoming a common component of higher education programs (Kearsley, Lynch & Wizer, 1995). An increasing number of instruction-related Web sites are being developed for a variety of purposes (Shotsberger, 1996). Shotsberger (1996) pointed out these course websites provide many services ranging from archiving class materials to providing opportunities for students to complete a course off-campus. He went on to say that most websites serve as an adjunct to the classroom. Thus, the majority of information on such sites consists of class notes, handouts, and illustrations.

One of the best indices of courses available on the Web is The World Lecture Hall (TeamWeb, 1996b) at the University of Texas. This website lists courses in categories from Accounting to Zoology, including Agricultural Education.

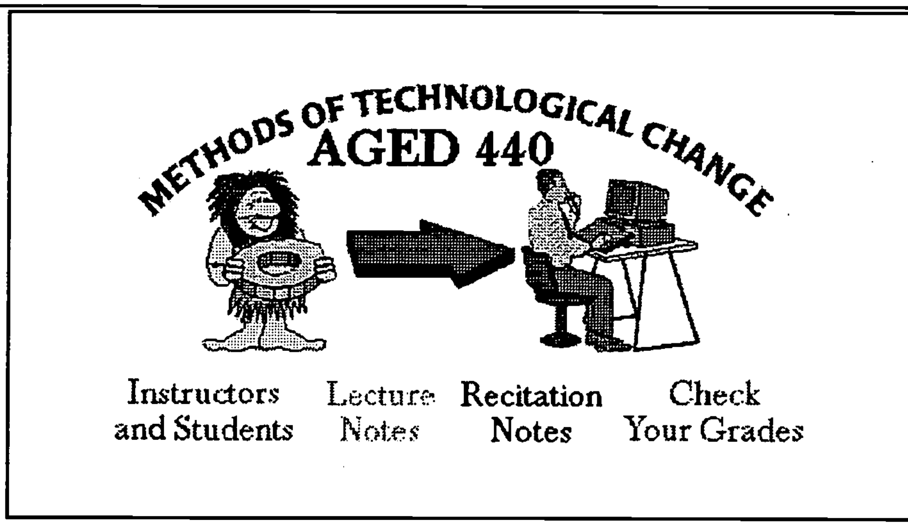
What are the benefits of these websites for agricultural educators? Newman, Raven and Day (1996) found that students taught using Web laboratory techniques in a technical writing class achieved at a higher level than did their counterparts taught using traditional classroom methods. Other researchers found further benefits from using the Web with classes such as challenging students, helping students gain an edge, and providing a new way of learning (Pool, Blanchard & Hale, 1995). Dyrli (1995) pointed out that the Web frees teachers and students from using only the instructional materials available on their campus.

Many educators have been captivated by the attractiveness, speed, and multitude of resources on the Web (Hertzberg, 1995). Agricultural educators can certainly be included in that group. In December of 1995, Newman, Terry and Raven (1995) stated that very few agricultural educators have a website for their classes. That number has increased significantly since then. As of May, 1996, 14 departments of agricultural education have homepages. A search of these sites revealed homepages for several agricultural education courses. One such website is the one used with AGED 440, Methods of Technological Change.

The AGED 440 Website -- the "Treatment"

Agricultural Education 440, Methods of Technological Change, is a long standing offering of the Department of Agricultural Education. The course is a requirement for students majoring in Agricultural Development and also meets the social science requirement in the core curriculum for other students. The class limit is 80 students. There are two lecture periods each week with all 80 students, then one recitation session each week with twenty students per section. There is no text required for the class; however, students are required to purchase and use a 106-page course packet printed locally.

The AGED 440 Website was initially developed by the researcher in the summer of 1995 for use during the Fall 1995 semester. The primary features were the course syllabus, outline of assignments, and materials from the course packet. Throughout the Fall term, features were added and enhanced as the researcher gained more skill in webpage development and received feedback from students. Further refinements and formatting changes were made prior to the Spring 1996 semester. A clickable imagemap was used to guide students through the webpage (see Figure 1). The primary sections of the website were "Instructors and Students," "Lecture Notes," "Recitation Notes," and "Check Your Grades."



Welcome to the AGED 440 Webpage!

This site is intended for the use of students currently enrolled in AGED 440 and other persons interested in the course. You can get to know the instructor better, put faces with names of students in the class, download visuals used during lectures, download contents of the course packet, even check your grades. We're always looking for ways to improve the site. Be sure to e-mail the instructor with your comments and suggestions! Simply click on the colored phrases above to explore that area. If you can't use the graphics interface, click on the phrases below:

- Instructor and Students
- Lecture Notes
- Recitation Notes
- Check Your Grades

Figure 1. Clickable imagemap from AGED 440 Website.

The Instructors and Students section included a link to the lead instructor's homepage and a short biography on each of the teaching assistants. There were also links to each of the three teachers' e-mail accounts. This section of the webpage also had a photo of each student in the class.

The Lecture Notes section was composed of a daily outline of the course with links to PowerPoint Presentations used in lecture and the corresponding readings that were formerly included in the course packet. The information was made available in its original format (Microsoft PowerPoint and Microsoft Word documents) as well as Portable Document Format (PDF) that could be viewed with Adobe Acrobat (see Figure 2). The Recitation Notes were organized in the same way. PDF has become a popular way to place documents on websites because they can be downloaded with their page layout style with computers with different types of operating systems (Lynch, 1996).

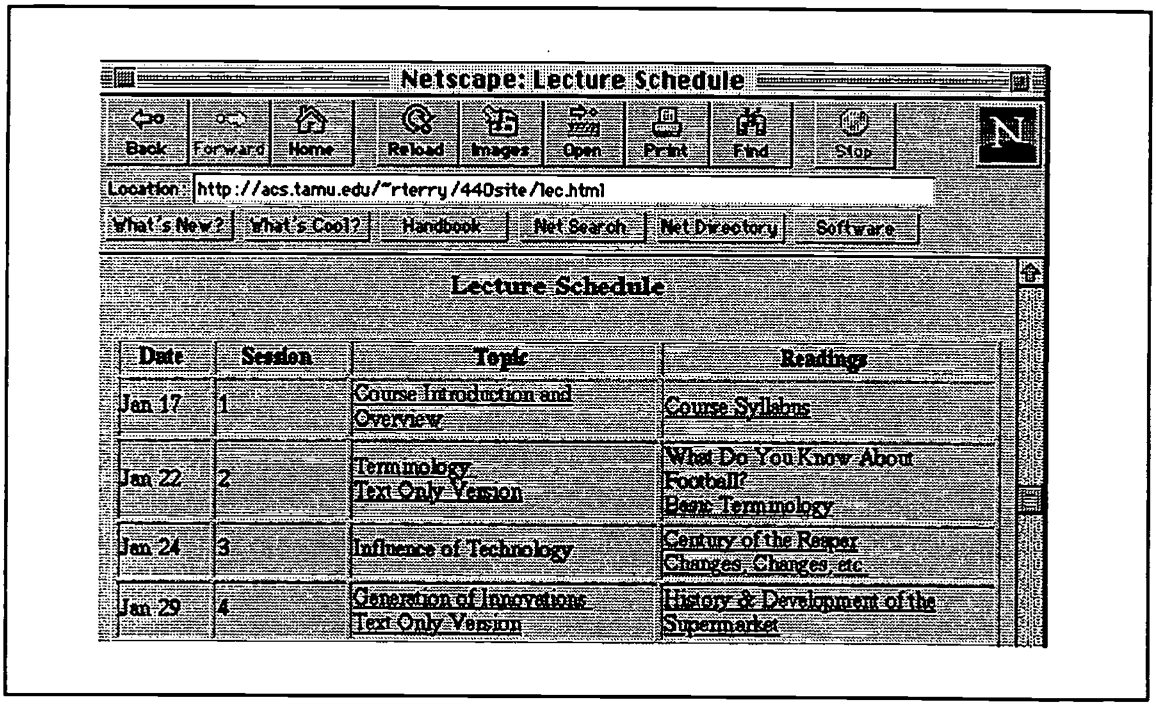


Figure 2. Organization of Lecture Notes section of AGED 440 Website.

The Check Your Grade feature provided students a way to find out their scores on tests, quizzes and assignments. Each student was given a password to access their personal information. The student's individual grades were then taken from a database and displayed in the format shown in Figure 3. In addition, individualized notes from the instructor could be sent from the database to accompany the student's grade report.

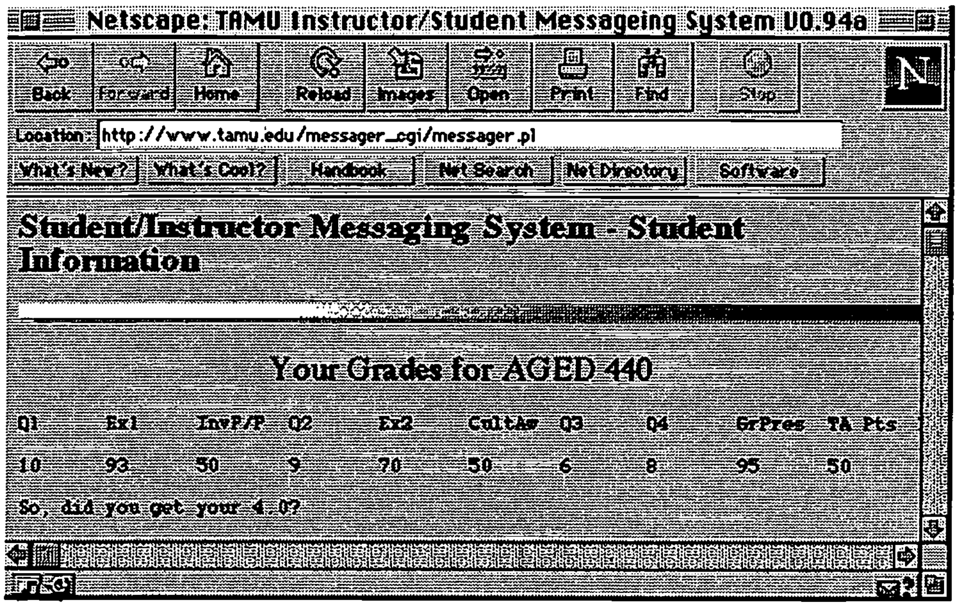


Figure 3. Display of individual student grades from Grade Check system.

Purposes and Objectives

The purpose of this study was to evaluate students' use and perceptions of the AGED 440 Website. The following objectives were formulated to accomplish this purpose:

1. Identify selected personal characteristics of students and their computer competency.
2. Determine how students utilized the AGED 440 Website.
3. Describe the students' perceptions regarding the AGED 440 Website.
4. Identify barriers to students' use of the AGED 440 Website.
5. Determine relationships between and among the students' personal characteristics and computer competency, their use of the website, and their perceptions of the website.

Methods and Procedures

This study was a case evaluation of a website developed for AGED 440 -- Methods of Technological Change. The population was all students who took the class during the Spring 1996 semester (N=80). A census of the population was used in the study.

A questionnaire was developed by the researchers to gather data related to the objectives of this study. The questionnaire was reviewed by other faculty who use websites with their classes and minor modifications were made based upon their suggestions. The questionnaire included scaled response items as well as open-ended response items.

Data were collected during the class session for the final examination. Seventy-nine useable, completed questionnaires were collected. Students responded to 19 items (Terry & Briers, 1996). Four items identified some personal characteristics of students: gender, academic major, classification, and college grade point average.

Three items were used to determine how students rated their own level of knowledge, skill, and use of computers and computer technology before taking AGED 440. These items were combined into a scale called "Computer Competency." The internal consistency of the scale, measured with the Cronbach's alpha procedure, was .65. Scale responses were interpreted on a scale from 1, indicating low competence, to 5, indicating high competence.
The second composite variable was named "Use of AGED 440 Website." This scale consisted of five items. Students indicated their level of use of various components of the website. Scale scores were interpreted from 0, no use, to 3, extensive use. A Cronbach's coefficient alpha of .67 indicated an internally consistent scale acceptable for this evaluation research.

Five items were used to indicate students' opinions about specific components of the website. Students indicated their level of agreement or disagreement with six statements about the availability and appropriateness of the website and its contents. These 11 items were combined to yield a composite, scaled variable labeled "Perceptions of the AGED 440 Website." So, for example, positive opinions about specific components of the website and strong agreement on appropriateness of the website provided an overall high score on "Perceptions of the AGED 440 Website." The scale ranged from 1, strong negative perception, to 5, strong positive perception. The internal consistency of this scale was .83.

Finally, students were asked in one more item to indicate how much they believed they might use the World Wide Web after taking AGED 440. Data were analyzed using SPSS for the PC. Descriptive statistics were calculated for each variable. In addition, correlation coefficients were calculated for appropriate pairs of variables. Table 1 shows the conventions developed by Davis (1971) that were used for describing the correlations.

Table 1.
Conventions for Describing Relationships of Correlations

Level of Association	Correlation Coefficient Range
Very strong association	.70 - 1.0
Substantial	.50 - .69
Moderate	.30 - .49
Low	.10 - .29
Negligible	.01 - .19

Results

Personal Characteristics of Students

Of the 79 students participating in the study, 45 were male. Almost 85% of the students were juniors and seniors and one freshman took the class. Fifty-six of the students were majoring in Agricultural Development or Agricultural Science, the two degrees offered in the Department of Agricultural Education, 16 were majoring in other areas of agriculture, and 7 were majoring in areas other than agriculture. The average grade point record (GPR) for the students was 2.7 on a 4.0 scale. One student had a 4.0 cumulative GPR, and the lowest reported GPR was 1.7.

Computer Competence of Students

Nearly 76% of the students had completed one or more computer classes while in college. Twenty students had completed three courses. More than 87% of the students rated their computer use knowledge and skill Good or Excellent. Two students rated their knowledge and skills Poor. Thirty-five students had computers at their college residence. Of those, four had a connection to the Internet. Of the remaining 44 students, 39 indicated they had plans to purchase a personal computer before they graduate from college.

Students were asked to indicate their experience with the World Wide Web prior to taking AGED 440. Forty-three percent said they had heard of it, but had never used it. Nearly 33% stated they had used it fewer than 20 times. There were more students who had never heard of the World Wide Web (4) than those who had developed webpages (3). The mean score for the scale "Computer Competence" was 2.29, with a range from 1.00 to 4.33 on a scale of "1" indicating low competence to "5" indicating high competence.

Use of the AGED 440 Website

The mean number of times students visited the AGED 440 Website ranged from 0 to 99 with a mean of 13.1 times. Students were asked to indicate what information they downloaded and/or printed from the website.

Twenty-one students downloaded/printed all of the course information provided (course schedule, description, assignment, etc.). Twelve students accessed most of this information, 18 students accessed little of the information, and 28 accessed none of the information. The vast majority of the students (82.3%) did not download/print any of the student photos from the website. Nearly 52% downloaded/printed the PowerPoint presentations used in lecture, and more than 49% downloaded/printed the course readings. The scaled variable "Use of the AGED 440 Website" was computed on a 0 - 3 scale, with "0" indicating no use, and "3" indicating extensive use. The mean for this variable was 1.16.

Perceptions of the AGED 440 Website

Students were asked to indicate their opinions about the website using a five-point scale ranging from Very Negative (1) to Very Positive (5). The mean for the students overall opinion of the AGED 440 Website was 4.20 on the five-point scale. When asked about specific areas of the webpage, the Instructor Information was rated 4.49, the Student Photos were rated 4.10, the Lecture Notes (PowerPoint presentations) received a rating of 4.40, and the Grade Check function was rated 4.60. Table 2 displays these data.

Table 2.
Opinions about the AGED 440 Website

Item	Very Positive	Somewhat Positive	Neutral	Somewhat Negative	Very Negative	Mean[1]
Overall	38	27	7	6	1	4.20
Instructor Info	49	21	8	1	0	4.49
Student Photos	38	17	20	3	0	4.10
Lecture Notes	52	19	1	3	3	4.41
Grade Check	59	11	6	3	0	4.60

[1]Scale: 5 = Very Positive; 4 = Somewhat Positive; 3= Neutral; 2 = Somewhat Negative; 1 = Very Negative.

Students were asked to provide their level of agreement with statements about the website and how it was used in AGED 440. They were to respond using a five-point scale that ranged from Strongly Agree (5) to Strongly Disagree (1). Nearly three-fourths of the students strongly agreed or agreed with the statement, "It is easy to locate the information I want." When asked about the information on the website being useful for the students needs, 93.7% marked "Strongly Agree" or "Agree" with one student marking "Strongly Disagree." Even more students agreed that the layout of the website looked nice (96.2%). Sixty of the 79 students agreed that the AGED440 Website increased their interest in the Internet with no students indicating the strongly disagreed with this statement. More than 72% of the students agreed that the website "fit" with the subject of the course. No students disagreed or strongly disagreed with this item. When asked if they would have preferred to purchase the course readings from a copy center rather than using the website to download them, more than half of the students disagreed. Only 14 students strongly agreed with that statement. Table 3 shows how students responded to each item in this section.

Table 3.
Agreement with Statements about AGED 440 Website

Item	Strongly Agree	Somewhat Agree	Neutral	Somewhat Disagree	Strongly Disagree	Mean[1]
It is easy to locate information I want	30	36	5	8	0	4.11
The information is useful for my needs	50	24	4	1	0	4.56
The website looks nice	61	15	3	0	0	4.73
Website increased my interest in the Internet	35	25	18	1	0	4.19
Website is a good "fit" with the subject	57	17	5	0	0	4.66
Would rather have bought the materials from a copy center[2]	14	13	10	16	26	2.66

[1]Scale: 5 = Strongly Agree; 4 = Somewhat Agree; 3= Neutral; 2 = Somewhat Disagree; 1 = Strongly Disagree.
[2]This item was reverse-scored to develop the scale score "Perceptions of AGED 440 Website."

Barriers to Using the AGED 440 Website

Students were to indicate what barriers prevented them from using the website. No student indicated their lack of interest in the content of the website was a barrier to their use of the technology. Twenty-eight students considered lack of easy access to a computer to be a barrier, 26 indicated they did not know enough about the Internet, and 17 said they did not know enough about computers.

The barrier most commonly cited was that they became frustrated while using the website. If students marked this item, they were to describe what caused their frustrations. Even though the second recitation period of the class was held in one of the campus computer labs to show students how to use the website and step-by-step instructions were handed out in lecture, several students indicated that did not understand how to use the website to access, download, and print information. Other students expressed frustration with the dependability of the server and lack of help from helpdesk personnel. Below is a sample of some of their responses:

> *"I couldn't ever figure out how to use the PDF files and the guys at the helpdesk were no help."*
>
> *"Would like more detailed instructions on downloading info at the start of semester. Some of us (especially the over 25 crowd) don't know about the Net."*
>
> *"I couldn't get anything on the screen that was written in English at first. Towards the end of the semester, though, it was easy to use."*
>
> *"There was always a problem when I wanted to print."*
>
> *"I found it difficult to get help when I was at the computer labs."*
>
> *"I could never get it to work right."*
>
> *"Many times, I would visit the site and nothing would come up."*
>
> *"The information was never as easy to get as you made it sound."*

Future use of the World Wide Web

Students were asked to indicate how often they expected to use the Web after taking AGED 440. Half of the students said they would used it seldomly or never. Nineteen said they would use it frequently, and seven indicated they planned to develop webpages.

Relationships Among Selected Variables

The major variables of concern from the data collected were Computer Competence (an independent variable), Use of the AGED 440 Website, and Perception of the AGED 440 Website (dependent variables). Other important moderator variables (independent) were gender, classification, and GPR. Results of exploration of the relationship among these variables are shown in Tables 4 and 5. The six potential barriers to use of the AGED 440 Website were also considered dependent variables. Table 6 shows these relationships.

The only relationship that had more than negligible association with gender was Use of the AGED 440 Website, which with an r value of .26. Though the association was considered to be low, females tended to be more positive about the website than did males. Amount of use of the AGED 440 Webpage had moderate association with Perceptions of the AGED 440 Webpage (.32), computer use (.31), and future use of the World Wide Web (.42). Future use of the Web was also moderately associated with perceptions of the AGED 440 Website (.37) and previous compute use and skill (.46). However, computer competence had only low association with perceptions of the AGED 440 Website (.15).

Table 4.
Relationships of Independent Variables to Dependent Variables

	Dependent Variables		
Independent Variables	Perception of AGED 440 Web-site	Use of AGED 440 Website	Future Use of WWW
Computer Competence	.15[a]	.31[a]	.46[a]
Gender (1= female, 2= male)	.16[b]	-.05[b]	-.05[b]
Classification (1 = fresh, 2= soph, 3= junior, 4= senior)	.06[c]	.26[c]	.14[c]
GPR	.27[a]	-.13[a]	.16[a]

Procedure Used: [a] Pearson, [b] Point Biserial, [c] Spearman.

Table 5.
Relationships of Scaled Variables

	Variables	
Variables	Use of AGED 440 Website	Future Use of the WWW
Perception of AGED 440 Website	.32	.37
Use of AGED 440 Website	--	.42

Note: Pearson's r correlation procedure used.

Correlations were also measured between the computed scales and the barriers to use of the AGED 440 Website. Each of the barriers except "Became frustrated trying to use the Website" had at least low association with amount of use of the AGED 440 Website, perceptions of the AGED 440 Website, previous computer competence, and future use of the World Wide Web. Three of the relationships had more than a low association. The barrier "Don't know enough about the Internet" was moderately associated with previous computer competence (-.41) and future use of the World Wide Web (-.32). "Didn't have easy access to a computer" was moderately associated with previous computer competence (-.37). These data are displayed in Table 6.

	Other Variables			
Barriers[a]	Computer Competence	Perception of Website	Use of Web-site	Future Use of Internet
No easy access to a computer	-.37	-.25	-.22	-.29
Don't know enough about computers	-.29	-.23	-.23	-.29
Don't know enough about the Internet	-.41	-.23	-.19	-.32
Became frustrated trying to use website	-.12	-.28	-.01	-.01

Note: Point Biserial correlation procedure used.
[a] Scoring used to quantify students' responses to "Was this a barrier?" was: 1= yes, 0= no.

Conclusions

1. The student composition of this class, in terms of gender, classification, academic major, and GPR is typical of AGED 440 classes for the past four years and similar to other upper-level Agricultural Education courses at this University.
2. While 87% of the students rated their computer knowledge and skill as "excellent" or "good," fewer than half had ever used the World Wide Web. On a 1-5 composite scale, students scored below the midpoint (2.29); so, their overt perceptions of their competence were higher than their "measured competence."
3. Students' perceptions about the AGED 440 Website were positive. The students were most positive about the on-line grade checking function, instructor information, and availability of lecture notes from the website.
4. The students visited the website, on average, once for each week of class. Half of the students downloaded or printed the presentation graphics used in class and the course readings from the website.
5. Students found the website to be functional and appropriate for the class. They strongly agreed that the website was aesthetically appealing, that it met their needs, and that it was a good "fit" for a class about change.
6. Lack of interest in the content was not a barrier to students using the AGED 440 Website. The most common barriers to using the website were associated with access to the website (due to computer terminal availability and/or Internet server problems) and ability to use the technology.
7. Gender did not influence the use of the AGED 440 Website or anticipated use of the World Wide Web. It had only a low influence on perception of the website, with females being more positive than males.
8. Computer competence, that is, previous experience with computers, taking computer classes, and previous use of the Web, had a moderate relationship with use of the AGED 440 website and future use of the Web. So, the more experience students had with computers coming into the class, the more they tended to use the class website.
9. Perception of the AGED 440 Website was moderately associated with use of the Website and expected future use of the World Wide Web. Use of the Website was also moderately associated with the expected future use of the Web.
10. Three barriers to using the Website -- lack of easy access to a computer, lack of knowledge about computers, and lack of knowledge about the Internet -- were moderately associated with computer competence, perception of the AGED 440 Website, use of the Website, and future use of the Web.

Recommendations

1. The World Wide Web has become a major form of communication, particularly information dissemination, yet students with little or no experience with the Web considered their computer use skills to be good or excellent. Computer application courses should include units on how to use the Web to access, download, and print information.
2. Students were positive about each of the components of the AGED 440 Website and indicated the content of the Website met their needs. The Website should continue to be used with AGED 440 and should maintain each of its major components.
3. Even though an entire recitation period was used to introduce the Website and the teacher provided guidelines and in-class discussions about using the Website, students need more information on using the features of the AGED 440 Website. Class or laboratory time should be used to provide students an orientation to a class website. Students should be introduced to the features of the website and procedures for effectively using it.
4. Because of the benefits of this website and the fact that it was viewed favorably by the students, similar websites should be developed for other agricultural education classes. Websites should be used to distribute course materials, to allow students to check their grades, and to communicate with instructors.
5. Other tools of the Internet, such as Listservs, should be integrated with AGED 440 and other courses. Listservs provide a useful communications link between and among students and instructors of a course.
6. Teaching faculty should make special efforts to keep abreast of new developments of the Internet and other communications technologies so they can be used with the classes they teach. Not only does application of such technologies enhance the course, they also expose students to applications they will likely use in their careers.
7. As websites for classes become more commonplace, they should continue to be evaluated to determine if the findings from this study are a result of the "novelty" of the Web, or if the Web's positive attributes and student appeal extend beyond its novelty.

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CASE ANALYSIS OF A WEBSITE FOR AN AGRICULTURAL EDUCATION COURSE

Discussant Remarks
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This case study sought to provide student perceptions of a specific class website and its utilization in AGED 440. The theoretical framework provided was sound, the explanation of the "treatment" was comprehensive, the methodology systematically conducted, and the results, conclusions, and recommendations logically presented.

The webpage setup was explained in detail as to the contents. The methodology used to conduct the study appeared to be appropriate. The study collected several items of personal characteristics. The population consisted of all students electing to enroll in AGED 440 at Texas A&M University.

Questions which may need to be addressed:

1. Why was most of the personal characteristics data collected when it was simply reported and the variables, except for gender, were really never used in making comparisons?

2. How are we, as educators, going to make this environment more friendly to our users in the future? Should we expect our students to be coming to us with more Internet/Webpage experience, not just computer experience?

3. What are your plans to make this a more interactive style of teaching tool?

4. Should Teacher Educators in Agricultural Education be adding Internet/webpage competency as a skill all Agricultural Education graduates should have?

The study was interesting, and the authors are to be commended for their efforts. I believe they accomplished their purpose and encourage others to pursue similar types of studies in the future.

THE EFFECTS OF WORLD WIDE WEB INSTRUCTION AND TRADITIONAL INSTRUCTION ON ACHIEVEMENT AND CHANGES IN STUDENT ATTITUDES IN A TECHNICAL WRITING IN AGRICOMMUNICATION COURSE

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Introduction and Theoretical Framework

The use of educational technologies such as computers and telecommunications offers great potential for improving the delivery of high quality instructional programs (McCaslin & Torres, 1992). In the future, our information society projects a world linked entirely by telecommunications (Dyrli, 1993). The World Wide Web (WWW) is currently the most exciting, user-friendly, and fastest way to share information on the Internet. A multimedia/hypermedia part of the Internet, the WWW brings a graphical user interface to world wide networking by allowing full integration of color graphics, text of varying typefaces, animation, video and sound (Seguin & Seguin, 1995). Over 24 million people worldwide currently use the Internet, 18 million of whom are in the United States, with the number growing geometrically (Nielsen, 1995; Raven & Settle, 1995).

According to Marrison and Frick (1994), "Multimedia is a multi-faceted approach to computer based education that brings together text, animation, graphics, video, and audio" (p. 26). Many companies have developed multimedia packages to aid in instruction. However a new innovation is that of hypermedia. Hypermedia, as an information presentation and representation system, has four advantages: nonlinearness, associativity, flexibility, and efficiency (Liu, 1994). Hypermedia based instruction differs from traditional instruction because there is no specific sequence for proceeding from one point to another (Liu, 1994). Therefore Learners are able to choose ways of pursuing the content. Because of its ability to present information through text, graphics, audio, and video, hypermedia holds much potential for optimizing learning (Liu, 1994).

Numerous universities throughout the country have on-line classes, with the number of hypermedia-based course materials and lessons being placed on home pages increasing (Raven & Settle, 1995). These classes provide students with an additional supplement to the classroom experience in the form of a class home page. Students are able to access assignments, reading materials, quizzes, videos, graphics, audio, slide presentations, and other useful information. In agriculture, however, very few professors have courses on-line at the present time (Newman, Terry, & Raven, 1995).

"A continual dilemma experienced by educators is how to respond to the changing face of society and stay focused on the impacts technology could have in the teaching and learning process" (Marrison & Frick, 1994, p. 26). Because the World Wide Web is such a new medium, little information exists on the effectiveness of courses taught using the Web. Some benefits include improving students' computer abilities and information processing abilities, providing students with teachers' lecture materials, and providing students with links to related information so they can study the subject matter in more depth (Newman, Raven, & Day, 1995; Newman, Terry, & Raven, 1995).

Student Achievement and Attitudes

According to Chinien and Boutin (1994), changes in instructional materials and methods should be evaluated in terms of achievement, study time, and attitude toward the course material. In an experimental study of computer-assisted instruction in mathematics, Ganguli (1992) found that the CAI instruction group experienced higher enjoyment, more motivation, and better understanding of the concepts in the course. In a college chemistry course, subjects taught using a computer simulation scored better than students taught using the traditional lecture method and the learning cycle method (Jackman, Moellenberg, & Brabson, 1987).

Researchers have differed in their findings, however, when studying student attitudes toward the computer as an instructional tool. Some researchers have found that giving students the opportunity to use computers in instruction increases their attitudes toward using the computer (Kinzie, Delcourt, & Powers, 1994; Busch, 1995). Other researchers have concluded that students' attitudes may either increase or decrease with more experience (Weil, Rosen, & Wugalter, 1990; Campbell & Williams, 1990).

Principles of Teaching and Learning

Principles of teaching and learning provide the foundation for all phases of the instructional process (Newcomb, McCracken, & Warmbrod, 1993). Beginning Fall 1995, the researchers designed a World Wide Web-based course in technical writing in agricommunication in an effort to implement these principles better. This study is a report of the effectiveness of that course.

Of the 12 principles of teaching and learning described by Newcomb, McCracken, and Warmbrod (1993), the researchers believe that 6 principles are demonstrated more effectively with the use of the World Wide Web for instruction as opposed to traditional lecture-discussion methods. These 6 principles and how they were demonstrated in the Web-based course are discussed in more detail below.

Subject matter to be learned must possess meaning, organization, and structure that is clear to students so that learning proceeds more rapidly and is retained longer. Teaching that is creative, interesting, and challenging to students and results in students' achieving a high level of mastery begins with course study that makes sense. The subject matter needs to pertain to the objectives of the course and be divided into subunits. Students need to see how important the subject matter is to their futures (Newcomb, McCracken, & Warmbrod, 1993). For each unit in the Web-based course, the home page for that unit included the objectives for the unit and subject matter and assignments directly related to the objectives.

Behaviors that are reinforced (rewarded) are more likely to be learned. If behaviors to be learned are skills, they are more likely to recur and be retained if the correct performance of the skill is rewarded (Newcomb, McCracken, & Warmbrod, 1993). In the laboratory portion of the Web-based course, teachers supervised the work of the students and provided immediate feedback. Additionally, students who used the scoresheets provided on the class home page to check their major assignments received a higher grade, rewarding their behavior.

Reward (reinforcement) must follow as immediately as possible the desired behavior and be clearly connected by the student. Students need to understand that they have demonstrated a level of achievement or performance as well as what they did right to achieve this level (Newcomb, McCracken, & Warmbrod, 1993). The use of electronic mail to submit laboratory assignments and feedback meant that the students did not have to wait until the next class meeting to find out how they performed. For some laboratory assignments, students received immediate feedback from the instructor teaching the class.

Directed learning is more effective than undirected learning. Both the teacher and student need to be aware of what is going on and why. Teachers need to be task-oriented and business-like (Newcomb, McCracken, & Warmbrod , 1993). One of the primary benefits of the Web-based course was that the entire course was laid out for the students to help them see how all of the content fit together. Students had a constant reminder of what the course had provided in the past and would provide in the future and what the instructor felt was the most important information in each unit. They could review and study the course content at any time.

To maximize learning, students should "inquire into" rather than "be instructed in" the subject matter. The simple message of this principle is that "students learn" and "teachers teach". Through the students' own activity, study, and practice that is supervised by the teacher, they acquire, attain, and use skills and attitudes (Newcomb, McCracken, & Warmbrod, 1993). In addition to the course textbook, students in the Web-based course could go to the course home page and review the instructor's lecture notes, examples of quality assignments completed by students from previous semesters, scoresheets for all major assignments, and reading assignments for each unit. If they wanted more information, most units contained links to other World Wide Web sites.

Students learn what they practice. The teaching techniques a teacher uses are accompanied by students' practicing certain learning behaviors, cognitive skills, psychomotor skills, and attitudes. Practice must be accompanied with supervision because students could be practicing error instead of success (Newcomb, McCracken, & Warmbrod, 1993). For the major assignments, students were expected to complete the assignments outside of class. For students in the Web-based class, however, the laboratory provided students the benefit of practicing while being supervised by the instructor.

Purpose

The purpose of this study was to determine the effect of type of instruction on student achievement and attitudes in a three-credit hour, technical writing in agricommunication course. The two methods of instruction were traditional instruction without a laboratory and World Wide Web instruction with a laboratory. To accomplish the purpose, two research hypotheses were developed:

H_1: Students in AEE 3203 - Technical Writing in Agricommunication taught using World Wide Web instruction with a laboratory will have higher group means on selected application questions on the midterm examination than those taught using traditional instruction.

H_2: Students in AEE 3203 - Technical Writing in Agricommunication taught using World Wide Web instruction with a laboratory will have higher group means on the major class project than those taught using traditional instruction.

H_3: Students in AEE 3203 - Technical Writing in Agricommunication taught using World Wide Web instruction with a laboratory will have higher mean increases than those taught using traditional instruction on the following attitude scales:

a. Attitude toward computers,
b. Attitude toward writing,
c. Attitude toward the Internet, and
d. Attitude toward learning about writing.

Methods

To determine the effects of method of instruction on students' achievement, a posttest-only experimental design was used. To determine the change in student attitudes, a pretest-posttest experimental design was used. According to Campbell and Stanley (1966), both designs control for the major threats to internal validity. These designs were appropriate for comparing the effectiveness of the two types of teaching (Borg & Gall, 1989).

Population and Sampling

The population of the study consisted of 58 undergraduate students at Mississippi State University enrolled in AEE 3203, Technical Writing in Agricommunication during Fall semester, 1995. AEE 3203 is a technical writing course for juniors and seniors in the College of Agriculture and Home Economics. Although class size is typically limited to 28 students, 57 students were allowed to register for Section 2 of the class, taught at 10:00 a.m. on Monday, Wednesday, and Friday. Prior to the first day of class, students were randomly assigned to one of two groups, A or B. The treatment level was then randomly assigned to the groups. Group A was assigned to be the traditional course. Group B became the World Wide Web course. Each group had 29 students. One student from Group B withdrew from the university.

Description of Treatments

Students in Group A received a traditional, 3-credit-hour course. Students attended class three times per week for 50 minutes each class session. Students purchased a textbook and a course packet of handout materials. Traditional media, primarily the chalkboard and overhead transparencies, were used in instruction. Each student completed seven major assignments for the class: a review of a journal article, a memorandum, a business letter, a letter of application, a press release, a technical report (about a subject in their field), and an oral presentation about the technical report. A midterm and final examination also were given.

Students in Group B participated in a "Web-supported class" (Newman, Terry, & Raven, 1995). Students in this class attended two 50-minute class sessions each week (on Monday and Wednesday) and one 50-minute laboratory each week (on Friday). The primary medium used in the class sessions was computer-generated slides using a computer, overhead projector, and LCD display panel. The laboratory consisted of assignments based on each week's class sessions which the students completed in a computer laboratory under the supervision of the course instructor. Some assignments could be completed in the laboratory, but others required students to continue to work on the assignments outside of regular class time. Students could turn in these assignments using electronic mail. Students purchased the course textbook but did not purchase the handout materials. All supplemental course materials, including regular and laboratory assignments, were provided on the AEE 3203 home page on the World Wide Web (URL: http://www.msstate.edu/Dept/AgEdExp/3203/). In addition, all of the computer-generated slides used in the class sessions were available to students via the AEE 3203 home page. Students were required to complete the same seven major assignments as Group A. They also took the same midterm and final examination.

The AEE 3203 home page consists of links to twelve units for technical writing in agricommunication. A typical unit includes lab assignments, regular assignments, score sheets, reading assignments, links to other sources, content not provided in the textbook, slides from lectures, and examples of good and bad assignments from previous semesters.

Instrumentation

Two application questions on the midterm examination were used as one measure of students' achievement. The questions were developed by six instructors who teach different sections of the course. One question involved writing a memorandum. The other involved editing a business letter. Although the midterm examination contained other questions that measured students' knowledge of cognitive concepts related to technical writing and the communication process, these questions were selected because they required students to apply the concepts in actual writing activities. Content validity of the measurement is assumed because the two questions reflected the overall objectives of the course.

The midterm examination was used as one measure of achievement in this study for several reasons, but four of them are the most important. First, this study is a formative study and results were needed to justify replicating the study during Spring 1996 and Fall 1996. Second, the two application questions on the midterm have been used and refined over several semesters by the various instructors. Third, some students have "made their grade" (or not made it) by the end of the semester and don't prepare for the final with as much diligence as they do for the midterm examination. Fourth, the majority of the content of the course as far as writing skills has been taught by the time students take the midterm examination.

To control for experimenter effect, the questions were graded by a graduate assistant. The graduate assistant was provided with a scoring key developed by the instructors of the course.

The other measure of student achievement was the major class project, a technical report that accounted for 25% of their course grade. The technical report was to be written following the guidelines set forth in Writing for Technicians (Barnett, 1987), the textbook for the course. Each technical report was graded by the researchers using a standardized rating scale that incorporated the criteria presented in class and in the text. The inter-rater reliability among the researchers was over 95% agreement.

To measure the attitudes of the students toward computers, writing, the Internet, and learning about writing, the researchers developed semantic differential instruments. Each instrument contained 10 sets of bipolar adjectives with a seven-place scale between for students to indicate where their feelings existed. All four instruments contained the same 10 sets of adjectives.

Reliability estimates for the semantic differential instruments were obtained through the use of a pilot test. The pilot test was conducted during a Summer 1995 session of AEE 3203--the same class used for this study. Obtained reliability estimates were as follows: computers-.96, writing-.81, the Internet-.84, and learning about writing-.87.

Although the groups were randomly assigned, group sizes were still small (N=57). Therefore, student attitudes were measured on the first day of class and the last day of class, with gain scores used as the dependent variables for hypothesis 3.

Statistical Analysis

For the purpose of statistical analysis, the researchers treated the students in the study as a sample of possible students who might enroll in the course (Allen, Abaye, McKenna, & Camp, 1995). Based on this approach, inferential statistics were used in the analyses. The following null hypotheses were tested at the *a priori* alpha level of .05:

$H1_0$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group means on selected application questions between students taught using the World Wide Web instruction and those taught using traditional instruction.

$H2_0$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group means on the major class project between students taught using the World Wide Web instruction and those taught using traditional instruction.

$H3_0$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group mean increases on the following attitude scales between students taught using World Wide Web instruction with a laboratory and those taught using traditional instruction:

a. Attitude toward computers,
b Attitude toward writing,
a. Attitude toward the Internet, and
b. Attitude toward learning about writing.

An independent t-test was used to test the first two hypotheses, to determine the difference between group means on the two questions from the midterm examination and the difference between group means on the major class project. This statistic is appropriate when determining the differences between two independent groups on one dependent variable (Borg & Gall, 1989).

To reduce the family-wise error rate for the second null hypothesis, a multivariate analysis of variance was used to determine if the students were different on the set of attitude scales taken as a whole. If a statistically significant difference was found, follow-up analyses would include one-way analysis of variance for each individual scale.

Results

Hypothesis 1

Group A, the traditional group, had a mean of 27.34 out of a possible 50 points on the two questions. Group B, the World Wide Web group, had a mean of 31.68 (see Table 1). The independent t-test yielded a significant t-value, indicating the group means were significantly different. The null hypothesis was rejected and the research hypothesis was retained.

Table 1.
Comparison of Group Means for Achievement on Selected Midterm Questions (N=57)

Group	n	Mean	t	p
A - traditional	29.00	27.34	3.32	.002
B - World Wide Web 28	31.68			

Hypothesis 2

The second measure of achievement was student scores on the major class project, a written technical report. Students in Group B, the World Wide Web group, had a mean of 212.00 out of a possible 250. Students in Group A, the traditional group, had a mean of 182.55. An independent t-test revealed that the scores were statistically significantly different. The null hypothesis was rejected and the research hypothesis retained. The analysis is summarized in Table 2.

Table 2.
Comparison of Group Means for Achievement on Major Class Project (N=57)

Group	n	Mean	SD	t	p
A - traditional	29	182.55	24.22	4.14	.000
B - World Wide Web	28	212.00	26.33		

Hypothesis 3

For each of the attitude scales, Group B, the World Wide Web group, had higher mean gains than Group A, the traditional group. A MANOVA revealed a statistically significant difference between the two groups when the four scales were taken as a whole ($p = .02$). Univariate F-tests revealed that the group means for two of the scales, writing and the Internet, were statistically different. Table 3 contains a summary of the analysis for Hypothesis 3.

Table 3.
A Comparison of Group Mean Attitude Gains for Computers, Writing, the Internet, and Learning About Writing (N=57)

Scale/Group	Pretest	Posttest	Gain	F	p
Computers					
A-traditional	48.6	49.1	0.5	0.11	.744
B- World Wide Web	50.6	50.1	-0.5		
Writing					
A - traditional	47.3	46.5	-0.8	7.39	.009
B - World Wide Web	41.3	46.7	5.4		
The Internet					
A - traditional	43.3	47.1	3.8	4.02	.050
B - World Wide Web	41.9	53.4	11.5		
Learning About Writing					
A - traditional	47.8	47.1	-0.7	0.38	.540
B - World Wide Web	46.2	47.0	0.8		

Conclusions

Students who were taught using the World Wide Web with a laboratory achieved at a higher level than those students who were taught using the traditional classroom approach. Using the combination of World Wide

Web-supported instruction with a practical laboratory is a better method of teaching students technical writing than a traditional classroom approach.

Teaching using the World Wide Web with a laboratory improved students' attitudes toward writing and the Internet and did not harm their attitudes toward computers and learning about writing.

Recommendation

The researchers recommend that future sections of AEE 3203 -- Technical Writing in Agricommunication at Mississippi State University be taught using the World Wide Web with laboratory technique. This recommendation will be implemented beginning with the Fall Semester, 1996.

Researcher Concerns

The threat of experimental treatment diffusion was a concern of the researchers, because students in the two groups were often friends, sometimes even roommates. Several of the students enrolled in this particular section of the class because their friends also enrolled in this section. In a few instances, these friends were separated due to random assignment. To attempt to control for this threat, some of the students in the traditional group were interviewed to try to determine whether they had used the Web-based instruction outside of class. The students interviewed indicated that they had not. The researchers concluded that experimental treatment diffusion was not a serious threat to the internal validity of the study. This conclusion was further supported by the results of the study. It appears that the traditional group did not take advantage of the Web-based materials, although they were available to anyone with access to the Web throughout the semester.

Another concern, albeit a minor one, of the researchers was that taking the time in class and laboratory to teach students in the World Wide Web group how to use the computer would mean that students would be behind students in the traditional group in the amount of subject matter content taught in class. Two class periods and two lab periods were devoted to instruction in using Netscape, the World Wide Web browser provided on the laboratory computers, and in how to send, read and manage electronic mail. Additionally, laboratory time was often spent teaching some functions of WordPerfect, the word processing program provided on the laboratory computers, so students could complete the laboratory assignments. The results of the study indicated that this concern was not a problem in the study. Apparently, the problem-solving approach used to teach the World Wide Web group motivated students to make up for the class time lost by spending more time outside of class inquiring into the subject matter.

One possible threat to internal validity that could not be controlled for is novelty effect (Borg & Gall, 1989). Novelty effect means that a new instructional technique may be more effective at first simply because it is new. Of the 28 students in this study who were in the World Wide Web group, only one had browsed the Web previously, and none had ever taken a course where the primary organization and much of the content was provided via the Web. Whether novelty is a real threat to validity can only be determined in future studies as students come into the class with World Wide Web experience.

Recommendations for Further Study

More research is needed to explain further the effectiveness of the World Wide Web as an instructional technique. The Web is a fast-growing medium, but this is the first experimental study that has focused on using the Web for college-level instruction. The results of this study cannot be generalized to other populations or other subject matter. The results of this study, however, indicate that the World Wide Web is potentially an effective medium for instruction. This supports conclusions by Swortzel and McCaslin (1995).

Changes in instructional materials and methods should be evaluated in terms of achievement, study time, and attitude toward material. This study focused only on achievement and attitudes. Further research should also include the amount of time students spend studying outside of class when the different teaching methods are used (Chinien & Boutin 1994).

Another area that needs study is the effectiveness of World Wide Web-based instruction for students with different learning styles. Cognition/learning style can be an important source of learning failure (Chinien & Boutin, 1993). Much research has been conducted on student learning styles, but researchers disagree about the effectiveness of multimedia/hypermedia-based instruction (such as the World Wide Web) for students with different learning styles. Marrison and Frick (1994) found that field-independent learners found multimedia instruction easier and more exciting, but found no significant differences in achievement between field dependent and field independent learners. Liu (1994) found that different learning style groups employed different learning strategies in accomplishing the same task in a hypermedia environment, indicating that hypermedia has potential as an instructional medium for learners of various learning styles. This study supports Liu's finding in that learning styles were assumed to be equal in the two groups due to random assignment. The researchers recommend, however, that learning styles be included in similar studies that are not experimental in nature.

The instructor who taught the Web-based course was comfortable with the technology used in the course. The results could be different if this were not the case. The level of familiarity of the instructor with the technology should also be included in future studies of a similar nature.

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THE EFFECTS OF WORLD WIDE WEB INSTRUCTION AND TRADITIONAL INSTRUCTION ON ACHIEVEMENT AND CHANGES IN STUDENT ATTITUDES IN A TECHNICAL WRITING IN AGRICOMMUNICATION COURSE

Discussant Remarks

Michael K. Swan
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These studies sought to provide student attitudes towards world wide web instruction versus traditional instruction and its utilization in AEE 3203. The theoretical framework provided was sound, the methodology systematically conducted, and the results, conclusions, and recommendations logically presented.

The technical writing in agricommunication course was the source for data collection for both of these studies. The methodology used to conduct these studies were experimental and quasi-experimental in nature and appeared to be used appropriately. The population of both studies consisted of students enrolled in AEE 3203 at Mississippi State University.

Questions which may need to be addressed:

1. Did teaching using the World Wide really improve students attitudes toward writing or was it a fascination with the web?

2. When we use the World Wide Web as a vehicle for delivering lessons or course materials do we actually lose instructional time because we also need to include instruction on how to use the web?

3. Are we really providing a quality product, course lesson, when we use the web as a teaching technique or teaching tool?

4. Where do we go now or in the future with this type of technology?

The study was interesting, and the authors are to be commended for their efforts. I believe they accomplished their purpose and encourage others to pursue similar types of studies in the future.

A QUASI-EXPERIMENTAL COMPARISON OF ACHIEVEMENT AND STUDENT ATTITUDES AS INFLUENCED BY WORLD WIDE WEB INSTRUCTION AND TRADITIONAL INSTRUCTION

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Introduction and Theoretical Framework

The use of educational technologies such as computers and telecommunications offers great potential for improving the delivery of high quality instructional programs (McCaslin & Torres, 1992). In the future, our information society projects a world linked entirely by telecommunications (Dyrli, 1993). The World Wide Web (WWW) is currently the most exciting, user-friendly, and fastest way to share information on the Internet. A multimedia/hypermedia part of the Internet, the WWW brings a graphical user interface to world wide networking by allowing full integration of color graphics, text of varying typefaces, animation, video and sound (Seguin & Seguin, 1995). Over 24 million people worldwide currently use the Internet, 18 million of whom are in the United States, with the number growing geometrically (Nielsen, 1995; Raven & Settle, 1995).

Marrison and Frick (1994) indicated, "Multimedia is a multi-faceted approach to computer based education that brings together text, graphics, audio, video, and animation" (p.26). Many companies have developed multimedia packages to aid in instruction. However a new innovation is that of hypermedia. Hypermedia, as an information presentation and representation system, has four advantages: nonlinearness, associativity, flexibility, and efficiency (Liu, 1994). Hypermedia based instruction differs from traditional instruction because there is no specific sequence for proceeding from one point to another (Liu, 1994). Therefore learners are able to choose ways of pursuing the content. Because of its ability to present information through text, graphics, audio, and video, hypermedia holds much potential for optimizing learning (Liu, 1994).

Numerous universities throughout the country have on-line classes, with the number of hypermedia-based course materials and lessons being placed on home pages increasing (Raven & Settle, 1995). These classes provide students with an additional supplement to the classroom experience in the form of a class home page. Students are able to access assignments, reading materials, quizzes, videos, graphics, audio, slide presentations, and other useful information. In agriculture, however, very few professors have courses on-line at the present time (Newman, Terry, & Raven, 1995).

Marrison and Frick (1994) stated, "A continual dilemma experienced by agricultural educators is how to respond to the changing face of society and stay focused on the impacts technology could have in the teaching and learning process" (p.26). Because the World Wide Web is such a new medium, little information exists on the effectiveness of courses taught using the Web. Some benefits include improving students' computer abilities and information processing abilities, providing students with teachers' lecture materials, and providing students with links to related information so they can study the subject matter in more depth (Newman, Raven, & Day, 1995; Newman, Terry, & Raven, 1995).

Providing on-line course materials such as lecture notes may increase the connection between the class and other course content (Butler, 1995). Further, supplying good on-line documentation of course content may increase how students use other course materials such as textbooks (Butler, 1995).

According to an Australian study, the use of hypertext showed no evidence of increasing teaching effectiveness. In the same study, however, students enjoyed learning from the World Wide Web, and using a class web page increased the efficiency of the instructor in disseminating information (Hart, 1995).

Student Achievement and Attitudes

According to Chinien and Boutin (1994), changes in instructional materials and methods should be evaluated in terms of achievement, study time, and attitude toward the course material. In an experimental study of computer-assisted instruction in mathematics, Ganguli (1992) found that the CAI instruction group experienced higher enjoyment, more motivation, and better understanding of the concepts in the course. In a college chemistry course, subjects taught using a computer simulation scored better than students taught using the traditional lecture method and the learning cycle method (Jackman, Moellenberg, & Brabson, 1987).

Researchers have differed in their findings, however, when studying student attitudes toward the computer as an instructional tool. Some researchers have found that giving students the opportunity to use computers in instruction increases their attitudes toward using the computer (Kinzie, Delcourt, & Powers, 1994; Busch, 1995). Other researchers have concluded that students' attitudes may either increase or decrease with more experience (Weil, Rosen, & Wugalter, 1990; Campbell & Williams, 1990).

Principles of Teaching and Learning

Principles of teaching and learning provide the foundation for all phases of the instructional process (Newcomb, McCracken, & Warmbrod, 1993). Beginning Fall 1995, the researchers designed a World Wide Web-based course in technical writing in agricommunication, in an effort to better implement these principles.

Of the 12 principles of teaching and learning described by Newcomb, McCracken, and Warmbrod (1993), the researchers believe that 6 principles are demonstrated more effectively with the use of the World Wide Web for instruction as opposed to traditional lecture-discussion methods (Newman, Raven, & Day, 1996).

Purpose

The purpose of this study was to determine the influence of type of instruction on student achievement and attitudes in a three-credit hour, technical writing in agricommunication course. The two methods of instruction were traditional instruction without a laboratory and World Wide Web instruction with a laboratory. To accomplish the purpose, two research hypotheses were developed:

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H_2: Students in AEE 3203 - Technical Writing in Agricommunication taught using World Wide Web instruction with a laboratory will have higher group means than those taught using traditional instruction on the following attitude scales:

a. Attitude toward writing,
b. Attitude toward learning about writing,
c. Attitude toward computers, and
d. Attitude toward the Internet.

Methods

To determine the influence of teaching method on students' achievement, a static group comparison quasi-experimental design was used (Borg & Gall, 1989). According to Campbell and Stanley (1966), this design does not control for selection, mortality, or interaction of selection and maturation as threats to internal validity. To determine the change in student attitudes, a nonequivalent control group quasi-experimental design was used (Borg & Gall, 1989). Campbell and Stanley (1966) stated that this design controls all the major threats to internal validity except for the interaction of selection and maturation.

Population and Sampling

The population of the study consisted of undergraduate students at Mississippi State University enrolled in AEE 3203-Technical Writing in Agricommunication during Fall Semester, 1995. AEE 3203 is a technical writing course for juniors and seniors in the College of Agriculture and Home Economics. Class size is typically limited to 28 students. Six sections of the class were taught, three traditional and three with the World Wide Web. Group A, sections 4, 5 and 6, was assigned to be the traditionally taught group. Group B, sections 1, 2 and 3, became the World Wide Web-instructed group.

Description of Treatments

Students in Group A received a traditional, 3-credit-hour course. Students in section 6 attended class three times a week for 50 minutes each class session (on Monday, Wednesday, and Friday). Students in section 5 attended class two times a week for 75 minutes each session (on Tuesday and Thursday). Students in section 4 attended class once a week for 150 minutes (on Wednesday). Students purchased a textbook and a course packet of handout materials. Traditional media, primarily the chalkboard and overhead transparencies, were used in instruction. Each student completed seven major assignments for the class: a review of a journal article, a memorandum, a business letter, a press release, letter of application, a technical report (about a subject in their field), and an oral presentation about the technical report. A midterm and final examination also were given.

Students in Group B participated in a "Web-supported class" (Newman, Terry, & Raven, 1995). Students in sections 1 and 2 attended two 50-minute class sessions each week (on Monday and Wednesday) and one 50-minute laboratory each week (on Friday). Section 3 attended one 75-minute class session each week (on Tuesday) and one 50-minute laboratory (on Thursday).The primary medium used in the class sessions was computer-generated slides using a computer, overhead projector, and LCD display panel. The laboratory consisted of assignments based on each week's class sessions which the students completed in a computer laboratory under the supervision of the course instructor. Some assignments could be completed in the laboratory, but others required students to continue to work on the assignments outside of regular class time. Students could turn in these assignments using electronic mail. Students purchased the course textbook but did not purchase the handout materials. All supplemental course materials, including regular and laboratory assignments, were provided on the AEE 3203 home page on the World Wide Web (URL: http://www.msstate.edu/Dept/AgEdExp/3203/). In addition, all of the computer-generated slides used in the class sessions were available to students via the AEE 3203 home page. Students were required to complete the same seven major assignments as Group A. They also took the same midterm and final examination.

The AEE 3203 home page consists of links to twelve units for technical writing in agricommunication. A typical unit includes lab assignments, regular assignments, score sheets, reading assignments, links to other sources, content not provided in the textbook, slides from lectures, and examples of good and bad assignments from previous semesters.

Instrumentation

The measure of student achievement was students' scores on the major class project. The technical report accounts for 25% of the students' course grade. The technical report requirements were developed by the six instructors who teach the course. Content validity of measurement is assumed because the technical reports reflect the objectives of the course. The technical report was to be written following the guidelines set forth in Writing for Technicans (Barnett, 1987), the textbook for the course. Each technical report was graded by the researchers using a standardized rating scale that incorporated the criteria presented in class and in the text. The inter-rater reliability among the researchers was over 95% agreement.

To measure the attitudes of the students toward computers, writing, the Internet, and learning about writing, the researchers developed semantic differential instruments. Each instrument contained 10 sets of bipolar adjectives with a seven-place scale between for students to indicate where their feelings existed. All four instruments contained the same 10 sets of adjectives.

Reliability estimates for the semantic differential instruments were obtained through the use of a pilot test. The pilot test was conducted during a Summer 1995 session of AEE 3203--the same class used for this study. Obtained reliability estimates were as follows: computers - .96, writing - .81, the Internet - .84, and learning about writing - .87.

Student attitudes were measured on the first day of class and the last day of class, with means used as the dependent variables.

Statistical Analysis

For the purpose of statistical analysis, the researchers treated the students in the study as a sample of possible students who might enroll in the course (Allen, Abaye, McKenna, & Camp, 1995). Based on this approach, inferential statistics were used in the analyses. The following null hypotheses were tested at the *a priori* alpha level of .05:

$H1_0$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group means on the major class project between students taught using the World Wide Web instruction and those taught using traditional instruction.

$H2_0$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group means on the following attitude scales between students taught using World Wide Web instruction with a laboratory and those taught using traditional instruction:

a. Attitude toward computers,
b. Attitude toward writing,
c. Attitude toward the Internet, and
d. Attitude toward learning about writing.

A one-way analysis of variance was used to determine the difference between group means on the technical reports. Analysis of covariance was used to determine differences between group means on the attitude scales.

Results

Hypothesis 1

Group A, the traditional group, had a mean of 190.41 out of a possible 250 points on the technical reports. Group B, the World Wide Web group, had a mean of 208.10 (see Table 1). The one-way analysis of variance yielded a significant F-value, indicating the group means were significantly different. The null hypothesis was rejected and the research hypothesis was retained.

Table 1.
Comparison of Group Means for Achievement (N=164)

Group	n	M	F	p
A - traditional	85	190.41	10.50	.001
B - World Wide Web	79	208.10		

Hypothesis 2

An analysis of variance was conducted on each of the attitude scales using the pretest as the covariate. Tables 2 and 3 summarize the data for students' attitudes toward writing. World Wide Web students' attitudes toward writing increased during the semester. Traditional students' attitudes toward writing decreased during the semester. There was a statistically significant difference in attitudes toward writing between students taught using World Wide Web instruction and traditional instruction.

Table 2.
Pretest and Posttest Means of Students' Attitudes toward Writing (n=150)

Group	Pretest	Posttest	
		Adjusted	Unadjusted
World Wide Web	43.9	48.3	47.6
Traditional	45.8	44.9	45.6

Table 3.
Analysis of Covariance of Students' Attitudes toward Writing: Posttest Scores with the Pretest as the Covariate (n=150)

Source	SS	df	MS	F	p
Covariate (Prestest)	7330.0	1.0	7330.0	146.5	.000
Method 413.8	1.0	413.8	8.3	.005	
Residual	7355.6	147.0	50.0		
Total	14834.0	149.0	99.6		

Tables 4 and 5 summarize the data for students' attitudes toward learning about writing. World Wide Web students' attitudes toward learning writing increased during the semester. Traditional students' attitudes toward learning about writing decreased during the semester. There was a statistically significant difference in attitudes toward learning about writing between students taught using World Wide Web instruction and traditional instruction.

Table 4.
Pretest and Posttest Means of Students' Attitudes toward Learning about Writing (n=151)

Group	Pretest	Posttest Adjusted	Posttest Unadjusted
World Wide Web	47.2	48.8	48.8
Traditional	47.1	45.9	45.9

Table 5.
Analysis of Covariance of Students' Attitudes toward Learning about Writing: Posttest Scores with the Pretest as the Covariate (n=149)

Source	SS	df	MS	F	p
Covariate (Prestest)	3864.0	1.0	3864.0	57.1	.000
Method 306.5	1.0	306.5	4.5	.035	
Residual	9887.1	146.0	67.7		
Total	14068.2	148.0	95.06		

Tables 6 and 7 summarize the data for students' attitudes toward computers. Students' attitudes toward computers increased in both groups during the semester. However, there was not a statistically significant difference in attitudes toward computers between students taught using World Wide Web instruction and traditional instruction.

Table 6.
Pretest and Posttest Means of Students' Attitudes toward Computers (n=151)

Group	Pretest	Posttest Adjusted	Posttest Unadjusted
World Wide Web	47.4	51.2	50.8
Traditional	48.4	49.5	49.9

Table 7.
Analysis of Covariance of Students' Attitudes toward Computers: Posttest Scores with the Pretest as the Covariate (n=151)

Source	SS	df	MS	F	p
Covariate (Prestest)	12127.7	1.0	12127.7	122.4	.000
Method 105.4	1.0	105.4	1.1	.304	
Residual	14659.7	148.0	99.1		
Total	26821.1	150.0	178.8		

Tables 8 and 9 summarize the data for students' attitudes toward the Internet. Students' attitudes toward the Internet increased in both groups during the semester. There was a statistically significant difference in attitudes toward the Internet between students taught using World Wide Web instruction and traditional instruction.

Table 8.
Pretest and Posttest Means of Students' Attitudes toward the Internet (n=150)Pretest and Posttest Means of Students' Attitudes toward the Internet (n=150)

Group	Pretest	Posttest	
		Adjusted	Unadjusted
World Wide Web	41.7	54.6	53.7
Traditional	44.4	47.1	48.0

Table 9.
Analysis of Covariance of Students' Attitudes toward Internet: Posttest Scores with the Pretest as the Covariate (n=150)

Source	SS	df	MS	F	p
Covariate (Prestest)	7123.3	1.0	7123.37	54.6	.000
Method 2044.9	1.0	2044.9	15.7	.000	
Residual	19179.1	147.0	130.5		
Total	27516.1	149.0	184.7		

Conclusions

Students who were taught using the World Wide Web with a laboratory achieved at a higher level than those students who were taught using the traditional classroom approach. Using the combination of World Wide Web-supported instruction with a practical laboratory is a better method of teaching students technical writing than a traditional classroom approach. These findings agree with findings of a parallel experimental study using the same population (Newman, Raven & Day, 1996).

Teaching using the World Wide Web with a laboratory improved students' attitudes toward writing, learning about writing and the Internet and did not harm their attitudes toward computers. With the exception of learning about writing, these findings are the same as those of Newman, Raven, and Day (1996).

Recommendation

The researchers recommend that future sections of AEE 3203 -- Technical Writing in Agricommunication at Mississippi State University be taught using the World Wide Web with laboratory technique. This recommendation will be implemented beginning with the Fall Semester, 1996.

Recommendations for Further Study

More research is needed to explain further the effectiveness of the World Wide Web as an instructional technique. The results of this study cannot be generalized to other populations or other subject matter. The results of this study, however, indicate that the World Wide Web is potentially an effective medium for instruction. This supports conclusions by Swortzel and McCaslin (1995).

Changes in instructional materials and methods should be evaluated in terms of achievement, study time, and attitude toward material. This study focused only on achievement and attitudes. Further research should also include the amount of time students spend studying outside of class when the different teaching methods are used (Chinien & Boutin, 1994).

Another area that needs study is the effectiveness of World Wide Web-based instruction for students with different learning styles. Cognition/learning style can be an important source of learning failure (Chinien & Boutin, 1993). Much research has been conducted on student learning styles, but researchers disagree about the effectiveness of multimedia/hypermedia-based instruction (such as the World Wide Web) for students with different learning styles. Marrison and Frick (1994) found that field-independent learners found multimedia instruction easier and more exciting, but found no significant differences in achievement between field dependent and field independent learners. Liu (1994) found that different learning style groups employed different learning strategies in accomplishing the same task in a hypermedia environment, indicating that hypermedia has potential as an instructional medium for learners of various learning styles. This study supports Liu's finding in that learning styles were assumed to be equal in the two groups due to random assignment. The researchers recommend, however, that learning styles be included in similar studies, especially those that are not experimental in nature.

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A QUASI-EXPERIMENTAL COMPARISON OF ACHIEVEMENT AND STUDENT ATTITUDES AS INFLUENCED BY WORLD WIDE WEB INSTRUCTION AND TRADITIONAL INSTRUCTION

Discussant Remarks

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These studies sought to provide student attitudes towards world wide web instruction versus traditional instruction and its utilization in AEE 3203. The theoretical framework provided was sound, the methodology systematically conducted, and the results, conclusions, and recommendations logically presented.

The technical writing in agricommunication course was the source for data collection for both of these studies. The methodology used to conduct these studies were experimental and quasi-experimental in nature and appeared to be used appropriately. The population of both studies consisted of students enrolled in AEE 3203 at Mississippi State University.

Questions which may need to be addressed:

1. Did teaching using the World Wide really improve students attitudes toward writing or was it a fascination with the web?
2. When we use the World Wide Web as a vehicle for delivering lessons or course materials do we actually lose instructional time because we also need to include instruction on how to use the web?
3. Are we really providing a quality product, course lesson, when we use the web as a teaching technique or teaching tool?
4. Where do we go now or in the future with this type of technology?

The study was interesting, and the authors are to be commended for their efforts. I believe they accomplished their purpose and encourage others to pursue similar types of studies in the future.

PERCEPTIONS OF SUSTAINABLE AGRICULTURE AND PREFERRED INFORMATION SOURCES: A LONGITUDINAL STUDY OF VARIOUS GROUPS OF YOUNG FARMERS

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Introduction

An important societal trend with implications for agricultural education is the environmental movement. A 1993 nationwide Gallup survey found that almost half of consumers believed the agricultural industry was causing irreversible damage to the environment. Three-fourths agreed that pesticide residues on food were a substantial health danger (Gallup, Inc., 1993).

Yet, in Iowa, a majority of farmers continue to practice conventional, chemically intensive methods (Leopold Center, 1993). Producers seem to lack adequate information, training, and incentives to reduce their costs and extend the productivity of their land through sustainable practices such as multi-cropping, reduced tillage, and integrated pest management.

Agricultural educators nationwide are attempting to provide environmental education for students who will be the producers of the future. The National Council for Agricultural Education has developed and pilot-tested instructional materials on environmental education (Birkenholz, Baker, Garton, & Ribble, 1996). Educators are interested in the young farmer audience because their farming methods will affect the environment for years to come. Iowa State University has developed programs to reach the young farmer audience. From 1955 to 1996, the College of Agriculture had an on-campus program during the winter months specifically for young farmers whose interests and opportunities limited their access to a bachelor's degree. Declining enrollments forced the demise of the Winter Program, and innovative programs have emerged to meet the needs of this young farmer group. An ISU program that serves potential young farmers is the agricultural studies undergraduate curriculum; 49% of these students intend to farm for themselves or manage farms for others after graduation, 40% expect to be in agricultural sales and service, and 11% have other choices (AgEdS, 1995).

The problem is how best to educate young farmers so they will adopt sustainable agricultural practices. What are their attitudes on sustainability? Have these attitudes changed over time? What delivery methods do they prefer for information about sustainability, and have their preferences changed? What factors affect their adoption of practices? Some studies have touched on these questions (Alonge & Martin, 1993; Gamon & Scofield, 1994; Gamon, Harrold & Creswell, 1994; Rollins, 1993; Scofield & Kahler, 1993), but more information is needed. The adoption-diffusion model provides a theory base to study adoption of sustainable practices.

Most of the adoption-diffusion research has focused on determining characteristics of the different adopter categories. More research is needed on how the properties of an innovation affect its rate of adoption (Rogers, 1995). The adoption-diffusion model cites the following attributes as factors that affect adoption of innovations: relative advantage, compatibility, complexibility, trialability, and observability. Relative advantage is the degree to which an innovation is better than what it supersedes, usually expressed in economic terms, but it could include a societal value such as environmental protection. Compatibility includes consistency with existing values, experiences, and needs. Complexity involves the difficulty of understanding and using. Trialability means the use of a new idea on a limited basis, and observability refers to the visibility of the innovation (Rogers, 1995). In a study by Gamon et al. (1994), relative advantage, compatibility, and observability were strongly and positively related to adoption of sustainable agriculture practices.

Purpose and Objectives

The purpose of this study was to determine changes over time and differences among groups of young farmers in their perceptions related to sustainable agriculture. Included were perceptions on the concept of sustainable agriculture, the implications of adoption of sustainable agriculture practices, the influences affecting adoption, and preferences for sources of information about sustainable agriculture. Objectives were as follows:

1. Assess young farmers' level of agreement with statements about sustainable agriculture.
2. Determine the information sources young farmers prefer to use in gaining information about sustainable practices.
3. Determine which attributes of sustainable agricultural practices influence their adoption by young farmers.
4. Determine if there are differences over time and among groups in perceptions of young farmers toward sustainable agriculture, preferred information sources, and attributes that influence their adoption of practices.

Procedures

The population for this descriptive study included three groups of young farmers: (1) an older group, (2) a younger group, and (3) a potential group (See Table 1). The groups were chosen because they were readily accessible. Results cannot be generalized to all young farmers. Data were collected over a period of four years, beginning in 1993. The older group included everyone enrolled in a short-term Winter Program for young farmers from 1982 to 1992. In 1993, 1994, and 1995, data were collected from the younger group, those who were Winter Program students. In the 1995/1996 academic year, potential producers (undergraduates from farm backgrounds, with agricultural career objectives) were the research population; these were students in the agricultural careers class required for all majors in the Agricultural Studies curriculum. Ninety-five percent of the people in the agricultural careers class were reared on farms and used their home farms as a basis for answering the questions. The other five percent had worked on farms and used their work experiences as reference points (AgEdS, 1996).

Table 1.
Characteristics of the Young Farmer Groups in the Study

Characteristic	Older	Younger	Potential
Enrollment status	Winter students 1982-1992	Winter students 1993-1995	Undergraduates, Ag Studies career class members, 1995-1996
Dates of data collection	1993	1993 1994 1995	Fall, 1995 Spring, 1996
Number in population	97	55 33 16	44 40
Return rate of questionnaires, number & percent	44 (45%)	54 (98%) 32 (97%) 16 (100%)	42 (95%) 35 (88%) 77(92%)
Mean age of young farmers at time of data collection	29 yrs	20 yrs 20 yrs 20 yrs	22 yrs

The questionnaire was mailed to students who were absent when the data was collected and to the older group. Return rates were 54 out of 55 (98%) in 1993, 32 out of 33 (97%) in 1994, 16 out of 16 (100%) in 1995, 77 out of 84 (92%) in 1995/1996, and 44 out of 97 of the older group (45%) in 1993 after a follow-up request. Efforts to contact nonresponders among the 97 people in the older group were hindered by lack of current addresses; those nonresponding may have ceased farming. Late responders were compared to early responders as an alternative to contacting nonresponders. When responses were grouped by sections of the questionnaire to minimize the error that would result from multiple t-tests, there were no significant differences (.05 level) between early and late responses.

The researcher-generated questionnaire used a 5-point Likert-type scale and contained one section on likely consequences of sustainable agriculture (17 items) and one specifically on reduced use of chemicals (9 items). Other sections of the questionnaire included items on preferred sources of information about sustainable agriculture (14 items) and influences on adoption of sustainable practices (7 items). The questionnaire was based on a literature review of sustainable agriculture and questionnaires used in previous studies related to sustainability. The questions were reviewed for content validity by faculty and staff in agricultural education. Reliability of the instrument was checked using a test-retest procedure and also a Cronbach's alpha. The test-retest check produced a Pearson's correlation figure of .87. Cronbach alpha reliabilities of individual parts of the questionnaire in various years ranged from .62 to .88, and overall reliability was between .87 and .88.

Analysis of Data

The data analyses were performed using SPSSpc, with a level of significance set beforehand at .05. Negative items were recoded. Frequencies, means, standard deviations, and analyses of variance were calculated for perceptions of likely results of adoption of sustainable practices and substitution of nonchemical alternatives. The same set of analyses was used for sources of information and influences on adoption.

Results

The researchers analyzed young farmers' perceptions of the consequences of increased adoption of sustainable agriculture practices on a 5-point scale ranging from 1=Very Unlikely to 5=Very Likely. The most likely consequences (Table 2) were: greater management requirements (Mean=4.21, SD=.82); changes in equipment (Mean=4.09, SD=.74; conservation of soil (Mean=3.89, SD=.88); and protection of water quality (Mean=3.88, SD=.82). Other likely consequences (3.49 or above) were: increased labor requirements; reduced use of chemicals; safer food; and protection of woodlands, wildlife, and wetlands. Respondents tended to be unsure (mid-point on the scale) of whether sustainable agriculture would result in lower profits for farmers, more small farms, more livestock, more expensive food, or whether there would be better rural communities or benefits to citizens of Iowa or to society in general. Overall, the potential farmers were significantly more sure (at the .05 level) than the other groups of the benefits of sustainable agriculture. The older group tended to be less sure of the benefits. Thirteen of the seventeen items showed significant differences among the groups. In ten of the thirteen items, the Tukey test was able to identify the specific groups with significant differences. Two items--lower profits for farmers and more expensive food--were recoded; therefore, the means should be interpreted in the opposite direction. The potential young farmers were much more likely to believe that sustainable agriculture practices would result in lower profits for farmers and in more expensive food.

When young farmers were asked specifically about substituting non-chemical alternatives for pesticide and commercial fertilizers (Table 3), the only items they chose as likely outcomes were less groundwater contamination and improved health for farm families. The potential farmers were more likely to have positive expectations than the other groups, and the younger groups tended to be more positive than the older group. The potential farmers were significantly more likely than the previous groups to think that substitutions of non-chemical alternatives for pesticides and commercial fertilizers would result in improved soil conditions, better-quality products, higher yields under adverse conditions, and fewer weeds. There were no differences in the grand mean for this section--an indication that, over time and among groups, predictions of likely results of non-chemical alternatives were similar.

When respondents were asked how frequently they used various sources of information in determining farming practices (Table 4), neighbors, family, and friends were rated most highly as a source of information. Other sources used frequently (above 3.5) were seed/feed dealers and fertilizer and chemical dealers. Gamon et al. (1994) also found these dealers to be often-used sources of information on sustainable agriculture practices. When young farmers and older young farmers were compared using analyses of variance, the younger ones were much more likely than the older ones to use dealers as sources of information for sustainable practices.

Table 2.
Means, Standard Deviations, and Analyses of Variance for Likely Results of Sustainable Agriculture

Results of sustainable agriculture	Older 1982-1992 (n=45) M SD	Young farmers Younger 1993 (n=54) M SD	1994 (n=32) M SD	1995 (n=16) M SD	Potential 95-96 (n=77) M SD	All (n=224) M SD	F-ratio (df=4)
Protection of water quality	3.78_a .88	3.80_a .63	3.58_a .76	3.38_a 1.20	4.22_b 3.88	3.88 .82	6.92***
Lower profits for farmers[r]	3.58_a 1.12	3.52_a .86	3.55_a .89	3.06_{ab} 1.12	2.81_b .96	3.26 1.02	6.96***
Benefits for citizens of Iowa	3.16_a 1.13	3.44_a .69	3.06_a .77	3.38_{ab} 1.09	3.90_b .72	3.48 .90	8.26***
Benefits for society	2.98_{ab} 1.07	3.54_{bc} .79	3.13_{ab} .81	3.31_{abc} 1.01	3.92_c .90	3.48 .97	9.28***
Conservation of soil	3.70_a .88	3.76_a .87	3.52_a .77	3.75_{ab} .86	4.27_b .83	3.89 .88	6.50***
Reduced use of chemicals	3.89 1.01	3.72 1.01	3.55 .81	3.50 1.54	3.64 .99	3.68 .99	.80
More small farms	2.77 1.38	2.59 1.11	2.45 .96	3.13 1.31	2.56 1.11	2.64 1.16	1.15
Better rural communities	2.91 1.10	2.80 .88	2.71 .74	3.33 1.05	3.22 1.05	2.99 1.00	2.77*
More expensive food[r]	3.57_a 1.15	3.56_a .90	3.19_{ab} 1.01	3.38_{ab} 1.15	2.71_b .93	3.20 1.06	7.88***
Safer food	3.16_a 1.16	3.67_{ab} .85	3.16_a .86	3.44_{ab} .85	3.74_b	3.50 .95	4.31*
Increased labor requirements	4.00 .99	3.87 .85	3.84 1.00	3.75 1.00	3.55 1.02	3.77 .98	1.83
Changes in equipment	4.39_a .69	4.04_{ab} .75	4.26_{ab} .51	3.88_{ab} 1.02	3.96_b .94	4.09 .74	2.65*

Table 2 continued

Means, Standard Deviations, and Analyses of Variance for Likely Results of Sustainable Agriculture

	Young farmers						
	Older		Younger		Potential		
	1982-1992	1993	1994	1995	95-96	All	F-ratio
Results of sustainable agriculture	(n=45)	(n=54)	(n=32)	(n=16)	(n=77)	(n=224)	(df=4)
M	M	M	M	M	M		
	SD	SD	SD	SD	SD	SD	
More livestock	3.18	3.44	3.35	3.25	3.32	3.32	.51
	1.11	.88	.75	1.13	.88	.93	
Greater management requirements	4.39	4.06	4.03	3.94	4.35	4.21	2.45*
	.78	.90	.88	.93	.68	.82	
Protection of wildlife/wildlife habitat	3.73	3.83	3.48	3.38	3.96	3.77	2.82*
	.90	.77	.77	1.09	.85	.86	
Protection of woodlands	3.50_{ab}	3.54_{ab}	3.19_{a}	3.25_{a}	3.93_{b}	3.60	5.52***
	.88	.84	.79	1.00	.86	.90	
Protection of wetlands	3.39_{a}	3.69_{ab}	3.26_{ab}	3.31_{a}	3.95_{b}	3.63	5.34***
	.92	.82	.77	.87	.93	.92	
Grand mean	3.53_{a}	3.58_{a}	3.37_{a}	3.46_{a}	3.65_{b}	3.56	2.36*
	.49	.34	.35	.80	.45	.46	

Note: Scale: 1=Very Unlikely, 2=Somewhat Unlikely, 3=Unsure, 4=Somewhat Likely, 5=Very Likely
Means in the same row that do not share subscripts differ significantly at $p < .05$ in the Tukey honestly significant difference comparison.
'Negative statements recoded.
*$p < .05$ ***$p < .001$

This study assessed attitudes toward four of the attributes of innovation described by Rogers (1995): relative advantage, complexity, observability, and compatibility. Questions in Table 2 and Table 3 measured attitudes indicating the level of compatibility of sustainable agriculture practices with existing values of the young farmers. Table 5 displays ratings of questions related to relative advantage, complexity, and observability. The young farmers rated all of the questions above the mid-point on the 5-point scale (Table 5), an indication that each attribute had some influence on their adoption of sustainable practices. The item with the most influence was necessary financing (3.61). Among the groups of young farmers, there were no significant differences related to the influence of necessary financing or to short-term profitability. Among the items that showed significant differences, the potential young farmer group usually differed from the older group.

Table 3.

Means, Standard Deviations, and Analyses of Variance of Predictions of Non-Chemical Alternatives for Pesticides and Commercial Fertilizers

Results of non-chemical alternatives	Older 1982-1992 (n=45) M SD	Young farmers Younger 1993 (n=54) M SD	1994 (n=32) M SD	1995 (n=16) M SD	Potential 95-96 (n=77) M SD	All (n=224) M SD	F-ratio (df=4)
Improved soil conditions	3.00_a	3.07_{ab}	3.38_{ab}	3.06_{ab}	3.55_b	3.26	2.75*
	1.11	1.06	1.07	1.24	.97	1.07	
Improved health for farm families	3.64	3.67	3.72	3.25	3.88	3.71	1.78
	1.00	.97	.92	1.13	.76	.92	
Less groundwater contamination	3.80	3.93	3.56	3.38	3.92	3.80	1.63
	.97	.97	1.16	1.26	.94	1.01	
Better quality products	2.73_{ab}	2.46_a	2.69_{ab}	3.13_{ab}	3.22_b	2.67	5.35***
	1.05	.97	1.06	1.08	.94	1.04	
Higher yields under adverse conditions	2.06_{ab}	1.94_a	2.47_{ab}	2.63_{ab}	2.54_b	2.29	3.75**
	.96	.88	1.16	1.20	1.10	1.06	
Lower overall production costs	3.07	3.44	3.34	3.06	3.17	3.23	.85
	1.34	1.11	1.23	1.12	1.15	1.19	
Higher profits for farmers	2.62	2.43	2.72	2.63	2.79	2.65	.79
	1.25	1.17	1.22	1.15	1.05	1.15	
Fewer weeds	1.93_{ab}	1.80_a	1.91_{ab}	2.25_{ab}	2.30_b	2.04	2.68*
	.84	1.00	1.00	1.18	.97	.99	
Fewer insects	2.00	1.87	1.91	2.19	2.32	2.08	2.30
	.85	.89	1.00	1.05	1.02	.97	
Grand mean	2.76	2.74	2.85	2.84	3.07	2.88	2.35
	.74	.64	.70	.91	.65	.70	

Note: Scale: 1=Very Unlikely, 2=Somewhat Unlikely, 3=Unsure, 4=Somewhat Likely, 5=Very Likely

Means in the same row that do not share subscripts differ significantly at $p<.05$ in the Tukey honestly significant difference comparison.

*$p < .05$**$p < .01$***$p < .001$

Table 4.
Means, Standard Deviations, and Analyses of Variance for Use of Sources of Information

Use of sources of information	Older 1982-1992 (n=45) M SD	Young farmers Younger 1993 (n=54) M SD	1994 (n=32) M SD	1995 (n=16) M SD	Potential 95-96 (n=77) M SD	All (n=244) M SD	F-ratio (df=4)
Farm magazines and publications	3.60_a .81	3.26_a .76	3.72_a .73	3.69_{ab} .70	4.22_b .82	3.75 .86	12.71
Natural Resource Conservation Service	$.04_{ab}$ .88	3.26_a .71	3.53_{ab} .84	3.13_{ab} .72	3.69_b 1.03	3.39 .91	4.78
County Extension Service	3.11 1.04	3.26 .81	3.38 .75	3.31 .60	3.91 .83	3.48 .90	8.21***
Farm organizations	2.87_a .92	3.04_a .90	3.19_{ab} .74	3.13_{ab} .89	3.64_b .89	3.23 .92	6.88***
Fertilizer and chemical dealers	3.76 .71	3.78 .84	3.84 .77	3.69 .87	3.80 1.04	3.79 .88	.11
Livestock dealers	2.33_a 1.11	3.35_b .80	3.00_b 1.05	3.31_b 1.01	3.45_b 1.02	3.13 1.07	10.20***
Farm machinery dealers	2.76_a .86	3.43_b .86	3.34_{ab} .94	3.44_{ab} .73	3.44_b 1.03	3.29 .96	4.68***
Seed/feed dealers	3.20_a .79	3.93_b .77	3.59_{ab} .56	3.44_{ab} .73	3.73_b .94	3.63 .84	5.49
Iowa State University Experiment Station	2.89_{ab} .98	2.74_a .89	2.78_{ab} .98	2.75_{ab} 1.13	3.31_b 1.16	2.97 1.06	3.26**
Neighbors, family, and friends	3.78 .82	3.78 .95	3.97 .69	3.56 .73	4.11 .83	3.80 .84	2.40
Personal consultation with area Extension Crop and/or Livestock Production Specialists	2.71_a 1.12	2.96_a .85	3.13_a .91	3.06_{ab} 1.18	3.70_b .95	3.19 1.04	8.86***
Practical Farmers of Iowa	2.07_a 1.23	2.44_a 1.11	2.63_{ab} 1.16	2.56_{ab} 1.09	3.14_b 1.19	2.64 1.23	6.67***

Table 4 continued
Means, Standard Deviations, and Analyses of Variance for Use of Sources of Information

Use of Sources of Information	Older 1982-1992 (n=45) M SD	Young farmers Younger 1993 (n=54) M SD	1994 (n=32) M SD	1995 (n=16) M SD	Potential 95-96 (n=77) M SD	All (n=224) M SD	F-ratio (df=4)
High school agriculture teachers	1.91_a	1.91_a	2.19_{ab}	2.31_{ab}	2.66_b	2.23	5.80***
	.93	.83	1.15	.87	1.18	1.07	
Grand mean	2.94_a	3.17_a	3.25_c	3.18_a	3.29_b	3.29	15.14***
	.48	.43	.42	.50	.55	.54	

Note: Scale: 1=Very Unlikely, 2=Somewhat Unlikely, 3=Unsure, 4=Somewhat Likely, 5=Very Likely
*$p < .05$**$p < .01$ ***$p < .001$. Means in the same row that do not share subscripts differ significantly at $p <$ .05 in the Tukey honestly significant difference comparison.

Table 5.
Means, Standard Deviations, and Analyses of Variance for Attributes Influencing Adoption of Sustainable Agriculture Practices

Attributes influencing adoption of sustainable practices	Older 1982-1992 (n=45) M SD	Young farmers Younger 1993 (n=54) M SD	1994 (n=32) M SD	1995 (n=16) M SD	Potential 95-96 (n=77) M SD	All (n=224) M SD	F-ratio (df=4)
Relative Advantage							
Improvement of environment	3.12_a	3.25_a	3.00_a	3.09_a	3.76_b	3.35	8.72***
	.82	.59	.82	.85	.83	.82	
Short term profitability	3.40	3.35	3.52	3.25	3.51	3.43	.48
	1.03	.83	.68	1.06	.94	.91	
Reduction of yields[r]	3.70_a	3.72_a	3.48_a	3.60_{ab}	2.74_b	.33	8.22***
	.96	1.00	.96	1.06	1.38	1.21	
Complexity							
Necessary financing	3.37	3.72	3.65	3.31	3.74	3.61	1.39
	1.05	.88	.75	1.01	1.13	1.00	
Availability of equipment	3.12_a	3.39_{ab}	3.19_a	2.88_a	3.78_b	3.40	6.66***
	.88	.96	.70	.89	.84	.91	
Observability							
Opportunity to observe	3.35_a	3.28_{ab}	3.26_{ab}	2.94_{ab}	3.63_b	3.39	3.08*
	1.02	.71	.63	.93	.91	.87	

Table 5 continued

Means, Standard Deviations, and Analyses of Variance for Attributes Influencing Adoption of Sustainable Agriculture Practices

Attributes influencing adoption of sustainable practices	Older 1982-1992 (n=45) M SD	Young farmers Younger 1993 (n=54) M SD	1994 (n=32) M SD	1995 (n=16) M SD	Potential 95-96 (n=77) M SD	All (n=224) M SD	F-ratio (df=4)
Opinions of other farmers	2.88_a .93	3.11_{ab} .84	3.26_{ab} .77	3.00_{ab} .89	3.50_b 1.08	3.21 .96	3.46**
Grand mean	3.28 .55	3.40 .44	3.34 .41	3.12 .77	3.51 .48	3.39 .51	2.87*

Note: Scale: 1=Never, 2=Seldom, 3=Sometimes, 4=Frequently, 5=Always

'Negative statement recoded

*$p < .05$**$p > .01$***$p < .001$. Means in the same row that do not share subscripts differ significantly at $p < .05$ in the Tukey honestly significant difference comparison.

Conclusions and Recommendations

There were relatively few changes over time and among groups in their perceptions of sustainable agriculture. The potential farmers--those currently enrolled in the agricultural studies degree program--were the most positive about the benefits of sustainable agriculture. All of the young farmers and potential young farmers had relatively high positive perceptions of sustainable agriculture, but thought changes in practices would require changes in machinery and more management. Younger farmers and potential farmers were more likely than the older group to think sustainable agriculture would benefit society and result in safer food.

All of the young farmer groups in the study indicated it was somewhat likely that nonchemical alternatives to pesticides and commercial fertilizers would result in less groundwater contamination and improved health for farm families. Overall, they were unsure about whether nonchemical alternatives would have positive results. All respondents rated higher yields under adverse conditions as somewhat unlikely, but the older ones rated it the most unlikely. Young farmers' preferred sources of information were neighbors, family, and friends; dealers; and articles in farm magazines and publications. The younger group and the potential group were significantly more likely to use dealers for information on sustainable agriculture. The attribute that most influenced adoption was complexity, or ease of use.

Based on the results of this study and a review of relevant literature, the following recommendations are made:

1. Undergraduate education should include a stronger emphasis on conservation practices that promote agricultural sustainability.
2. Agricultural programs should establish networks of graduates who enter production agriculture and devise methods to meet their needs for continuing education related to sustainability.
3. Agricultural education, extension, and agribusinesses should cooperate in providing educational programs on sustainable agriculture to young farmers.

Young farmers are an important audience for agricultural educators, and sustainability of the environment is an important societal trend. Agricultural educators need to reach young farmers, potential young farmers and those who intend to work in the sales and service field with information on sustainable agriculture. Networks of support and encouragement could play an important role in the adoption of sustainable practices.

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PERCEPTIONS OF SUSTAINABLE AGRICULTURE AND PREFERRED INFORMATION SOURCES: A LONGITUDINAL STUDY OF VARIOUS GROUPS OF YOUNG FARMERS

Discussant Remarks

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The authors should be commended for identifying an important societal concern as the focus of their research and for having the persistence to study the issue, namely perceptions held by young farmers of sustainable agriculture, over a period of time. By conducting longitudinal studies, important themes can emerge, theories can be developed, and more focused research studies can be designed to collect evidence regarding whether or not to accept or reject the theories posited.

Although in Iowa, as stated in the paper, a majority of farmers continue to practice conventional, chemically intensive methods, the authors seem to be providing education and studying those who are most likely to implement desirable environmental practices in the future. Subjects studied included older young farmers, mean age 29, younger young farmers, mean age 20, and potential young farmers, mean age 22. The educational focus on this group of relatively young farmers provides the most promising results in the future.

The purposes of the study were stated clearly. Four objectives were specified and evidence was collected for each. The procedures used were presented clearly, return rates were satisfactory, and validity and reliability issues were addressed adequately. The instrument used was designed to collect information related to the four major objectives of the study. Detailed results were presented related to each objective and differences of opinion among groups were easy to comprehend. Although a concise statement of conclusions is presented, no discussion of results is presented and some of the recommendations presented probably could have been made without conducting the study.

The reviewer has two major questions about the paper. First, the authors are using public opinion as the basis of need for the research conducted. They refer to a 1993 nationwide Gallup survey which found that almost half of consumers believed the agricultural industry was causing irreversible damage to the environment and three-fourth agreed that pesticide residues on food were a substantial health danger. My question is, "Is concern regarding the adoption of sustainable agriculture practices a concern because the public thinks it is a concern or is it a concern because detrimental damage to the environment is actually happening because of current agricultural practices?" Perhaps one recommendation that could have been made is that: Research regarding more precise measurement of the results of sustainable agriculture should be conducted. The authors have identified important "likely results" of sustainable agriculture; the next step, although much more difficult than gathering opinion data, would seem to be to collect actual information on selected "likely results" from a small sample of farmers. Such research data, over time, may be far more beneficial than studying opinion, however important.

A second question is, "What is the availability, validity, and purpose of the various sources of information presented?" Perhaps a recommendation that could have been made is that: Research regarding the availability, validity, and purpose of the various sources of information used should be conducted. Decisions made about use or non-use of sustainable agriculture practices will be no better than the amount, timeliness, and quality of the information available. In summary, the study was well conducted and adds to the body of literature regarding sustainable agriculture.

AN ASSESSMENT OF THE INTRODUCTORY UNIT OF AN APPLIED ENVIRONMENTAL SCIENCE CURRICULUM

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Introduction/Theoretical Framework

The environment and its protection has been identified as a major issue to address in the 1990s. Americans have become increasingly conscious and concerned for the conservation of the environment, and have become more aware of the long-term implications of environmental deterioration (Heimlich, 1992; Trisler, 1993). Environmental education is needed to enable students to understand and appreciate their impact on the environmental, to increase their knowledge of environmental problems, and teach ways to make decisions concerning environmental problems and conflicts (Roa, 1993; Vahoviak & Etling, 1994; Bruening, 1994; Water Impacts, 1994).

Kirts (1990) claimed that both agricultural education and environmental education share similar property rights in terms of subject matter and should be combined to provide effective instruction. Orr (1992) noted that environmental education requires instructional techniques that use both the head and the hands, which is a technique widely used in agricultural education. Stewart and Sutphin (1991) found that tenth grade students possessed a positive view towards the importance of agriculture and the environment. These students believed that agriculture and the environment were important for the future, the economy, and to society. Students need to understand that agriculture and the environment are not separate entities; but are one in the same. In order for agriculture to continue the high level of food production, it must conserve and protect the environment (Bruening, 1994). Brown and Kane (1994) highlighted the linkage between agriculture and the environment when they wrote: "The environmental degradation of the planet in its many forms, affects all sectors of the global economy, but none as much as the food section" (p. 146-147).

With these issues in mind, the *National Council for Agricultural Education* sponsored a project to develop instructional materials to assist agriculture and science teachers in teaching about the environment. The instructional materials consisted of an introductory unit and seven advanced units in specific environmental areas. The objective of the *Introduction to Environmental Science* unit, was to introduce students to the concepts of environmental science, encourage students to be conscious and concerned about the environment in which they live, to recognize the need to conserve the environment and its resources, and to begin to understand the interrelationships between agriculture and the environment. However, after developing the introductory unit, the question arose as to the influence the instructional materials would have on students' attitudes and knowledge of the environment. In addition, how would teachers perceive the content and usability of the instructional materials? Consequently, a field test of the introductory unit was needed to address these questions.

Purpose and Research Questions

The purpose of the study was to assess students' attitudes toward and knowledge of environmental science concepts before and after being taught the *Introduction to Environmental Science* unit. The study also sought to assess the content and usability of the instructional materials. To accomplish these purposes, a field test was conducted to address the following research questions:

1. What were the field test students' attitudes toward the environment and learning about environmental science concepts?
2. What was the field test students' level of achievement with regard to learning the environmental science concepts taught in the *Introduction to Environmental Science* unit?
3. What were the field test teachers' perceptions of the content, structure, and organization of the instructional materials?

Methods/Procedures

The Director of Agricultural Education in each state was requested to nominate agriculture and/or science teachers to participate in the field test. Twenty-nine teachers were nominated and 23 agreed to participate in the field test. Participating teachers were mailed data collection instruments, instructional materials, and directions for conducting the field test. After follow-up procedure were employed, usable data were collected from 18 teachers and their students (N=328) representing 16 states.

Two forms of a questionnaire were designed to pretest and posttest students' attitudes toward and knowledge of the environment. The instruments were assessed for content and face validity by a panel of experts who were knowledgeable about teaching environmental science. Cronbach's alpha reliability coefficients for the attitudinal section were .83 and .88 for the pretest and posttest, respectively. Cronbach's alpha reliability coefficients for the knowledge section were .70 for the pretest and .80 for the posttest.

An additional instrument was developed for teachers to evaluate the content and usability of the instructional materials. The instrument was examined for content and face validity by a panel of experts knowledgeable on curriculum development. The Cronbach's alpha reliability coefficients for the instrument were .76 for Section I (content) and .80 for section II (structure and organization).

Results/Findings

Student attitudes toward the environment and knowledge of environmental science concepts were assessed prior to (pretest) and after (posttest) being taught the content contained in the instructional materials. Students were asked to rate their level of agreement on 25 items using a five-point Likert scale. Regarding student attitudes prior to being taught the instructional materials, five of the 17 positively worded items had mean ratings of 4.0 (agree) or greater and all the remaining items were above the neutral response category (3.0), indicating a relatively positive attitude toward the environment (Table 1). An assessment of the eight negatively worded items revealed that two had a mean rating of less than 2.0 (disagree), while the six remaining items were all below the neutral classification.

Table 1. Students' Pre-Assessment and Post-Assessment Attitude toward the Environment and Learning about Environmental Science Concepts (N=328)

Item	Pretest mean (Std dev)	Posttest mean (Std dev)
1. Learning about the environment <u>is not</u> beneficial to me.	2.12 (1.11)	2.00 (1.16)
2. Persistence and hard work, rather than luck, will solve most environmental problems.	4.22 (0.92)	4.20 (0.98)

Table 1. Students' Pre-Assessment and Post-Assessment Attitude toward the Environment and Learning about Environmental Science Concepts ($\underline{N}$=328)

	Item	Pretest mean (Std dev)	Posttest mean (Std dev)
3.	I can make a difference in the environment by considering the products I buy.	4.00 (0.89)	4.12 (0.86)
4.	As one of over five billion humans on earth, my lifestyle has no real effect on the environment.	2.31 (1.04)	2.20 (1.01)
5.	Writing letters, leading discussions, and taking part in debates about environmental issues is a good way to help solve environmental problems.	3.67 (1.02)	3.76 (0.93)
6.	The amount of solid waste that I produce is so small compared to the total that it does not matter.	2.28 (1.03)	2.27 (1.06)
7.	Whether I live an environmentally sound lifestyle or not has no impact on whether or not others do.	2.73 (1.12)	2.54 (1.08)
8.	I see no value in studying the environment.	1.89 (0.97)	2.03 (1.08)
9.	Studying the environment and factors that impact the environment is fascinating.	3.43 (0.97)	3.40 (1.01)
10.	Studying the environment is a waste of time.	1.98 (1.06)	2.07 (1.08)
11.	Studying the environment gives me the opportunity to apply what I learn in the classroom to real life situations.	3.91 (0.89)	3.94 (0.88)
12.	Environmental science is an interesting subject.	3.47 (1.01)	3.49 (0.99)
13.	Recycling my cans, glass, and paper will help the solid waste problem.	4.22 (0.82)	4.13 (0.82)
14.	The food choices I make ultimately have an effect on the environment.	3.13 (1.02)	3.48 (0.98)
15.	Forests should be managed for the production of wood products needed by humans.	3.29 (1.19)	3.30 (1.09)
16.	It is okay to cut down trees for construction, as long as new trees are planted for the cut trees.	3.81 (1.02)	3.81 (1.01)
17.	Buying recycled paper products, when available, will help conserve the environment.	4.13 (0.76)	4.13 (0.76)

Table 1. Students' Pre-Assessment and Post-Assessment Attitude toward the Environment and Learning about Environmental Science Concepts (N=328)

	Item	Pretest mean (Std dev)	Posttest mean (Std dev)
18.	The type of fuel I select for my automobiles will ultimately have an effect on the environment.	3.68 (0.95)	3.82 (0.95)
19.	I cannot influence politicians on environmental matters.	2.61 (1.10)	2.60 (1.13)
20.	Legal action should be taken against farmers who allow animal manure to flow into streams.	3.25 (1.23)	3.51 (1.10)
21.	I would report a neighbor for dumping toxic chemicals in a steam.	4.15 (1.02)	4.14 (0.95)
22.	It is my responsibility to report illegal activities that threaten the environment to the proper authorities.	3.87 (1.00)	3.98 (0.87)
23.	Volunteering my services to environmental projects will make a difference in my life and the lives of future generations.	3.82 (0.89)	3.87 (0.88)
24.	Discussing water quality issues with the public is a good way to inform people about water pollution.	3.95 (0.75)	3.98 (0.76)
25.	The solution to many environmental problems will be found by accident.	2.90 (1.08)	2.92 (1.05)

Note. 5=Strongly Agree; 4=Agree; 3=Neutral; 2=Disagree; 1=Strongly Disagree

An analysis of the students' attitudes after receiving instruction indicated that five of the 17 positively worded items produced mean ratings of 4.0 (agree) or greater and all the remaining items were above the neutral response category (3.0), indicating a relatively positive attitude (Table 1). Three of the eight negatively worded items had a mean rating of 2.0 (disagree) or less. All five of the remaining items had mean ratings of less than 3.0 (neutral), indicating a relatively positive attitude toward the environment.

Student attitude scores were summed for the pretest and posttest, and a test of significance was calculated. The summated pretest mean score for student attitude toward the environment and learning about environmental science concepts was 93.1 (std dev = 10.9) (Table 2). The summated posttest mean score was 94.3 (std dev = 12.2). There was a statistically significant difference between pretest and posttest scores regarding student attitude toward the environment and learning about environmental science concepts (t-value = 2.02, $p<.05$).

Table 2. Test for Differences Between Pretest and Posttest Students' Summated Attitude Scores (N=328)

Assessment	Summated Mean	Std dev	t value	prob
Pretest	93.1	10.9		
			2.02	.045
Posttest	94.3	12.2		

The students produced a mean of 9.2 (std dev = 3.8) out of a maximum possible score of 21 on the pretest for knowledge about environmental science concepts (Table 3, Figure 1). The mean posttest score on their knowledge of environmental science concepts was 13.1 (std dev=4.8). This represented a gain of nearly four points (18.8%) in achievement, which was found to be statistically significant (t-value=10.14, p<.05).

Table 3. Test for Differences Between Pretest and Posttest Students' Achievement Scores (N=328)

Assessment	Mean	Std dev	Min.-Max.	t value	prob
Pretest	9.2	3.8	0 - 19		
				10.14	.001
Posttest	13.1	4.8	0 - 21		

A semantic differential scale was employed to assess the teachers' perceptions regarding the content of the instructional materials. Adjectives with exact opposite meanings were positioned at two ends of a seven point scale. Seven of the ten characteristics related to the content of the instructional materials produced response means in the positive category (Table 4, Figure 2). The "need" for the instructional materials received the highest mean rating (6.3), while "usefulness," "technical accuracy," and "up-to-datedness" tied for the next highest mean rating (5.8). The mean rating of the three remaining characteristics were classified in the neutral response category.

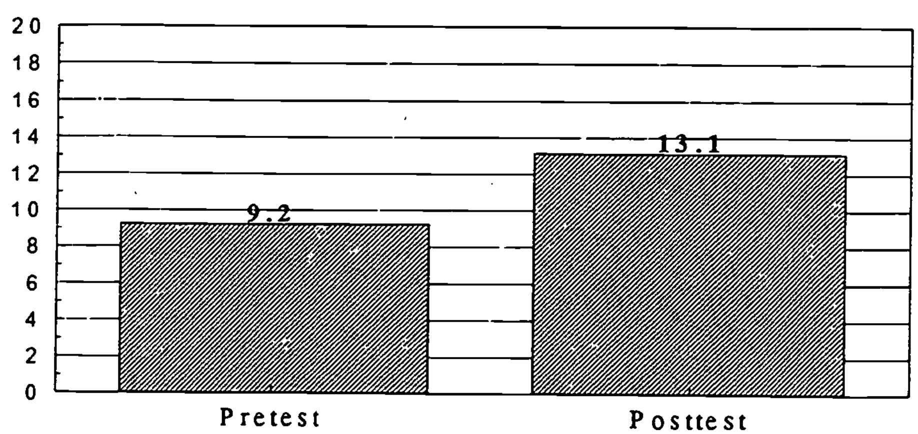

Figure 1. Difference Between Pretest and Posttest Knowledge Scores

Table 4.	Teachers' Perceptions of the Subject Matter Content of the Instructional Materials (N=18)		
Characteristic	Mean	Std dev	Response Range
Effectiveness	5.44	0.92	3.0-7.0
Usefulness	5.78	1.06	3.0-7.0
Appropriateness	5.39	1.29	2.0-7.0
Technical accuracy	5.78	0.81	4.0-7.0
Readability	5.39	1.58	2.0-7.0
Up-to-datedness	5.78	0.88	4.0-7.0
Bias	4.78	1.40	2.-0-7.0
Need	6.28	0.89	4.0-7.0
Science based	5.00	1.41	2.0-7.0
Complete	5.00	1.37	2.0-7.0

Ten quality factors were rated on a five-point Likert scale to assess the teachers' perceptions of the structure and organization of the instructional materials. Three items had mean ratings of 4.0 (agree) or greater (Table 5). The three items included: "the study questions were useful" (mean=4.2, std dev=0.55), the "format was well organized" (mean =4.1, std dev=0.32), and the "directions for the teacher were useful" (mean=4.0, std dev=0.49). Five of the remaining seven items had mean ratings above 3.5.

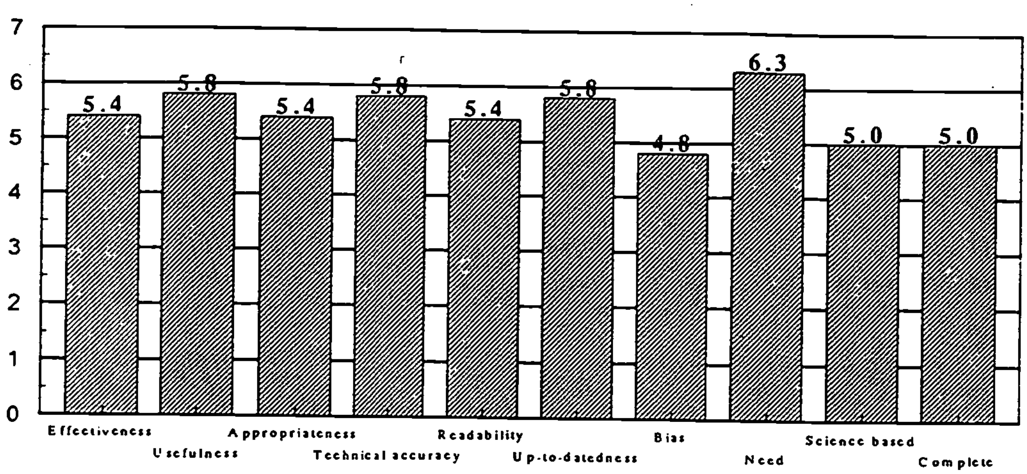

Figure 2. Teachers' Perceptions of the Subject Matter Content of the Instructional Materials

Table 5. Teachers' Perceptions of the Structure and Organization of the Instructional Materials (N=18)

	Item	Mean	Std dev
1.	The format of the instructional materials was well organized.	4.11	0.32
2.	The study questions were useful in teaching the subject content.	4.22	0.55
3.	The transparency masters were of little value in teaching the subject.	2.22	0.88
4.	The student evaluations adequately assessed student learning.	3.56	0.86
5.	The suggestions offered in the *directions for the teacher* column were helpful in teaching the material.	4.00	0.49
6.	Resources for students to investigate the study questions and learn the subject content were difficult to locate.	3.39	1.09
7.	Teacher resources were adequate to teach the lessons.	3.50	0.99
8.	The suggested interest approaches were helpful in motivating students.	3.61	0.85
9.	The content taught was interesting to students.	3.50	0.79
10.	Prior knowledge or experience in environmental science would be necessary to teach the lessons.	2.61	1.04

Note. 5=Strongly Agree; 4=Agree; 3 Neutral; 2=Disagree; 1=Strongly Disagree

Conclusions/Recommendations/Implications

Students who participated in the field test developed more positive attitudes toward the environment and developed a greater knowledge of environmental science concepts. Students responded favorably to the positively worded items as well as unfavorably to the negatively worded items. However, little practical difference was found between pretest and posttest attitude scores.

The small change in attitude between the pretest and posttest could be attributed to students having a relatively positive attitude toward the environment prior to the field test. Students who participated in the field test were enrolled in elective courses in environmental science and/or natural resources, which indicates the possibility of prior interest in learning about the environment. This prior interest could possibly explain students' positive attitude prior to being exposed to the instructional materials. Furthermore, it is difficult to presume that a substantial change in attitude could have occurred in the short period of time that students were exposed to the instructional materials.

As a result of being exposed to the environmental science instructional materials, students gained in their knowledge of environmental science concepts. However, this gain in knowledge did not substantially alter their attitude either positively or negatively toward the environment. Teachers reported that they experienced time management problems associated with teaching the instructional unit, which may have inhibited greater student achievement. Further investigation should be conducted to address the issue of why students didn't achieve a greater gain in knowledge after being exposed to the instructional materials.

The students who participated in the field test were not from traditional agriculture production programs. Consequently, it is possible that students who have not been enrolled in an elective environmental science course and have limited knowledge about the environment may experience a greater attitudinal change if taught the content in the instructional materials. Therefore, it is recommended that the current study be replicated with students who have had less experience in learning about the environment.

With regard to the content of the instructional materials, the teachers reported the materials in the unit were needed, up-to-date, technically accurate, and useful. The teachers also indicated that the materials in the instructional unit were effective, science-based, appropriate, easy to read, and complete. Overall, the teachers who participated in the field test appeared to be satisfied with the content of the instructional materials.

Regarding the structure and organization of the instructional materials, the teachers agreed that the materials were well organized. They revealed that the instructional materials were easy to follow and use. The teachers noted that little prior knowledge of environmental science would be needed to teach the materials. The teachers also reported that the resources were adequate and the content was interesting to students.

The environment and its protection has become a major issue facing today's society. Environmental education is needed to enable school age children, the future citizens of our country, to make wise decisions concerning environmental problems and conflicts. The *Introduction to Environmental Science* unit developed and field tested in this study should be a valuable resource to agriculture and science teachers as they teach the concepts of environmental science, encourage students to be conscious and concerned about their environment, and begin understanding agriculture's relationship with the environment. It is recommended that the Environmental Education Instructional Materials be made available to agriculture and science teachers through the *National Council for Agricultural Education's* professional growth series.

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AN ASSESSMENT OF THE INTRODUCTORY UNIT
OF AN APPLIED ENVIRONMENTAL SCIENCE CURRICULUM

Discussant Remarks
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The authors have accepted the challenge of developing curriculum in a current area of societal need and concern. Not satisfied to do "armchair evaluation", they decided to evaluate materials being developed in a formal manner through a nationwide study. Relevant research questions were developed and the study was conducted on student attitudes toward and knowledge of environmental science concepts before and after being taught the "Introduction to Environmental Science" unit. Teachers' perceptions of the content, structure, and organization of the instructional materials were also collected.

The reader was introduced to the topic adequately and a case was made for conducting a field test of the materials developed. Three relevant research questions were formulated. As a field test, one additional question probably should have been asked. It is, "What changes, if any, should be made in the unit based on the results of the field test data?" Answers to this question may have led to some revision of the unit developed. There was no indication that anything about the unit was changed based on field test results. Provision for teacher and students comments, in addition to the data collected, may have further enlightened the researchers.

The methods and procedures section of the paper was the least informative. Although the Director of Agricultural Education in each state was requested to nominate agriculture and/or science teachers to participate in the field test, usable data were collected from 18 teachers and their students (N=328) representing 16 states. No reference is made to any effort to increase participation above the some 30 percent of potential involvement reported.

Although the dependent variables, or the instruments used were adequately described, there was little description of the potential independent variables. Information regarding the scope, purpose, length, time, and content of the unit was not evident. Also lacking was a description of the audience studied, including major (agriculture or science student), grade level, extent of previous instruction in environmental science issues, or other identifying characteristics. All too often we ask questions which could improve our research after the study has been conducted.

The results are presented clearly and discussed adequately in the conclusions section. However, as noted previously, there was no indication that any changes had been made based on field test results. Also, the study addressed only one of eight units developed. Would results have been different had advanced units been studied? For whom are the units most appropriate? Answers to these and other important questions are needed to ensure that the curriculum developed is comprehensive in scope and reaches the intended audience.

EXTENSION AGRICULTURAL AGENTS' PERCEPTIONS OF SUSTAINABLE AGRICULTURE IN THE SOUTHERN REGION OF THE UNITED STATES

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Introduction and Theoretical Framework

Since its inception in the early twentieth century, the Cooperative Extension Service has been a national catalyst for change. Major innovations and improvements in agricultural production methods have been brought about primarily by the expansion and development of research and extension through the land grant university system. Since the 1930s, many innovations have had an impact on agricultural production: new planting and harvesting machinery and methods; the development of synthetic fertilizers and an array of pesticides; new developments and improvements in the farm tractor; and higher yielding, insect and disease resistant crop varieties. All have contributed to an improved and diversified food production system, and a greater quantity and availability of food products for the population, with commodities swelling, in some cases, to vast surpluses. The concept of food production as an entity has changed during this period of emerging growth and prosperity. Agricultural food production has grown from the pre-World War II concept of a single family farm, producing food and fiber for the livelihood of the immediate family, to the multi-level farm conglomerate of today that produces crops on thousands of acres and markets the products nationally and internationally. Today's agriculture is energy intensive and supported by manufactured inputs, electricity, and available fossil fuels. The use of machinery, fuels, pesticides, fertilizers, and irrigation all influence increased production, but accomplish this with resulting ecological and social problems (Altieri, 1992).

A wide range of federal agricultural policies, which include farm commodity support programs, have also influenced agricultural production practices, promoting maximum yields in cropping systems and the increased use of marginal lands. These increased yields generally have been accomplished with the continuing use of heavy inputs of fertilizers, accompanied by diverse pesticide applications. As a whole, these policies work against environmentally favorable production systems (National Research Council, 1989). Associated outcomes have had a far-reaching effect on the environment in this hemisphere, and on a global scale as well, creating ever-increasing chemical residues in ground water resources and threatening the quality of the drinking water for our population (Williams, Holden, Parsons, & Lorber, 1988).

The decades from the 60's to the 90's have seen the demise of the farmer, in the eyes of some members of the public, from a place of prominence as a food provider to that of an environmental assailant. Not only does the public want food and fiber, but also an accounting as to the production methods and the environmental consequences of these production methods. The "Environmental Movement," in addition to creating an awareness and sensitivity towards a number of traditional agricultural production practices perceived by many as environmentally unfriendly, has also resulted in the development of regulations that place constraints on agricultural production systems. These constraints have the potential to threaten the survival of agricultural productivity as we know it today. The development of chemical and capital intensive farming methods over the past four decades has been a primary focus of the U.S. Land Grant System (Liebman, 1992). Agricultural production is estimated to be the largest single nonpoint source of water pollutants (Chesters & Schierow, 1985). This includes salts, pesticides, fertilizers, sediments, and manures. Nonpoint pollutants account for up to 50% of surface water pollution. Giant monocultural cropping systems farming on highly erodible lands generate tremendous soil losses each year and, after 50 years of state and federal efforts to control severe soil erosion, it continues to be a major problem. These techniques may be used because of tradition, lack of information, or social and economic conditions that encourage destructive short-term gain instead of long term planning for a sustainable agriculture (Cunningham & Saigo, 1990, p. 182).

Many alternative methods can be utilized to avoid the threat of continuing severe soil erosion and reduce dangerous chemicals while improving production yields. These methods evolve from the development of recent scientific technologies as well as traditional successful farming practices (Cunningham & Saigo, 1990). One approach to addressing these challenges is a sustainable agriculture system. "Sustainable agriculture" is an integrated system of site specific plant and animal production practices. This system satisfies long term human food and fiber needs; enhances environmental quality; enhances the natural resource base upon which the agricultural economy depends; makes the most efficient use of nonrenewable and on-farm resources; integrates natural biological cycles; controls and sustains the economic viability of farm operations; and enhances the quality of life for farmers and society as a whole (U.S. Department of Agriculture, 1994).

Many sustainable methods have been tried by the American farmer. These attempts at sustainable agriculture systems have been individualized, generally site specific, and integrated with traditional methods, independent of adjoining farms or other production systems. A number of traditional agricultural teaching systems have addressed the need for a total integration of agricultural disciplines in production systems. However, this has been on a limited basis, and acceptance and the adoption of sustainable agriculture practices continues to evolve slowly. Research based, interdisciplinary problem solving methods need to be developed to address the promotion and implementation of agricultural production techniques advocating positive environmental benefits. There is also a need for the successful integration of research methods into workable farm systems utilizing alternative production technologies (National Research Council, 1989). These research-based technologies must be made available by a delivery system that is on the cutting edge of modern technology.

Studies of the capabilities of the Cooperative Extension system and the competency of extension agricultural agents have not been reported in the literature. An investigation by Chesney (1992) in a policy study initiated as part of the Leadership Development Program of the National Center for Food and Agricultural Policy in January, 1991, revealed perceptions that the Cooperative Extension Service still has the human resource base to maintain its competitive position in the delivery of agricultural and natural resources technology. However, the responses from county personnel differed from responses of the state personnel. Among other concerns, county staff cited a need for workers with more sophisticated skills in high technology and a lack of agent training.

As the Cooperative Extension Service becomes increasingly involved with the implementation of concepts and practices of sustainable agriculture, several questions must be addressed. How are these concepts and the emerging need for a sustainable agriculture land base significant to the training needs of the Cooperative Extension Service? Can the Cooperative Extension Service provide the needed teaching services in the area of sustainable agriculture with present capabilities, or are changes needed in the qualifications of new professionals employed by the Cooperative Extension Service? Do the personnel presently assigned to agricultural program areas have the needed expertise to teach specific alternative agricultural concepts utilizing sustainable production methods? Are the agricultural production methods that are being taught and promoted by Cooperative Extension personnel conducive to a sustainable agriculture land base? Prior to this study, no research had ever been conducted to determine extension agricultural agents' perceptions of sustainable agriculture in the Southern Region of the United States. This study was designed to address this void.

Purpose and Objectives

The purpose of this study was to describe extension agricultural agents' perceptions of sustainable agriculture in the Southern Region of the U.S. Agents' perceptions were investigated as an indicator of knowledge and feelings about sustainable agriculture, in lieu of a more objective measure such as a test of agents' competencies. The objectives of the study were to:

1. Describe the demographic characteristics of extension agricultural agents employed by the Cooperative Extension Service in the Southern Region of the U.S.
2. Describe extension agricultural agents' perceptions of:
    a) Concepts of sustainable agriculture.
    b) The potential impact of selected factors on the sustainability of production agriculture in the Southern Region of the U.S.
    c) Production agriculture trends and their relationship to the future of sustainable agriculture in the Southern Region of the U.S.
    d) Sustainable agriculture capabilities of the Cooperative Extension Service in the Southern Region of the U.S.
    e) Extension agricultural agents' competencies in sustainable agriculture in the Southern Region of the U.S.
3. Determine if differences exist by age, agricultural background, educational background, and type of institution of employment in Extension agricultural agents' perceptions of:
    a) Sustainable agriculture concepts.
    b) The potential impact of selected factors on the sustainability of production agriculture.
    c) Selected trends and their relationship to the future of sustainable agriculture.
    d) Capabilities of the Cooperative Extension Service in sustainable agriculture.
    e) Extension agricultural agents' competencies in sustainable agriculture.

Methods and Procedures

From the review of literature, it was determined that a research instrument that met the needs of this study was not available. The researcher developed and validated a research instrument in the form of a questionnaire to accomplish the objectives of the study. The areas of investigation emerged from the review of literature and suggestions from the expert validation panel. The questionnaire had five Likert scale sections in addition to the demographic information section: knowledge of sustainable agriculture concepts, knowledge of sustainable agriculture trends, perceptions of potential impact of selected factors on sustainability of production agriculture, capabilities of the Cooperative Extension Service in the area of sustainable agriculture, and competency of extension agricultural agents in the area of sustainable agriculture. The instrument was designed using Dillman's (1978) Total Design Method.

In order to determine the face and content validity of the questionnaire, a panel of 11 experts was utilized. Each possessed one or more of the following attributes: knowledge and expertise in the area of sustainable agriculture; extensive agricultural background in traditional and/or low-input production systems; familiarity with current U.S. agricultural policies dealing with the spectrum of sustainability in agricultural systems; or administrative background in areas of agricultural production systems. Panel members represented different areas of agriculture and this diversity was valuable and pertinent to the validation process. The panel was asked to review and evaluate the questionnaire's ability to accomplish the stated objectives of the study. They were also asked to add or delete items, to make comments regarding effectiveness of the instrument, and to offer suggestions for improvement. The internal consistency coefficients for the five scales in the instrument as measured by Cronbach's alpha were as follows (in order by objectives 2-6): concepts - .71, factors - .84, trends - .84, capabilities - .61, and competencies - .90.

The population included Cooperative Extension county/parish agents with major responsibility in agriculture working in the 13 states of the Southern Region of the U.S. These individuals were either employed by the 13 institutions established by the Morrill Act of 1862 or by the 11 institutions established by the Second Morrill Act of 1890. The stratified random sample (stratified by 1862 or 1890 institution) consisted of 412 extension agricultural agents selected from the 1,915 agents in the population. After 10 frame errors were removed, the final sample size was 402. A 95.5% (384 out of 402) response rate was achieved after two mailings and a phone follow-up.

A comparison of the five scale means by response wave was made to determine if the sample was a fair representation of the population. It was concluded that no statistically significant differences existed among the response waves and that the data collected was representative of the population of extension agricultural agents. The data collected during the phone follow-up phase was combined with the data collected by mail for further analyses.

Descriptive statistics were used to describe the agents' demographic characteristics and perceptions regarding sustainable agriculture. Analyses of variance and inferential t-tests were used to determine if the agents' perceptions of sustainable agriculture concepts, sustainable agriculture factors, sustainable agriculture trends, sustainable agriculture capabilities of the Cooperative Extension Services, and agents' sustainable agriculture competencies differed by age, agricultural background, educational background, and type of land grant institution of employment. The alpha level was set a priori at .05.

Results and/or Findings

Due to the size of this study and the 12 page limit on manuscripts for this conference, the authors were forced to decide whether to split the manuscript into two manuscripts or whether to omit a part of this manuscript. The decision was made to omitting a section of this manuscript. was considered to be preferable to splitting the manuscript into two papers. Since data tables require large amounts of space, we opted to eliminate this section in favor of providing more detailed information in the conclusions section. All tabular data are available from the authors in the final report of this regional project.

Conclusions

The following conclusions are directed at extension agricultural agents in the Southern Region of the U.S. Unless otherwise noted, the term "agents" will be used to represent this population.

Agents' Demographic Characteristics

The average agent is 42 years old and has 14 years of experience with the Cooperative Extension Service. The agents are a well educated group. Most agents hold undergraduate degrees in the plant sciences, animal sciences, education, or agricultural business or economics. Most agents have advanced degrees in the animal sciences, plant sciences, education, or agricultural business or economics. Most agents have farm background. Nearly one-half of the agents spend the majority of their professional time working with owners/operators of small farms (below $50,000 gross income). Over half of the agents spend most of their time working with crop production while over one-fourth spend most of their time working with livestock production.

Agents Perceptions of Sustainable Agriculture Concepts

Agents perceive that most sustainable agriculture practices can be successfully used in production systems but do not perceive that insects, weeds, or diseases in production systems can be successfully controlled without the use of pesticides. Agents perceive that perennial grain crops, with the potential for sustaining or increasing production with limited inputs, should receive more research emphasis. They perceive that federal guidelines for acceptable levels of pesticides and other polluting agents found in municipal drinking water systems should be relaxed. Agents do not perceive that chemical residues on many fruits and vegetables that are currently available in the market place pose a significant health threat to the consumer.

Agents 33 years old and younger are more likely to agree with the sustainable agriculture concepts presented in the questionnaire than agents 34 years and older. Agents working with small farm clientele are more likely to agree with the sustainable agriculture concepts as presented than those working with large farm or agribusinesses. Agents employed by the 1890 Cooperative Extension Services agree are more likely to agree with the sustainable agriculture concepts as presented than agents employed by the 1862 Cooperative Extension Services.

Agents' Perceptions of Selected Factors and Their Potential Impact on the Sustainability of Production Agriculture

Agents perceive that the Cooperative Extension Service will have a positive impact on the sustainability of production agriculture during the next ten years. They perceive that minimum tillage systems will have a positive impact on production agriculture during the next ten years. The agents perceive that the following factors will have a negative impact on the sustainability of production agriculture: increased nitrate levels in drinking and in irrigation water, increased pesticide residues in groundwater, a shortage of synthetic fertilizers, loss of productive land to population expansion, reduced water availability, salinization of water, severe erosion of major cropland, and the increased use of marginal soils. Agents perceive that global warming will have no impact on the sustainability of production agriculture. Agents with an undergraduate degree in agricultural business and/or economics are more likely to perceive that the selected factors presented will have a positive impact on the sustainability of production agriculture during the next ten years than are agents with an undergraduate degree in animal science or plant science.

Perceptions of Selected Trends and Their Relationship to the Future of Sustainable Agriculture

Agents do not perceive that cultural and biological control will replace chemical pest control in most major agricultural production systems within the next ten years. Agents perceive that large irrigation systems will adopt practices that significantly reduce water usage. Agents working with small farm clientele are more likely to agree with sustainable agriculture trends than agents working with agribusinesses. Agents employed by the 1890 Cooperative Extension Services are more likely to agree with sustainable agriculture trends than agents employed by the 1862 Cooperative Extension Services.

Agents' Perceptions of Sustainable Agriculture Capabilities of the Cooperative Extension Service in the Southern Region of the U.S.

Agents perceive that the Cooperative Extension Service provides the major leadership in sustainable agriculture in their local county/parish. They also perceive that more time and adequate funding should be set aside for training in the area of sustainable agriculture.

Agents employed by the 1890 Cooperative Extension Services are more likely to agree with perceived capabilities of the Cooperative Extension Service than agents employed by the 1862 Cooperative Extension Services. Agents having farm background are more likely to agree with perceived sustainable agriculture capabilities of the Cooperative Extension Service than agents with no farm background.

Agents working with small farm clients are more likely to agree with the perceived sustainable agriculture capabilities of the Cooperative Extension Service than agents working with moderate to large farm clientele or agents working with agribusinesses.

Agents with undergraduate or graduate degrees in the areas of the plant sciences are more likely to disagree with perceived sustainable agriculture capabilities of the Cooperative Extension Service than agents with undergraduate or graduate degrees in areas of education, animal science, or agricultural business and/or economics.

Agents' Perceptions of Competencies in Sustainable Agriculture in the Southern Region of the U.S.
Agents perceive themselves to be slightly competent or moderately competent in sustainable agriculture competencies. Agents perceive themselves to be slightly competent in the area of the use of trap crops, the use of cover crops in orchards, ridge tillage systems, solid waste product utilization, the integration of animal and plant systems, the use of computer software, and the use of green manure crops and cover crops.

Agents perceive themselves to be moderately competent in biological pest control methods, cover crops in vegetable production, minimum tillage, no-till, weed management, soil nutrient management and fertilization, crop rotational systems, and livestock rotational grazing systems. Over one-half of the agents have received no training in the area of computer software dealing with sustainable agriculture topics. Agents perceive themselves to be less competent in this area than others dealing with sustainable agriculture. Over ninety percent of the agents have received training in the areas of minimum tillage production systems and soil nutrient management and fertilization methods. Agents perceive themselves to be most competent in these areas.

Agents working in rural plant science areas or rural animal science areas perceive themselves to be more competent in sustainable agriculture than agents working in urban plant science areas. Agents with farm background perceive themselves to be more competent in sustainable agriculture than agents with no previous farm background. There are no differences between the perceived competencies of the agents employed by the 1862 Cooperative Extension Services and agents employed by the 1890 Cooperative Extension Services.

Analysis

It appears that the training needs of extension agents should be accentuated in the following areas:

1) Sustainable agriculture concepts for older agents (34 years and older), for 1862 agents, and for agents working with moderate to large farms and agribusinesses as compared to their respective counterparts;
2) Sustainable agriculture trends for 1862 agents, and for agents working with moderate to large farms and agribusinesses;
3) Sustainable agriculture competencies for urban agents working in the plant science areas, and for agents having no farm background.

Several questions were raised at the outset of the study. It would appear that these were partially, if not fully, answered.

First, the study affirmed that these concepts and the emerging need for a sustainable agriculture land base are significant to training needs of extension agricultural agents, in that the Cooperative Extension Service must have expertise in sustainable agriculture to address the continuing needs of the agricultural community in the U.S. and abroad. As societal needs change and environmental concerns continue to escalate, the development and adoption of a sustainable agriculture technology that creates strong ties among the farmer-producer, the consumer, and the environmentalist become more and more critical to food production.

Second, it is not clear from the study whether or not the Cooperative Extension Service can provide the needed teaching services in the area of sustainable agriculture with present capabilities. However, this study revealed that extension agricultural agents working in the Southern Region of the U.S. perceive themselves to be weak or lacking in a large number of sustainable agriculture competencies. From the resulting data and analyses, it is questionable whether or not these agents presently have the needed capabilities to provide teaching services in sustainable agriculture technology.

Third, changes may be needed in the qualifications of new professionals employed by the Cooperative Extension Service. Although this study did not reveal strong positive or negative tendencies one way or another with regard to this question, support may be given to this concept because of the relatively low self-perceptions of sustainable agriculture competencies of agents working in the Southern Region.

Fourth, it appears that personnel presently assigned to agricultural program areas may lack the needed expertise to teach specific alternative agricultural concepts utilizing sustainable production methods. The study investigated field agents only, therefore this would apply only to that group. Extension agricultural agents working in the Southern Region of the U.S. perceived themselves only slightly to moderately competent in the areas of sustainable agriculture that were investigated by this study. The study did not address the competencies of state program specialists. It is interesting to speculate that if field agents need training in sustainable agriculture, and if state program specialists are to provide this training, just how competent are those at the state level? Do they have the needed expertise to teach agents about sustainable agriculture, and at what level?

Fifth, all agricultural production methods that are being taught and promoted by Cooperative Extension personnel may not be conducive to a sustainable agriculture land base. It was evident from the study that agents perceive a number of selected agriculture production practices are conducive to sustainable agriculture. Agents perceive that insect, disease, and weed control in most cropping systems can not be accomplished without the use of pesticides. However, several researchers (Altieri, 1992; Cunningham & Saigo, 1990; Pimentel, et al., 1991; Schaller, 1993) have indicated that the continuing use of excessive levels of pesticides in agricultural systems can hinder their sustainability. Alternative pest control methods are being investigated and developed. The integration of the best of current and traditional methods may provide an improved blueprint for a sustainable agriculture land base.

Sixth, it is imperative that the Cooperative Extension Service undertake employee training in sustainable agriculture concepts leading to the development of farm production practices reflecting the environmental concerns supportive of an emerging global agriculture.

The 1990 Farm Bill, according to Hoag and Pasour (1992), requires Extension agents to be trained in sustainable agriculture in order to develop understanding, competencies, and the ability to teach sustainable agriculture concepts and communicate with the farm community. The education program package is mandatory, and suggests that sustainable agriculture is socially beneficial and should be adopted. Also, according to Hoag and Pasour (1990), all Extension agents must complete a training program no later than November, 1995 and new agents hired after November, 1993 are required to complete training within eighteen months following employment. This would indicate that the Cooperative Extension Service must initiate training as needed in sustainable agriculture for extension agricultural agents in the Southern Region of the U.S.

These concerns are directed towards agent training needs in sustainable agriculture. A curriculum that focuses on concepts, factors and their impacts, trends, and perceived levels of competencies of extension agricultural agents, therefore, appears to be appropriate as a base for this training.

Planning for training designed to enhance the sustainable agriculture capabilities of extension agriculture agents is presently underway by State Cooperative Extension Services. Federal seed money has been allocated to initiate this training. It is important to the future viability of the Cooperative Extension Service as a teaching organization in the Southern Region of the U.S. and to the preservation of an agricultural land base for future generations that the training needs of extension agricultural agents in sustainable agriculture be addressed.

Recommendations

The following recommendations are based on the conclusions of this study:

1) More time and funding should be allocated by the Cooperative Extension Service for agent training in the areas of sustainable agriculture.
2) A follow-up to this study should be conducted to determine if differences exist in the perceptions of competencies and actual competencies of agents in sustainable agriculture. Agents may actually be lacking in sustainable agriculture competencies or it is possible that they may only perceive that they are lacking in these competencies.
3) Administrators in the ranks of the Cooperative Extension may want to consider hiring only those candidates for employment as agricultural agents with specialized training and background in the area of sustainable agriculture. Consideration may also be given to the concept of requiring specialized course work or training in sustainable agriculture for "new hire" employees that come on as agricultural agents.
4) Agents need training that provides awareness in concepts and principles of sustainable agriculture.
5) Cooperative Extension Services should consider providing agents with training leading to the integration of technical agriculture disciplines into components of working sustainable agriculture applications. Agents may be competent in technical disciplines but may lack the ability to integrate this knowledge.
6) Agents need to be provided with information and/or training which will make them more in tune with current agricultural research as it pertains to the sustainability of agriculture on a global basis and more familiar with how this research influences local agricultural production. With the convenience of the electronic media, this may be made available for Cooperative Extension professionals on a regular basis at the state and national levels.
7) A data bank (packaged program) for use by agents in the Southern Region of the U.S. is needed which will provide specific environmental applications for the integration of vegetables, agronomic crops, ground covers, and plant and animal rotational practices into an environmentally sound system to be used in teaching applications.
8) There is a need for Cooperative Extension Services to provide agents with training that will aid them in helping producers in the transition away from intensive chemical usage and towards sustainable production systems. This training should enable agents to promote the following sustainable agriculture practices: greater use of crop rotations using legumes, animal and green manures for use as soil builders, the integration of crop and animal production systems, mechanical weed control, and increased emphasis on soil and water conservation practices and the continuing use of biological pest control.

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EXTENSION AGRICULTURAL AGENTS' PERCEPTIONS OF SUSTAINABLE AGRICULTURE IN THE SOUTHERN REGION OF THE UNITED STATES

Discussant Remarks
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The authors have identified and studied an important topic of not only regional, but also national concern. Understanding the many aspects of sustainable agriculture, organizing the content for relevant instruction, and delivering valid and useful content to the ultimate user is a major challenge to anyone in any agency, institution, organization, or company seeking to provide such information. Helping the ultimate user make wise decisions and initiate informed behavior changes regarding sustainable agriculture issues and practices is a larger challenge. The authors are to be commended for studying the issue.

The introduction to the paper was comprehensive and well written. The authors began with a general overview of the Cooperative Extension System and its initiatives, included incidents and events of historical significance, provided excellent examples to support their claims, and ended with questions important to the profession and relevant the research being conducted. The introduction provided the need and rational for the purpose and objectives that followed. Relevant objectives were identified and evidence was collected for each objective specified.

The methods and procedures used were delineated clearly. Acceptable procedures were used to develop the instrument used and validity and reliability procedures were described adequately. The authors were persistent in their data collection efforts as evidenced by a reported response rate of over 95 percent.

Due to the size of the study and the 12 page limit for the manuscript, the authors were faced with a decision of splitting the manuscript into two papers or omitting findings and tabular data. They chose to eliminate tables requiring large amounts of space in favor of providing more detailed information in the conclusions section. I think they made the right choice, as the conclusions were comprehensive and included much detail. However, the results and/or findings section in the manuscript I received included fragmented and incomplete sentences and should have been proofread prior to submission.

The authors ended the paper by presenting eight recommendations. After perusing the section, I felt that recommendations 4, 6, 7, and 8 were more statements of need than they were recommendations. Stating that a need exists does not include a proposed solution. The recommendations section should be reviewed and be made more prescriptive if the desired results are to be attained.

In summary, the study was comprehensive and well conducted and the result should be improved understanding of the complex issue of initiating and implementing sustainable agriculture.

LEARNING STYLES OF AGRICULTURAL FACULTY ATTENDING THE NATIONAL ASSOCIATION OF COLLEGES AND TEACHERS OF AGRICULTURE ANNUAL CONFERENCE

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Introduction

Each and every student is unique. Students differ from each other in a number of ways. One way students differ is the way they learn. Dunn and Dunn (1979) stated that not only do students learn in considerably different ways, but certain students succeed only through selected methods. Just as each and every student is unique so are their teachers. Studies indicate that individuals have the basic capability to learn and teach; however, they are not able to learn and teach effectively in the same exact way (Gregorc, 1979). Therefore, the learning style of teachers has implications for student learning (Avery, 1985).

Nichols and Mundt (1993) reported a significant difference existed between agricultural educators and home economics educators in the importance placed on individual student differences. Agricultural educators placed individual student differences very low on their list of teaching priorities. Yet, teaching and learning, which are highly influenced by individual differences, should be the heart of the mission in colleges of agriculture. Warmbrod (1992) wrote, "Teaching and learning are the core of the intellectual content of agricultural education as an academic endeavor. . ." (p.26). The focus of the profession must continue to be the deep, rich, complex study of teaching and learning. Have college of agriculture faculty lost sight of the fact that as agricultural faculty the most important people in the profession are the students?

"As teachers, we invest a great deal of time thinking about and preparing for <u>what</u> we should teach. Likewise, we should spend an equal amount of time thinking about and preparing for <u>how</u> we should teach" (Cox and Zamudio, 1993). <u>How</u> we teach should be directly correlated to the learning styles of the students in the class. Cano (1991) suggested that "...responsibilities of the instructor are to encourage all learners to learn, provide choices for learners, and above all else, adapt the teaching style to fit the learning style of the learners". If instructors are expected to adjust teaching styles to fit learning styles, some understanding of learning styles is in order.

Theoretical Framework

Learning styles is not a new concept. However, because educational practitioners started to investigate learning styles at about the time most psychologists were losing interest, progress in the area has been slow (Keefe and Monk, 1986).

Learning style refers to the predominant and preferred manner in which individuals take-in, retain, process, and recall information. "...Learning style is demonstrated in that pattern of behavior and performance by which an individual approaches educational experiences. Learning style represents both inherited characteristics and environmental influences" (Keefe and Monk, 1986, p.1-2).

In considering learning styles, there has been extensive study of the influence the surrounding field has on a person's perception of items within the field as well as its impact on the person's intellectual domains and personality traits. According to Cano, Garton and Raven (1992a), two of the most widely studied learning styles are field-dependence and field-independence. Witkin, Moore, Goodenough, and Cox (1977) described the extremes of the aforementioned continuum as follows: when perception is strongly dominated by the prevailing field (a region, space or sphere where mental or physical activity exists), that mode of perception is designated as "Field-Dependent", but when the person experiences items as more or less separate from the surrounding field, the perception is designated as "Field-Independent" (p. 7).

Individuals with a field-dependent learning style tend to perceive the world in a global fashion. Field-dependent learners have a social orientation and best learn material with a social content. Field-dependent learners require externally defined goals and need organization provided for them. Consequently, they may need more explicit instruction in problem-solving strategies. As teachers, field-dependent learners tend to use student-centered activities. They are strong in establishing a warm and personal learning environment. Teachers that are field-dependent are also less likely to provide negative feedback and evaluation towards the student (Witkin, 1973).

Field-independent learners view the world more analytically. Field-independent learners rely on self-defined goals and self-structured situations. Teachers with a field-independent learning style are more subject-centered in their instruction. Field-independent teachers serve more as a "guide" than a "teacher" for their students. Field-independent teachers place more emphasis on the cognitive aspect of instruction. They are more likely to use an inquiry or problem-solving approach to learning due to their analytical perspective (Witkin, 1973). Gaining an awareness of field-dependence and field-independence should add to teachers' and students' ability to use their learning style, appreciate the style differences of others, and to begin thinking about the best classroom methods for facilitating effective learning.

In 1991, Cano, Garton, and Raven concluded that despite the amount of related research regarding learning styles, teaching styles, and personality styles, agricultural teacher educators may be unable to fully use the results since previous studies have not included agricultural teachers. Since the study by Cano et al. (1991) there have been a number of studies that have investigated the learning styles and teaching styles of pre-service agriculture and technology education teachers.

Cano, Garton, and Raven (1992a) found that the learning styles of pre-service agriculture teachers in Ohio do differ. Another study by Cano, Garton, and Raven (1992b) found a moderate relationship between pre-service teachers' learning styles and their ability to demonstrate the problem-solving approach to teaching in a microteaching laboratory. Cano et al. (1992b) found those pre-service teachers that tended to be field-independent tended to do a better job of demonstrating the problem-solving approach to teaching. Similar research by Raven and Shelhamer (1993) found no relationship between learning style and the ability to demonstrate the problem-solving approach to teaching. A study by Raven, Cano, Garton, and Shelhamer (1993) found that Ohio and Montana pre-service agriculture teachers differ in terms of age, learning style, teaching style, and personality style. Raven and Shelhamer (1993) also found that pre-service agriculture and technology education teachers differ in their learning styles. Pre-service agriculture teachers tended to be field-independent while technology education pre-service teachers tended to be field-dependent.

There have been some similar findings in these studies. A majority of subjects in the studies majoring in agricultural education have tended to be field-independent. Females majoring in agriculture strongly tend to be field-independent. However, these studies have been limited to undergraduate students and agricultural education faculty. Do these findings hold true for other faculty in different agricultural disciplines?

Purpose and Objectives

The purpose of this study was to determine, compare, and contrast the learning styles of agricultural faculty that attended the 41st Annual National Association of Colleges and Teachers of Agriculture (NACTA)

Conference held at The Pennsylvania State University. The following research objectives guided this investigation:

1. To describe the personal characteristics (gender, age, appointment, academic rank, discipline area, type of institution) of conference participants who are agricultural faculty at a four-year agricultural degree granting institution.
2. To determine the preferred learning style of conference participants' as measured by the Group Embedded Figures Test (GEFT).
3. To compare and contrast conference participants' learning styles by selected personal characteristics (gender, teaching appointment, discipline area, rank, institutional type -- land-grant vs. non-land grant,).
4. To determine the correlation between agriculture faculty's GEFT scores and selected personal characteristics (percentage of instructional, research, service, and administrative appointment, age).

Methods

The population (N = 82) for this descriptive study was agricultural faculty from four year agricultural degree granting institutions in North America who are directly involved with undergraduate instruction attending the 41st Annual National Association for Colleges and Teachers of Agriculture (NACTA) Conference. The NACTA Conference was chosen as there are a number of universities and states of the United States represented by agricultural faculty involved in undergraduate instruction.

Administration of the GEFT determined the preferred learning style of the subjects as either field-dependent or field-independent. Scores on the GEFT range from 0 to 18. Subjects with scores of 12 to 18 are classified as field-independent while subjects with scores of 0 to 11 are considered field-dependent. The GEFT is a standardized instrument and considered to be valid and reliable (Witkin, Oltman, Raskin, & Karp, 1971).

A questionnaire was developed by the researchers to determine the demographics of the conference participants. A panel of experts comprised of agricultural education faculty at the home department of one of the researchers established face and content validity of the questionnaire. Agricultural faculty were asked to furnish their age; gender; university of employment; highest degree; what area that degree was in; the percentage of their appointment in terms of instruction, research, service, and administration; and their academic rank.

Eighty-two of the 85 conference participants responded that they were agricultural faculty in a four year agricultural degree granting university in North America and were included in the final sample. Agricultural faculty were placed into one of five discipline areas based on the discipline in which they had earned their highest degree. Agricultural faculty with a degree in agricultural economics or agricultural business were placed into the agricultural economics category. Faculty with a degree in agricultural education, occupational education, or some other educational related degree were placed into the educational category. Those faculty with degrees in agronomy, horticulture, plant pathology, or weed science, were placed in the plant related category. Faculty with a terminal degree in animal science, dairy science, animal genetics, or poultry science were placed in the animal related category. Finally, those faculty with their highest degree in soil science, agricultural chemistry, or agricultural engineering were placed into the agricultural physical science related category.

Agricultural faculty were also categorized based on their teaching appointment percentage. Faculty with an appointment of 50% or more were placed in the category "teaching primary responsibility". Faculty with less than a 50% instructional appointment were placed in the category "teaching secondary responsibility".

The agricultural faculty completed the instrument at the beginning of a seminar on learning styles conducted by the researchers at the NACTA Conference. This seminar was selected to gather the data as there were no other activities taking place during the time period. Since the study was a census it was not appropriate to report inferential statistics. The researchers hand scored all instruments and analyzed the data using SPSS.

Findings

Data summarized in Table 1 reports the teaching responsibility of agricultural faculty by their rank. The results indicated that 70% (57) of the agricultural faculty had appointment with teaching as their primary responsibility. A greater number (78%) of associate professors had an appointment with teaching as their primary responsibility than full or assistant professors. Of the 82 conference participants, the overwhelming majority were men (78) and over half (48) of the participants were full professors. The mean age of the agricultural faculty attending the conference was 50.9 (sd=8.9).

Table 1.
Instructional Appointment of Agricultural Faculty Attending Conference by Rank (N = 82)

	Teaching Primary Responsibility		Teaching Secondary Responsibility		Total	
Rank	n	%	n	%	n	%
Professor	30	62.5	18	37.5	48	100.0
Assoc. Professor	21	77.8	6	22.2	27	100.0
Assist. Professor	2	66.7	1	33.3	3	100.0
Instructor	4	100.0	0	0.00	4	100.0
Total	57	69.5	25	30.5	82	100.0

The mean GEFT score of 10.6 for agricultural faculty varied from the national norm of 11.4 (Table 2). The mean GEFT scores for faculty in the animal related and agricultural physical science areas were the closet to the national norm. The mean GEFT score of 9.4 for agricultural faculty in the education discipline area was the lowest and below the national norm. The mean GEFT score for faculty in the agricultural economics discipline, another social science area, was also below 10.0. The mean GEFT scores for faculty with primarily a teaching appointment (10.5) were similar to faculty with an appointment where teaching was a secondary responsibility (10.7).

Table 2.
Group Embedded Figure Test Scores of Agricultural Faculty Attending Conference by Discipline Area (N = 82)

Discipline Area	Teaching Primary Responsibility Mean	SD	Teaching Secondary Responsibility Mean	SD	Total Mean	SD
Ag Econ	10.3	5.3	9.0	5.7	9.8	5.3
Education	9.0	5.2	11.0	5.2	9.4	5.2
Plant Related	11.1	2.7	9.25	5.5	10.7	3.4
Animal Related	11.0	2.2	12.3	4.6	11.6	3.4
Ag Physical Sci	11.9	4.2	11.8	6.1	11.9	4.7
Total	10.5	4.2	10.7	5.2	10.6	4.5

Data showed that 56% (46) of the agricultural faculty were field-dependent learners and 44% (36) were field-independent learners (Table 3). Three of the four female agricultural faculty were field-independent. Nearly 60% (45) of the male agricultural faculty were field-independent.

Table 3.
Learning Styles of Agricultural Faculty Attending Conference by Gender (N = 82)

Gender	Field Dependent n	%	Field Independent n	%	Total n	%
Female	1	25.0	3	75.0	4	100.0
Male	45	57.7	33	42.3	78	100.0
Total	46	56.1	36	43.9	82	100.0

Examination of Table 4 reveals the learning styles of agricultural faculty by their teaching appointment. Nearly 60% (34) of faculty who have an appointment where teaching is a primary responsibility are field-dependent. Almost half (12) of the faculty with an appointment where teaching is a secondary responsibility are field-dependent.

Table 4.
Learning Styles of Agricultural Faculty Attending Conference by Teaching Appointment (N = 82)

Teaching Responsibility	Field Dependent n	%	Field Independent n	%	Total n	%
Primary	34	59.6	23	40.4	57	100.0
Secondary	12	48.0	13	52.0	25	100.0
Total	46	56.1	36	43.9	82	100.0

The majority (57%) of agricultural faculty in the animal related discipline area tended to prefer the field-independent learning style (Table 5). Half of the faculty in the agricultural physical science area preferred the field-independent learning style. Agricultural faculty in the agricultural economics, education, and plant related discipline areas tended to prefer the field-dependent learning style. Two-thirds of the faculty in the education discipline area preferred the field-dependent learning style.

Table 5.
Learning Styles of Agricultural Faculty Attending Conference by Discipline Area (N = 82)

Discipline Area	Field Dependent n	%	Field Independent n	%	Total n	%
Ag Econ	9	60.0	6	40.0	15	100.0
Education	14	66.7	7	33.3	21	100.0
Plant Related	10	55.6	8	44.4	18	100.0
Animal Related	6	42.9	8	57.1	14	100.0
Ag Physical Sci	7	50.0	7	50.0	14	100.0
Total	46	56.1	36	43.9	82	100.0

There was little difference in the learning style of agricultural faculty at land-grant and non-land-grant schools. Approximately 56% of the faculty at either type of institution preferred the field-dependent learning style.

Table 6.
Learning Styles of Agricultural Faculty Attending Conference by Institution's Land-Grant Status (N = 82)

Land-Grant Status	Field Dependent n	%	Field Independent n	%	Total n	%
Yes	24	55.8	19	44.2	43	100.0
No	22	56.4	17	43.6	39	100.0
Total	46	56.1	36	43.9	82	100.0

Nearly two-thirds (30) of the full professors preferred the field-dependent learning style while all three of the assistant professors preferred the field-independent learning style. Approximately half (14) of the associate professors preferred the field-independent learning style.

Table 7.
Learning Styles of Agricultural Faculty Attending Conference by Rank (N = 82)

Discipline Area	Field Dependent n	Field Dependent %	Field Independent n	Field Independent %	Total n	Total %
Professor	30	62.5	18	37.5	48	100.0
Assoc. Professor	13	48.1	14	51.9	27	100.0
Assist. Professor	0	0.0	3	100.0	3	100.0
Instructor	3	75.0	1	25.0	4	100.0
Total	46	56.1	36	43.9	82	100.0

Table 8 presents the correlation between agricultural faculty's GEFT scores and their age, and percentage of appointment for teaching, research, service, and administration. There was a substantial negative correlation (-.37) between agricultural faculty's GEFT score and their age. The older the faculty the greater the tendency to prefer the field-dependent learning style. There was a slight positive correlation(.18) between agricultural faculty's GEFT score and their percentage of appointment designated for research. Faculty with a higher percentage of their appointment for research had a slight tendency to have a higher GEFT score.

Table 8.
Correlation Table of GEFT Scores with Age and Appointment Percentages

Variables	X_1	X^2	X_3	X_4	X_5	X_6
GEFT (X_1)	1.0					
Age (X_2)	-.37	1.0				
Instruction (X_3)	.04	.10	1.0			
Research % (X_4)	.18	-.15	-.19	1.0		
Service % (X_5)	-.10	-.13	-.27	-.09	1.0	
Administrative % (X_6)	-.09	.03	-.78	-.25	-.18	1.0

Conclusions

The majority of participants at the 41st Annual NACTA Conference were older faculty as indicated by the mean age of 51 and large number of full professors (59%). There were just three participants that were assistant professors. Additionally, the overwhelming majority of participants were male with just four females out of the 82 participants in the seminar where this study was conducted. A large majority of conference participants had an academic appointment with teaching as their primary responsibility. NACTA needs to encourage more females and more junior faculty to attend their annual conferences.

Agricultural faculty attending the NACTA Conference varied in their learning styles as indicated by the range of GEFT scores. Overall, participants tended to prefer a field-dependent learning style. Most studies of learning styles in agriculture have concentrated on pre-service agricultural educators. These studies have consistently found that pre-service agricultural educators tended to be field-independent. The data of the study indicates that the faculty teaching them may be more field-dependent. In fact, the faculty with a degree in the educational discipline area were the most field-dependent of the study with a mean well below the national norm. However, three of the four females in the study were field-independent which supports all earlier findings of females involved in the teaching of agriculture.

Additionally, the learning styles of the conference participants differed depending on their academic area. Agricultural faculty in the animal related discipline area tended to be more field-independent than those faculty in the social science areas of agricultural economics and education as well as the plant related area. Faculty in the agricultural physical science area were slightly more field-dependent than faculty in the animal related area. Nearly two-thirds of the faculty in the educational discipline area were field-dependent. Yet all of the studies concerning pre-service agricultural educators have shown that they tend to prefer the field-independent learning style. What are the implications of this dichotomy? Further research is needed to determine more precisely the learning styles of agricultural education faculty across the country. One study completed in Montana (Raven & Shelhamer, 1993) found that agricultural education faculty at Montana State University tended to be field-independent.

The substantial negative correlation between GEFT score and age supports the research that as one ages they tend to become more field-dependent (Witkin, et al., 1971). This could be a possible explanation why the conference participants were below the national norm as the participants did tend to be older, more experienced faculty. The majority of participants were full professors and nearly two-thirds of them were field-dependent. Conversely, all three assistant professors were field-independent.

Implications and/or Recommendations

The data from this study were used to teach the participants in the study. Thus, these agricultural faculty left the NACTA Conference with an awareness of student individual differences regarding learning styles. The agricultural faculty that participated in the learning styles seminar at the NACTA Conference represented a large number of universities from the United States and Canada as well as a variety of academic disciplines. Therefore, these agricultural faculty have an opportunity to incorporate this knowledge into their teaching and hopefully have a positive impact on their students. Research is needed to determine if teachers with knowledge of learning styles are able to incorporate this knowledge into their teaching and to measure resulting impacts.

This study supports the findings of numerous studies which have suggested that people involved in the teaching of agriculture, individually, do differ in learning styles. Why the difference of learning styles among the participants? More important, in light of the differences, what should agricultural faculty be doing differently?

This study, as in studies of agricultural pre-service teachers, found that females involved in teaching agriculture tended to be more field-independent than the national norm for the GEFT. Granted there were only four women in this study. But the question still remains. Why do the females in this study and females in previous learning styles studies of women involved in teaching tend to be different from the national norm for females? Which of their characteristics make them field independent? Are these the females who have broken down an initial barrier to entering the profession? These variables need to be studied longitudinally such that trends and associations can be found.

The overall mean GEFT scores for agricultural faculty that attended the NACTA Conference in this study were below the national norm. What are the factors which influenced these faculty to prefer a more field-dependent learning style?

What should agricultural faculty do?

As educators we know that the students seated in our classrooms at the beginning of the new term are all different from each other and different from us. It is wrong for us to ignore these differences.

There exists a need for agricultural faculty to explore the learning styles of students in our classes and, accordingly, design lessons that capture the educational uniqueness inherent in these individuals. Adding variability to our methods and approaches will result in improved instruction and, thus, enhanced learning.

Students are unique as are professors. However, is it the responsibility of the professor to reach all students, no matter what the students' learning style. Instructors may use informal observations or standardized instruments, such as the GEFT, to identify learning styles. Once the learning styles of the students are determined, teachers must use a variety of instructional and motivational strategies that take into account the learning styles of both field-dependent and field-independent students. By improving the match between the learning style of the student and the techniques utilized by the instructor, there should be an increase in the achievement level of students and thus a renewed satisfaction in teaching for the professor.

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LEARNING STYLES OF AGRICULTURAL FACULTY ATTENDING THE NATIONAL ASSOCIATION OF COLLEGES AND TEACHERS OF AGRICULTURE ANNUAL CONFERENCE

Discussant Remarks
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Not surprisingly, the topic of individual learning styles continues to pique the research interests of agricultural educators. Considerable research has been conducted in determining the learning styles of agricultural educators and their student learners. The authors of this study, however, are to be commended for breaking new ground by assessing the learning styles of agricultural faculty at four-year agricultural degree granting institutions from across North America; at least as represented by those faculty in attendance at the 41st Annual NACTA Conference and as measured by the Group Embedded Figure Test (GEFT). The study provides some comparative perspective of learning styles among agricultural faculty when categorized by discipline.

The introduction and theoretical framework provides an excellent foundation for the study. Although the statement, "...found that Ohio and Montana preservice agriculture teachers differ in terms of age, learning style, teaching style, and personality style," leaves the reader wondering whether those differences actually were between the two groups of teachers or among them collectively.

The purposes and methods seem appropriate and clearly presented. However, even though "the GEFT is a standardized instrument and considered to be valid and reliable," how meaningful are scores of 9-11 (field-dependent) as compared to 12 or 13 (field-independent)? Is there really a significant difference between the learning styles of one category with a score of 10.3 and one with 11.9? From the reviewer's own field-dependent (self-perceived) perspective as an educator, it seems predictable that applied behavioral scientists (e.g., educators and agricultural economists) would tend to be more socially-oriented and use student-centered activities (i.e., be field-dependent) more often than would physical (animal or plant) scientists. Incidentally, nearly 60% (45) of the male agricultural faculty were field-dependent (not field-independent).

Referring again to the reviewer's field-dependent perspective (this time due to age), it seems entirely logical that as one ages and gains more experience one tends to perceive the world in a more global fashion rather than from a subject-center orientation. In some circles, this differentiates applied research from basic research, or perhaps even wisdom from knowledge. This is an interesting study with plausible, somewhat predictable, findings.

Under implications/recommendations, the question was raised by the authors, "Why do females in this study and females in previous learning styles studies of women involved in teaching tend to be different from the national norm for females?" It would be helpful to share the national norm (GEFT score) for females with the reader. The recommendations from the study are solid. The bottom line is that adding variability to our methods and approaches will indeed result in improved instruction and, thus, enhanced learning. The authors are to be commended for creatively involving NCATA conferees in the study and furthering an awareness of student individual differences regarding learning styles among agricultural colleagues in higher education.

A COMPARISON OF LEARNING STYLES, VALUE SYSTEMS, AND DEMOGRAPHIC CHARACTERISTICS OF SELECTED EXTENSION PROFESSIONALS IN THE FLORIDA COOPERATIVE EXTENSION SERVICE

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Introduction and Theoretical Framework

To some degree, learning style of the teacher impacts the way a teacher guides the learning process (Jacobson, 1992; Dunn & Dunn, 1979; Garger & Guild, 1984). Although most experts agree that learning style involves the interaction between how a learner approaches a given task and personality behaviors, only a limited amount of research has been conducted with professionals employed in cooperative extension.

Rollins and Yoder (1993) utilized the Kolb Learning Style Inventory (LSI) on 199 extension professionals in the Pennsylvania Cooperative Extension Service. They found that 29% were classified by the LSI as Accommodators, 27% as Assimilators, 26% as Convergers, and 18% as Divergers. Seevers (1995) utilized the Principles of Adult Learning Scale (PALS) instrument to measure the learning styles of 609 extension professionals in the Ohio Cooperative Extension Service. She found that these subjects had a more teacher-centered behavior pattern than the norm-reference group.

Values are defined as the "standards (or principles) by which choices are made which lead to actions" (Performax Systems International, 1985, p.VI-1). One's value system is both stable from situation to situation and dynamic with respect to cognitive-based decision making predicated upon new information. O'Connor (Performax Systems International, 1985) proposed that culture is a key variable in one's values, and stated that "cultural variables include our ethnic or tribal group, geographic location, socio-economic status, community residence, and national citizenship" (p.V-7). Values are a reflection of numerous external and internal forces. External forces include family, religion, schooling, peers, and mass media. The primary internal force that influences values beyond the imprinting, modeling, and socialization stages (after age 20) involves significant emotional events (Performax Systems International, 1985).

Although the influence of value system upon the teaching-learning process is unknown, conflicting values could be especially problematic in educational programs where social, ethical, political, and economic issues are raised. If clients have differing value systems from extension professionals delivering programs, it is conceivable that extension professionals unaware of value systems would have difficulty providing instruction in a potentially hostile learning environment.

Value systems also impact organizational planning and climate (Bean, 1993; Bryson, 1995). Bean (1993) stated the following regarding values:

> Individual and organizational actions are caused in part by the values of individuals and organizations. In my mind, the operative thought here is "values drive actions." Actions are not executed in a values vacuum. . . People in organizations do things no only according to their personal values, but also according to what they feel are the enterprise's value as well. (p. 97)

In 1994, Safrit, Jones, and Conklin examined the organizational values of extension professionals in Ohio. The researchers used a self-developed instrument for data collection purposes. These researchers found over 90% agreement on the following statements: (1) honesty and integrity in our work, and (2) credibility with clientele.

In a qualitative study of extension professionals in Florida, Williams (1994) discovered twelve themes and classified the themes into three "communities of values." The "communities" included personal values, mission-related values, and structural values. She concluded her research by recommending the use of a quantitative instrument to assess value orientation of extension professionals in Florida.

Purpose and Objectives

The purpose of this study was to compare learning styles and value systems of extension professionals in the Florida Cooperative Extension Service. The following objectives were developed to guide the researchers:

1. identify selected demographic variables of extension professionals,
2. determine extension professionals' learning styles,
3. describe extension professionals' value systems, and
4. ascertain the differences between extension professionals' learning styles, value systems, and selected demographic characteristics.

Methodology

The target population for this descriptive comparative study consisted of 56 extension professionals employed in a 17 county region in north Florida. The counties ranged from primarily rural, to a predominately urban area, including Duval County (Jacksonville). A purposeful sample of 49 extension professionals was utilized in this study (N=49). As a result, the findings of this study are limited to the purposeful sample. The data were collected in conjunction with a teaching/learning workshop conducted by the researchers on February 2, 1996.
Three instruments were used to collect data for the study. Learning styles were measured by the GEFT (Witkin, Oltman, Raskin, & Karp, 1971). Reliability and validity have been established by the GEFT developers. Demographic data were collected by way of a researcher-developed questionnaire. Face and content validity were established for the questionnaire by a panel of experts in the Department of Agricultural Education and Communication at the University of Florida.

Values were measured by use of the Values Analysis Profile (VAP) (Performax Systems International, 1985). The VAP consists of 40 statements measured on a Likert-type scale. It classifies subjects into the following four categories based upon summations of degrees of agreement and disagreement with the statements: (1) traditionalists, (2) in-betweeners, (3) challengers, and (4) synthesizers.

Traditionalists are accepting of authority, traditional in terms of customs and practices (including work ethics), are loyal group members and respective of social orders, and believe in formal personal and work relationships. In-betweeners prefer choices and options, dislike situations in which they are forced to make limited decisions, and are influenced by trends and fads. Challengers are likely to question authority and traditional values, believe that individual rights should take precedence over group or organizational considerations, have difficulty accepting social orders, and are informal in their approach to social orders and organizational roles. Synthesizers are motivated to resolve conflicts, optimistic about the future, skeptical about present situations, and often noncommittal toward singular approaches (O'Connor & Massey, 1989).

The VAP was developed based upon over 1500 responses to "common sayings" by individuals of differing ages, gender, educational levels, state of residency, occupation, and other demographic characteristics. The developers of the instrument have reported that content, face, and criterion validity have been established, as well as internal consistency and test-retest reliability.

Data were analyzed using the SPSS/PC+ statistical software package. Descriptive statistics were used to summarize the data. Due to the purposeful sampling procedure, inferential statistics were not utilized.

Findings

The initial research objective was to describe extension professionals in terms of demographic characteristics. Table 1 indicates that a total of four broad program areas were represented by participants. About 35% of the extension professionals had multiple program area responsibilities. Of the multiple program extension professionals, 41% included county-level administrative responsibilities and a combination of 4-H and Youth Development, Family and Consumer Sciences, Agricultural and Natural Resources, or Community Development assignments. Thirty-five percent of those with multiple responsibilities indicated that they had 4-H and Youth Development as well as Agricultural and Natural Resources assignments. As revealed in Table 2, ages of extension professionals ranged from 22 to 61 (M=40.06, SD=9.96). Of the 49 extension professionals, over 53% were male. Approximately 71% of the subjects attended high school in the Southeastern U.S. Another 14% attended high school in the Midwest and 8.2% in the Northeast. Over 84% of the extension professionals attended the same high school for four years (Table 3).

Table 1.
Description of Selected Extension Professionals by Program Area

Program Area	n	Percent
Agricultural and Natural Resources	10	20.4
Family and Consumer Sciences	17	24.5
4-H and Youth Development	10	20.4
Multiple Program Areas	17	34.7
Totals	49	100.0

Table 2.
Description of Selected Extension Professionals by Age

Age Range	n	Percent
22 - 29	12	25.5
30 - 39	10	21.1
40 - 49	20	40.8
50 - 59	6	12.4
60 or Greater	1	0.2
Totals	49	100.0

M = 40.06, SD = 9.96

Table 3.
Description of Extension Professionals by Location of High School Attendance

Location	n	Percent
Midwest	7	14.3
Southeast	35	71.4
Northeast	4	8.2
Plains States	2	4.1
Southwest	1	2.0
Totals	49	100.0

Table 4.
Group Embedded Figures Test Scores of Selected Extension Professionals by Gender and High School Location (N = 48)

Location	Male			Female		
	n	Mean	SD	n	Mean	SD
Midwest	4	9.25	4.43	2	7.00	5.66
Southeast	20	8.05	5.60	15	10.27	4.76
Northeast	1	6.00	0.00	3	8.00	6.08
Plains States	0			2	14.50	3.54
Southwest	0			1	9.00	0.00
Totals	25			23		

The second research objective was to determine learning styles of the extension professionals. GEFT scores were unavailable for one of the 49 extension professionals. The average GEFT score for the 48 extension professionals was 9.04 (SD = 5.08). Scores ranged from a low of one to a high of eighteen. The national mean on the GEFT is 11.4 (Witkin, et al., 1971). For the purpose of classification, individuals scoring greater than the national mean are considered field independent, and those scoring less than the national mean are field dependent. As a whole, more extension professionals were field dependent learners (65%) than field independent learners.

The third research objective was to describe the value systems of the extension professionals. Forty-four subjects participated in the data collection process. All of the professionals were categorized by the VAP as synthesizers.

The final research objective was to ascertain differences between learning styles, value systems, and selected demographic characteristics. Due to the lack of heterogeneity in the value systems classification, analyses of value systems was excluded from this objective.

In terms of learning style and gender, both males (M = 8.16, SD = 5.26) and females (M = 10.00, SD = 4.81) were field dependent. A greater percentage of males were field dependent (68%) than females (60.9%). When learning style was examined by location of high school and gender, no clear pattern emerged for either males or females (Table 4). Females who attended high school in the Southeast had higher learning style scores (M = 10.27, SD = 4.76) than males who attended high school from this same region of the country (M = 8.05, SD = 5.60). Although females from this region scored higher on the GEFT, both males and females were field dependent learners.

Table 5 reveals that participants in their 30's scored highest on the GEFT than did participants in the other groups. When looking at GEFT scores by age range and gender (Table 6), males in their 20's were more field independent than males in other age groups (M=13.00, SD=1.73). Females in their 40's (although field dependent), scored highest on the GEFT (M=11.14, SD=4.74) compared to females in the other age groups.

Table 5.
Group Embedded Figures Test Scores of Selected Extension Professionals by Age

Age Range	n	Mean	Standard Deviation
22 - 29	12	11.58	4.91
30 - 39	10	6.30	3.09
40 - 49	19	10.00	5.63
50 - 59	6	5.17	2.32
60 or Greater	1	11.00	
Total	48		

Table 6.
Group Embedded Figures Test Scores by Age and Gender (N=48)

Age Range	Male			Female		
	n	Mean	SD	n	Mean	SD
22 - 29	3	13.00	1.73	9	11.00	5.60
30 - 39	7	5.71	3.15	3	7.67	3.05
40 - 49	12	9.33	6.18	7	11.14	4.74
50 - 59	3	4.33	1.53	3	6.00	3.00
60 or Greater	0			1	11.00	0.00
Totals	25			23		

Conclusions and Recommendations

Participating extension professionals in this study represented three broad ranges of program areas. Over one-third of the participants had multiple program responsibilities. The degree to which they represent the broader population of extension professionals is unknown. The subjects included about the same number of men as women. As a whole, they were in the mid-point in their extension careers. Over 70% of the extension professionals attended high school in the Southeast. However, participants represented every geographic region in the country with the exception of the Pacific West.

The participants tended to be field dependent learners. Field dependent learners have global perceptions, are sensitive to their social environments, have highly developed social skills, favor a spectator approach to learning, and need structured learning environments. This finding is similar to research on extension professionals in Pennsylvania. Using the LSI, researchers found that more extension professionals were classified as Accomodators than the other three classification areas. Accomodators prefer concrete experiences and active involvement (Rollins & Yoder, 1993).

Learning style identification certainly has implications for both program delivery and professional development of extension professionals. In terms of program delivery, presentation and learning experiences must be differentiated based upon the learning styles of clients. As for professional development, it is essential that programs be delivered to extension professionals that are highly structured and allow for social interaction.

The results of the VAP revealed that all participants were synthesizers. Synthesizers have the goal of integration of self with others. They are often overly-demanding upon themselves and what they can reasonably accomplish. There is a need to identify the value systems of program clients in an effort to determine if value systems are similar.

In terms of organizational planning and climate, there is a need to determine the value system of extension administrators and organizational beliefs. If values drive individual actions, and actions drive organizational success, then individual value systems affect organizational success (Bean, 1993). Safrit et al. (1994) stated:

> Identifying organizational values is an important first step towards improving the health and productivity of an organization, and provides critical information to examine current policies and to formulate future directions. (p. 2)

No clear patterns emerged in regards to learning style and gender, age range, or geographic region in which the extension professionals attended high school. Extension professionals differed only slightly in regards to their learning styles and demographic characteristics.

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A COMPARISON OF LEARNING STYLES, VALUE SYSTEMS, AND DEMOGRAPHIC CHARACTERISTICS OF SELECTED EXTENSION PROFESSIONALS IN THE FLORIDA COOPERATIVE EXTENSION SERVICE

Discussant Remarks
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Most educators would agree that teaching and learning styles both involve an interaction between how a teacher or learner approaches a given task and the personality behaviors of those so involved. The authors are to be commended for ambitiously tackling three variables in their quest to compare the learning styles and value systems of extension professionals in the Florida Cooperative Extension Service. Also, for furthering knowledge about learning styles with professionals in cooperative extension.

Explanations of the theoretical framework and methodology used in the study were helpful in understanding why a three-dimensional construct was employed for the research. The Kolb Learning Style Inventory (LSI) and Principles of Adult Learning Scale (PALS) were cited as instruments used in previous studies conducted on extension learning styles. Why was the Group Embedded Figures Test (GEFT) instrument used in this study instead of the LSI or PALS? The Values Analysis Profile (VAP) was selected to describe extension professionals' value systems. Unfortunately, all 49 respondents were categorized by the VAP scale as synthesizers. Was this the first time that the VAP was used to assess the values held by extension educators, or educators in general? Again, some discussion as to why various survey instruments were chosen (or rejected) for the study might better inform the reader.

The target population consisted of 56 extension professionals, but the purposeful sample was 49. Why were the seven professionals excluded? The total of "Selected Extension Professionals" classified by program area in Table 1 is 54, not 49. Table 5 reveals that participants in their 20s (not 30s) scored higher on the GEFT than did participants in the other groups. This seems to be consistent with previous research findings regarding age being negatively correlated with GEFT score. However, it was interesting to observe that a bimodal curve would be needed to graph the GEFT scores for females, by age, as shown in Table 6. interestingly, women in their 40s scored slightly higher than those in their 20s.

The study was successful in identifying selected demographic variables of a purposeful sample of extension professionals employed in a 17-county region in northern Florida. However, what was the rationale for asking respondents if they had attended the same high school for four years? The study also determined extension professionals' learning styles (as measured by the GEFT score). Most extension professionals were classified as field dependent learners. But, if everyone scoring below the national GEFT norm of 11.4 is field dependent, then 75% (not 65%) of the respondents in the study should be classified as field dependent. The extension professionals' value systems were quite similar--all were classified as synthesizers. In fact, this was a fairly uniform group of respondents. The challenge now is to identify the value systems and learning styles of program clients so that extension professionals can optimize the effectiveness of their educational services.

THE LEARNING STYLES OF SECONDARY AGRICULTURE TEACHERS AND STUDENTS: SIMILAR OR DIFFERENT?

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Introduction/Theoretical Framework

Educators have recognized that the learning process is critically important and understanding the way individuals learn is the key to educational improvement (Griggs, 1991). Thus, educational improvement initiatives (A Nation at Risk, 1983; The Unfinished Agenda, 1984; An Imperiled Generation: Saving Urban Schools, 1988) have called for educators to find ways for students to learn more effectively and more efficiently. Toward that end, research (Keefe, 1982; Keefe & Ferrell, 1990) regarding the way individuals prefer to learn, has been conducted to assist educators in developing instructional materials and identifying methods of teaching that were most compatible with students' preferred learning styles.

"If students cannot learn in the way they are taught, then they must be taught the way to learn" (Marshall, 1990, p. 62). Torres and Cano (1994) supported this ideology by indicating that students should have knowledge of their learning style in an effort to learn more effectively and efficiently. Further findings (Dunn & Dunn, 1979; Claxton & Murell, 1987) have indicated that when teaching methods were governed by student learning styles, the results were higher test scores, improved attitudes toward school and learning, improved student behavior, and greater learning. The challenge for educators is to assess the learning style characteristics of each student and to provide learning opportunities that are compatible with those characteristics. Diagnosing and interpreting learning styles provides data as to how individuals perceive, interact, and respond to the learning environment.

In responding to the learning environment, Cross (1976) stated that people see and make sense of their world in different ways. Dunn and Dunn (1979) contended that "teachers teach the way they learned" (p. 241). Consequently, because teachers tend to teach the way they learn, they often fail to recognize the different learning styles found within their classrooms. Therefore, having knowledge regarding the learning styles of students can be of assistance to the teacher in selecting instructional materials, teaching methods, and learning activities to be used in the teaching-learning process (Turner, 1985).

Relevant to agricultural education, researchers (Raven, Cano, Garton, & Shelhamer, 1993; Cano & Garton, 1994; Whittington & Raven, 1995; Cano & Metzger, 1995) have studied the learning styles of teachers and preservice teachers of agricultural education. The studies concluded that teachers of agriculture differed in learning styles, personality styles, and preferred ways of teaching. Although studies exist in describing the preferred learning and teaching styles of teachers of agriculture, a paucity of research exists which identifies the learning preferences of secondary agriculture students.

Regarding secondary agriculture students, a limited amount of research (Cox, Sproles, & Sproles, 1988; Rollins, 1990; Rollins & Scanlon, 1991; Dyer & Osborne, 1995) has been conducted that has assessed their learning styles. The findings from the previous research have been with mixed results. The only conclusion that is uniform is that the agriculture students have varied in their preferred ways of learning. Research, regarding the teaching-learning process, must be expanded if secondary agriculture teachers are to incorporate the learning differences found within the classroom and make modifications to their teaching methodology, instructional materials, and learning activities to better teach students.

Purpose and Research Questions

The purpose of this study was to describe the learning styles of secondary teachers and students of agricultural education. To guide the study, the following research questions were developed:

1. What was the learning style of secondary teachers of agriculture as assessed by the Individual Learning Preference Checklist?

2. What was the learning style of secondary students of agriculture as assessed by the Individual Learning Preference Checklist?

3. What differences existed between the secondary agriculture teachers' learning style and the secondary agriculture students' learning style?

Methods/Procedures

Population and Sample

The target population for the study was secondary agriculture teachers who were in their first or second year of teaching (N = 37) and students of the teachers (N = 1649) in the State of Missouri. The accessible sample consisted of a census of the first and second year secondary agriculture teachers (N = 37) and the students of the teachers who were present the day the data were collected (n = 1507) during the fall of 1994. Caution should be exercised when generalizing the results of the study beyond the accessible sample.

Instrumentation

The Individual Learning Preference Checklist (ILP) developed by Bargar, Bargar, and Cano (1994) was used to identify the learning styles of the secondary agriculture teachers and students. The ILP is a 56 item checklist consisting of eight sets of questions (one set for each of the eight learning preferences). The ILP is based on the Myers-Briggs Type Indicator (MBTI)®, which has been used extensively in the assessment of how people learn (Myers & Myers, 1980).

Validity for the ILP was established by the authors (Bargar, Bargar, & Cano, 1994) of the instrument. Reliability coefficients for the ILP ranged from .87 to .99 (Bargar, Bargar, & Cano, 1994). Correlations between parallel scales of the Myers-Briggs Type Indicator® and the ILP range from .88 to .99. The reliability coefficients indicate that the ILP is highly consistent with the Myers-Briggs Type Indicator® in measuring learning style characteristics.

The ILP measures an individual's preference on four dimensions: Extraversion-Introversion; Sensation-Intuition; Thinking-Feeling; and Judgement-Perception. The Extraversion-Introversion dimension describes how individuals orient themselves, either to their external world or inner thoughts. Individuals with an Extraversion orientation prefer doing things with other people, gain energy by taking charge of activities, are interested in application, learn by doing, and have a brief attention span. Individuals preferring Introversion enjoy working individually, prefer a quiet learning environment, are irritated by continual talk around them, and carefully consider questions before speaking.

The Sensation-Intuition dimension describes how individuals perceive events and experiences. Individuals preferring a Sensation orientation pay attention to what is "real" in experiences, need organization and structure in learning, and expect step-by-step instructions. Individuals preferring Intuition are intrigued by new possibilities, work from insights and hunches, and respond to activities that stimulate thought.

The Thinking-Feeling dimension describes how individuals make decisions. Individuals that prefer Thinking use facts to illustrate ideas, focus on achievement, competence, and completion, and may be uncomfortable when presenting ideas. Individuals preferring a Feeling orientation enjoy working with people, cooperative assignments, and avoid competition and confrontation.

The Judgement-Perception dimension describes how individuals approach and adapt to events and happenings. Individuals preferring Judgement make decisions quickly, may restrict options, prefer well-planned activities, and prefer structured assignments with concise instructions. Individuals with a perception orientation have flexible work habits, like new experiences, appreciate spontaneity, and dislike imposed structure and organization.

Data Collection

The first and second year agriculture teachers were administered the ILP as part of an inservice on the ILP and its administration during a session of a beginning teachers course. At the conclusion of the session, the first and second year teachers were provided with the appropriate number of instruments for the students enrolled in their agricultural education program. The ILP was administered by the teachers during the fall of 1994, with 1507 usable instruments returned. All 37 first and second year teachers participated in the study and returned instruments to the researchers.

Results/Findings

The ILP was used to gather data on the learning styles of secondary agriculture teachers and students. The dimensions were dichotomized as either Extraversion or Introversion, Sensation or Intuition, Thinking or Feeling, and Judgement or Perception.

The results indicated that the teachers were comprised of 31 (84%) males and six (16%) females. Regarding the dimensions, 54% of the teachers were Extraversion and 46% were Introversion (Table 1). On a gender breakdown, males were almost equally split between Extraversion and Introversion, while 67% of the females were Extraversion and 33% Introversion. With regard to the Sensation-Intuition dimension, 54% of the teachers preferred Intuition, while 46% preferred Sensation. Along gender lines, 39% of the males and 83% of the females preferred Sensation, while 61% of the males and 17% of the females preferred Intuition.

Table 1.
Learning Preferences of First and Second Year Agriculture Teachers (N = 37)

Preference	Male (N=31) f	%	Female (N = 6) f	%	Total (N = 37) f	%
Extraversion	16	51.6	4	66.7	20	54.1
Introversion	15	48.4	2	33.3	17	45.9
Sensation	12	38.7	5	83.3	17	45.9
Intuition	19	61.3	1	16.7	20	54.1
Thinking	18	58.1	6	100.0	24	64.9
Feeling	13	41.9	0	0.0	13	35.1
Judgement	17	54.8	6	100.0	23	62.2
Perception	14	45.2	0	0.0	14	37.8

The Thinking-Feeling results indicated that 65% of the teachers were Thinking and 35% were Feeling. The gender breakdown revealed that 58% of the males were Thinking and 42% were Feeling, while 100% of the females were Thinking. On the Judgement-Perception dimension, 62% of the teachers preferred Judgement and 38% preferred Perception. An examination of gender differences revealed that 55% of the males and 100% of the females were Judgement while 45% of the males were Perception.

An analysis of the ILP Checklist scores for the secondary agriculture students indicated that 55% of the students preferred the Introversion and 45% preferred the Extraversion learning preference (Table 2). While females were equally divided between Introversion and Extraversion, males leaned more toward the Introversion (57%) learning preference. With regard to the Sensation-Intuition dimension, 57% of the students preferred Sensation and 43% preferred Intuition. Males and females did not differ on their preference toward Sensation (males = 56% and females = 57%) and Intuition (males = 44% and females = 43%).

Table 2.
Learning Preferences of Secondary Agriculture Students (n = 1507)

Preference	Male (n = 1078) f	%	Female (n = 429) f	%	Total (n = 1507) f	%
Extraversion	464	43.0	213	49.7	677	44.9
Introversion	614	57.0	216	50.3	830	55.1
Sensation	609	56.5	244	56.9	853	56.6
Intuition	469	43.5	185	43.1	654	43.4
Thinking	388	36.0	127	29.6	515	34.2
Feeling	690	64.0	302	70.4	992	65.8
Judgement	563	52.2	228	53.1	791	52.5
Perception	515	47.8	201	46.9	716	47.5

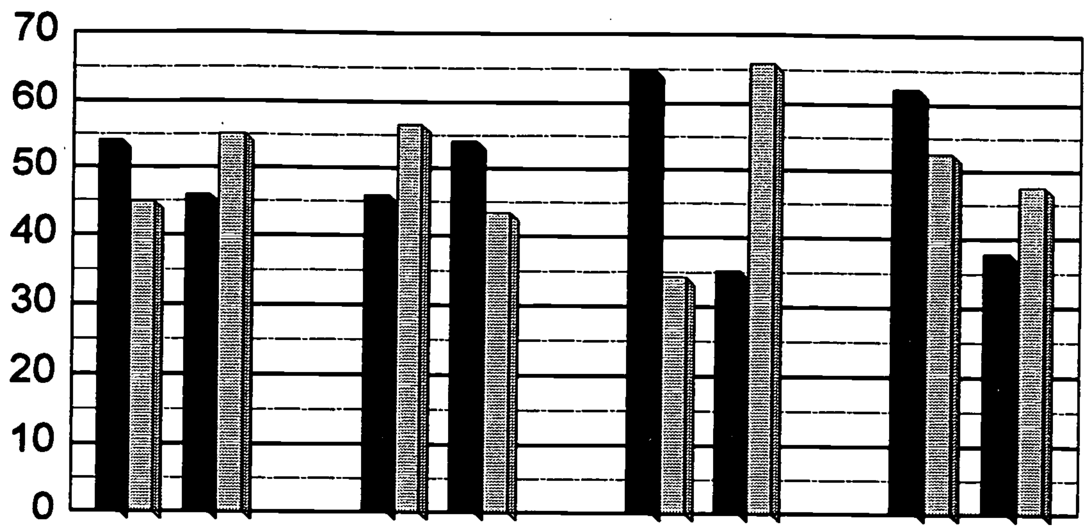
The dimension which exhibited the greatest difference was the Thinking-Feeling dimension. A majority (66%) of the students preferred Feeling and 34% preferred the Thinking learning preference. In addition, the dimension possessed the greatest difference between genders, with 70% of the females and 64% of the males preferring the Feeling learning preference. In regards to the Judgement-Perception dimension, 52% of the students preferred Judgement and 48% preferred Perception. Females leaned more toward Judgement (53%) over Perception (47%) as well as males (52% Judgement and 48% Perception).

The final research question sought to determine what differences existed between the preferred learning styles of secondary agriculture teachers and students. The secondary agriculture teachers and students differed with regard to three of the four learning dimensions (Table 3, Figure 1). The greatest difference between teachers and students was on the Thinking-Feeling dimension. A majority (65%) of the teachers leaned toward the Thinking preference while the greatest percentage (66%) of students leaned toward the Feeling learning preference.

Table 3.
Differences Between Secondary Agriculture Teachers' Learning Style and Secondary Agriculture Students Learning Style

	Teachers (N = 37)		Students (n = 1507)		Total	
Preference	f	%	f	%	f	%
Extraversion	20	54.1	677	44.9	697	45.1
Introversion	17	45.9	830	55.1	847	54.9
Sensation	17	45.9	853	56.6	870	56.3
Intuition	20	54.1	654	43.4	674	43.7
Thinking	24	64.9	515	34.2	539	34.9
Feeling	13	35.1	992	65.8	1005	65.1
Judgement	23	62.2	791	52.5	814	52.7
Perception	14	37.8	716	47.5	730	47.3

The teachers and students also differed on the Sensation-Intuition and Extraversion-Introversion dimensions. The one dimension that teachers and students possessed similar learning preferences was the Judgement-Perception dimension. A majority (62%) of the teachers preferred Judgement, as did a majority (53%) of the students.



	Extraversion	Introversion		Sensation	Intuition		Thinking	Feeling		Judgement	Perception
Teachers ■	54.1	45.9		45.9	54.1		64.9	35.1		62.2	37.8
Students ▤	44.9	55.1		56.6	43.4		34.2	65.8		52.5	47.5

Figure 1. Differences Between the Learning Style of Secondary Agriculture Teachers and Students

Conclusions/Recommendations/Implications

The secondary agriculture teachers differed in their preferred ways of learning, which can have an influence on the way they teach (Dunn & Dunn, 1979). A majority of the teachers leaned toward the Extraversion, Intuition, Thinking, and Judgement learning preferences. These learning preferences indicated that the secondary agriculture teachers preferred active learning (learning by doing), responded to activities that stimulated thought, and were intrigued by new possibilities. In addition, they preferred that facts and figures be used when illustrating a new concept, expected logical and well-planned assignments, and enjoyed being recognized for their accomplishments.

The male and female teachers differed in their learning preference on one of the four learning dimensions. The male teachers preferred Intuition, while the female teachers preferred the Sensation learning preference. This finding indicated that the male teachers perceived events and experiences differently than their female counterparts. The male teachers were more likely to be intrigued by new possibilities and grasp overall concepts more quickly, but ignore important details. Conversely, the female teachers had a preference for learning experiences that were well structured and organized and preferred to learn concepts by focusing on facts and exact meanings.

Similar to the teachers, the secondary agriculture students also differed in their preferred ways of learning. However, a comparison of the male and female students indicated that they did not differ with regard to the four learning dimensions. A majority of the students preferred the Introversion, Sensation, Feeling, and Judgement learning preferences. A preference for these dimensions indicated that the secondary agriculture students preferred to learn in a quiet learning environment, carefully considered questions before speaking, needed the teacher to provide organization and structure to the learning activities, and preferred "real-life" illustrations to better grasp the concept. Furthermore, a majority of the students were extrinsically motivated, needing constant praise and encouragement, and they preferred well-planned assignments with concise instructions.

The secondary agriculture teachers and students differed in their preferred ways of learning, as indicated by the results of the Individual Learning Preference Checklist. Consequently, teachers of agriculture should be made aware of their own learning preferences as well as the learning preferences of their students.

The greatest difference between teachers and students was with regard to the Thinking-Feeling dimension. While 64% of the teachers preferred Thinking, students were just the opposite, with 65% preferring the Feeling learning preference. The secondary agriculture teachers should be cognizant of the learning differences between students and the learning differences between teachers and students.

Teachers should develop good habits of praising and encouraging students. Whereas teachers preferred to focus on achievement and competition, they should be aware that many students prefer to avoid competition. Could this be a reason why some students do not participate in contests or leadership positions in the FFA? Teachers should strive to make the teaching-learning process less competitive for a majority of their students.

Because students had a preference for Feeling, they enjoyed learning activities that allowed them to work with others in a cooperative learning environment. Therefore, teachers must develop their skills in using cooperative learning activities. Since "teachers teach the way they learned" (Dunn & Dunn, 1979, p. 241), teacher preparation programs must teach using more cooperative learning strategies and assist teachers in developing cooperative learning skills.

The secondary agriculture teachers differed in their preferred ways of learning. Furthermore, the secondary agriculture students differed from each other and the teachers with regard to learning. Consequently, a variety of learning styles are being brought to the teaching-learning process in secondary agriculture programs. These varied learning styles demand that teachers of agriculture incorporate a variety of teaching strategies into the teaching-learning process. When teachers account for students' varied learning styles, students become more motivated to learn and student achievement increases (Cross, 1976; Claxton & Murell, 1987; Griggs, 1991).

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THE LEARNING STYLES OF SECONDARY AGRICULTURE TEACHERS AND STUDENTS: SIMILAR OR DIFFERENT?

Discussant Remarks

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Here is a comparative study that assesses the preferred learning styles of first- and second-year agriculture teachers and their high school agriculture students. The authors are to be commended for not only identifying the learning style preferences of secondary agriculture students, but for comparing them with those of their teachers.

The introduction/theoretical framework and purposes for the research are clearly presented. The Individual Learning Preference Checklist (ILP), based on the Myers-Briggs Type Indicator (MBTI), was used to identify the learning styles of all participants. Reliability coefficients for the ILP were high, but why was the ILP preferred to other learning styles instruments such as the Group Embedded Figures Test (GEFT), the Kolb Learning Style Inventory (LSI), and the Principles of Adult Learning Scale (PALS)? The various learning styles studies seem to employ several kinds of instruments--typically, without explaining the reasons for instrument selection. The ILP measures an individual's preferred learning style on four dimensions. Those measures were reported for both teachers and students, by gender, on all four dimensions. Differences and similarities were reported in both narrative and tabular form. The paper is well written.

The authors stated in their introduction that "the challenge for educators is to assess the learning style characteristics of each student and provide learning opportunities that are compatible with those characteristics." While this challenge might seem to be a worthy goal in theory (most educators would agree that individualizing instruction is important), determining a student's interests and providing a variety of learning activities might be more efficient and effective than assessing each student's learning style and then attempting to accommodate each individual's particular learning style.

The greatest, and most significant, difference between teachers and students was with regard to the Thinking-Feeling dimension. Perhaps not surprisingly, two-thirds of the teachers preferred Thinking (facts, competence, and completion), whereas two-thirds of the students preferred Feeling (cooperative assignments, minimize competition and confrontation). While one could attribute these differences to maturational factors, peer pressure and the insecurities of adolescence impact on how high school students learn. The authors' recommendations for teachers to develop good habits of praising and encouraging students, to develop skills in using cooperative learning activities, and to make the teaching-learning process less competitive for a majority of their students are well founded. As students gain confidence in their abilities, they will become more receptive to asserting their identity and independence through achievement and their own ideas and initiatives. The learning styles used by teachers can be adjusted as they get to know their students' interests and abilities and as those students mature. In the meantime, teachers need to use a variety of instructional strategies (applied learning, brain-based learning, etc.) and approaches to accommodate the diverse learning styles typically found among high school students.

SYSTEMATIC EDUCATIONAL EFFORTS TEACHING ABOUT AGRICULTURE AND THE EFFECT ON FOURTH-GRADE STUDENTS KNOWLEDGE OF ANIMAL AGRICULTURE IN OHIO

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Introduction / Theoretical Framework

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 (Committee on Agricultural Education in Secondary Schools, 1988). Furthermore, few, if any systematic efforts are made to teach or otherwise develop agricultural literacy in students of any age. If students receive any instruction about agriculture, it is often fragmented, frequently outdated, usually only farm-oriented, and often negative and condescending in tone (Committee on Agricultural Education in Secondary Schools, 1988).

Elementary school students lack knowledge about the importance of agriculture, particularly its social and economic significance and its links to human health and environmental quality (Committee on Agricultural Education in Secondary Schools, 1988). Horn and Vining (1986) found in Kansas that fewer than 30 percent of students gave correct answers to relatively basic questions on agriculture. In Virginia, Oliver (1986) concluded that fourth-grade students had only rudimentary concepts of where their food and fiber came. Williams and White (1991) found in Oklahoma that students were unaware about the significance of agriculture being an important part of American history.

If students are to become literate about the significance and importance of American agriculture, efforts must be made to provide systematic instruction (Committee on Agricultural Education in Secondary Schools, 1988). Instruction about agriculture could be incorporated into existing courses and would not have to be taught separately. State education leaders, school administrators, and school boards should develop and implement a plan to foster instruction about the food and fiber system and its history, role in advancing science and technology, and regional significance in selected areas of the curriculum.

The Committee on Agricultural Education in Secondary Schools (1988) recommended that all students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade. Hall (1991) reported that 32 states were offering organized programs about agriculture in at least one grade level. Four additional states were planning to implement organized programs about agriculture within the next school year.

What should be the focus of elementary school programs that provide instruction about agriculture? Efforts should include providing for the systematic infusion of agricultural concepts and knowledge into basic subject areas like science, mathematics, social studies, and language arts (Law & Pepple, 1990). Furthermore, it is important that elementary school students have an understanding of the scope and diversity of career opportunities in agriculture.

In Ohio, efforts have been made to provide instruction to fourth-grade students about the importance of Ohio agriculture. Through the support of the Ohio Agricultural Council; Ohio State University Extension; The Ohio State University College of Food, Agricultural, and Environmental Sciences; and Ohio's agricultural community, AgVenture Magazine has been written and distributed to fourth grade students over the past four years. Three issues are published each year. Each issue deals with a particular topic relating to Ohio agriculture.

Fourth grade teachers are provided suggestions for integrating the content of AgVenture Magazine into the core curriculum to teach their students about agriculture.

No research exists about whether efforts in teaching elementary students about agriculture are beneficial in making these students more knowledgeable about the importance of agriculture. If the agricultural education profession is to help develop and provide systematic efforts to make school-aged students more literate about the importance of agriculture, then the profession must not only develop such efforts, but also determine if they are spending their time on agricultural literacy projects that are beneficial and promote the industry of agriculture.
Are the efforts made by those who write and provide support for AgVenture Magazine worthwhile? Does the magazine help make students more literate about the importance of animal agriculture in Ohio? Are students becoming more literate about agriculture so they can see the significance and importance of the industry? Supporters of AgVenture Magazine hope that their efforts make a difference and school-aged students can become more literate about agriculture.

Purpose/Objectives

The purpose of the study was to assess fourth grade students' knowledge about animal agriculture in Ohio before and after receiving instruction about agriculture by integrating the content of AgVenture Magazine into the core curriculum. Furthermore, the study sought describe relationships between (a) the type of school district students attended and (b) the communities where students lived and their knowledge about animal agriculture in Ohio. Specific objectives of the study were to: (1) describe fourth grade students on selected demographic characteristics; (2) describe agricultural experiences of fourth grade students who lived on farms; (3) assess fourth grade students' knowledge about animal agriculture on a 20 question, multiple-choice pretest; (4) assess fourth grade students' knowledge about animal agriculture on a 20 question, multiple-choice posttest after receiving instruction about animal agriculture; (5) determine differences between fourth grade students' pretest knowledge scores and (a) type of school attended and (b) type of community where students lived; (6) determine differences between fourth grade students' posttest knowledge scores and (a) type of school attended and (b) type of community where students lived; and (7) determine differences between pretest knowledge scores and posttest knowledge scores of fourth grade students after receiving systematic, instruction on animal agriculture in Ohio.

The following null hypotheses were tested in the study:

Hypothesis 1: H_o: There is no difference between the type of school fourth grade students attended and their pretest knowledge scores on animal agriculture.

Hypothesis 2: H_o: There is no difference between the type of school fourth grade students attended and their posttest knowledge scores on animal agriculture.

Hypothesis 3: H_o: There is no difference between the type of community where fourth grade students lived and their pretest knowledge scores on animal agriculture.

Hypothesis 4: H_o: There is no difference between the type of community where fourth grade students lived and their posttest knowledge scores on animal agriculture.

Hypothesis 5: H_o: There is no difference between pretest knowledge scores of fourth grade students on animal agriculture and posttest knowledge scores on animal agriculture.

Methods/Procedures

Design

A pre-experimental pretest-posttest design (Campbell & Stanley, 1963) was used for the study. The treatment in this study was having fourth grade students receive instruction about animal agriculture in Ohio from the integration of the content of AgVenture Magazine into the core curriculum The pretest-posttest design is weak in that the design does not control for six internal validity threats (history, maturation, testing, instrumentation, regression, and interaction of selection, maturation, etc.), nor does the design control for any external validity threats (Campbell & Stanley, 1963).

Population and Sample

The population for the study included all public school and private school fourth-grade students in Ohio (N = 185,000) educated in 6,255 classrooms during the 1995-96 school year. Using the formula recommended by Krejcie and Morgan (1970), a sample of 385 students was needed for the study. A cluster sampling procedure was used to select 20 classrooms to be in the study. Cluster sampling is an appropriate sampling procedure to use in educational settings (Fraenkel & Wallen, 1996). The population of fourth grade classrooms was stratified into three strata: a) local and exempted village school classrooms, b) city school classrooms, and c) private school classrooms. Using a list of random numbers, nine city school classrooms, seven local/exempted village classrooms, and four private school classrooms were selected for the study.

A cover letter was sent to the classroom teacher and school principal of each class selected for the study to ask for their permission to use their class for the study. The cover letter explained the purpose of the study, the conditions to be followed should the class be allowed to participate in the study, and the time line for completing the study. To participate in the study, the teacher must have agreed to use the Fall Issue of AgVenture Magazine on animal agriculture in Ohio when it arrived to the classroom and provide instruction to their students about agriculture during a one-month time period. Teachers who agreed to use their classroom for the study returned a form to the researcher indicating the total number of students they had in class. Eighteen teachers, teaching 650 students, agreed to have their classes participate for the study.

Instrumentation

The pretest and posttest were developed by the researcher after reviewing the Fall Issue of AgVenture Magazine during an Editorial Review Board meeting. After developing the tests for the study, the tests were sent to the four fourth grade teachers who were members of the Editorial Review Board for AgVenture Magazine to determine content and face validity. After receiving their recommendations for changes in the test, the tests were field tested with a class of fourth-grade students not selected to be in the study. A Kuder-Richardson 20 reliability coefficient for internal consistency was calculated for the 20 multiple choice items on the test. Although the reliability coefficient was .60, this low of a reliability coefficient is acceptable for tests that have been developed and used for the first time (Nunnally & Bernstein, 1994).

Data Collection

A numbered pretest for each student enrolled in the class was mailed to the teacher at the scheduled testing date with instructions explaining how the teacher was to administer the pretest to their students. Teachers had one-week to administer the pretest. After the pretests were administered and returned to the researcher, teachers then were to provide instruction to their students about animal agriculture in Ohio, using the Fall Issue of AgVenture Magazine mailed to their classrooms. Following the four-week period in which instruction was to be provided to students through the interegration of magazine content into the core curriculum, posttests for each student were mailed to the teacher along with instructions for administering the posttest. Teachers had one week to administer the posttest. Posttests were returned to the researcher after being administered by the teachers. Pretests were returned from 584 fourth-grade students for a return rate of 90 percent. The number of usable posttests returned was 551 for a return rate of 85 percent.

Data Analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS Version 6.1) for Windows. Data were summarized using descriptive statistics. Means and standard deviations were used to summarize pretest and posttest knowledge scores. Frequencies and percentages were used to describe demographic characteristics of students' backgrounds and their experiences in agriculture. One way analysis of variance was used to describe differences between the type of school fourth grade students attended, they type of community where they lived, and their pretest and posttest knowledge scores. t-test for dependent groups was used to determine differences between pretest and posttest knowledge scores. Alpha levels to test hypotheses were set at .05 a priori.

Results

Demographic Characteristics

Twenty-one percent of the fourth grade students lived in a rural area, 22 percent lived in an urban area, and 57 percent lived in a suburban area. Six percent of the fourth grade students who responded in the study lived on a farm. Seventeen percent of the students had grandparents who lived on a farm. Ninety-one percent of the students had visited a farm sometime in their lifetime.

Agricultural Experiences

Fourth grade students who lived on a farm were asked to identify what types of livestock and crops they raised at home. Horses were the most popular livestock raised by students, being raised by seven percent of the students. Chickens were the next popular livestock commodity raised (six percent), followed by beef (five percent), sheep (four percent), turkeys (three percent), dairy (three percent), swine (three percent), and goats (three percent). The most common crop commodity raised by students was corn (10 percent). The next most common crop raised was hay (six percent) followed by wheat (four percent), oats (four percent), rye (four percent), soybeans (three percent), alfalfa (two percent), barley (one percent), tobacco (one percent), and sorghum (less than one percent).

Pretest Scores

Fourth grade students were administered a 20-item, multiple choice test to assess their knowledge on animal agriculture in Ohio before receiving instruction about agriculture through integration of the content of the Fall Issue of AgVenture Magazine into the core curriculum. Table 1 presents the scores students who completed the pretest. Scores on the pretest for all students in the study (n = 584) ranged from 0 to 80 percent, with an average score of 48.1 percent (standard deviation = 13.1).

Fourth grade students living in a rural area averaged 47.9 percent on the pretest (standard deviation = 12.7) while students living in a suburban area average 48.5 percent (standard deviation = 13.2). Students living in an urban area averaged 46.8 percent (standard deviation = 13.0) on the pretest. Fourth grade students attending city schools scored an average of 50.0 percent on the pretest (standard deviation = 12.5). Students attending either local or exempted village schools scored 47.3 percent (standard deviation = 12.5) while fourth grade students attending private school scoreds 47.6 percent on the pretest (standard deviation = 13.9).

Table 1.
Pretest Knowledge Scores of Fourth Grade Students on Animal Agriculture

Group	n	Mean	s.d.
All fourth grade students	584	48.1	13.1
Type of Community Where Students Lived			
Rural area	125	47.9	12.7
Suburban area	332	48.5	13.2
Urban area	127	46.8	13.0
Type of School Students Attended			
City school	121	50.0	12.5
Local school	239	47.3	12.5
Private school	224	47.6	13.9

Posttest Scores

Fourth grade students were administered the same 20-item, multiple choice test to assess their knowledge on animal agriculture in Ohio after receiving instruction through the intergration of the Fall Issue of AgVenture Magazine into the core curriculum Table 2 presents the scores students who completed the pretest. Scores on the posttest for all students who completed the posttest (n = 551) ranged from 15 to 100 percent, with an average score of 57.5 percent (standard deviation = 16.5).

Fourth grade students living in a rural area scored an average of 54.1 percent on the posttest (standard deviation = 16.9). Students living in a suburban area scored 58.3 percent (standard deviation = 16.2) while students living in an urban area scored 58.9 percent (standard deviation = 16.6). Students attending city schools scored an average of 66.7 percent on the posttest (standard deviation = 17.9) while students attending either local or exempted village schools scored 53.7 percent (standard deviation = 14.8). Fourth grade students attending private schools scored 56.8 percent on the posttest (standard deviation = 15.9).

Table 2.
Posttest Knowledge Scores of Fourth Grade Students on Animal Agriculture

Group	n	Mean	s.d.
All fourth grade students	551	57.5	16.5
Type of Community Where Students Lived			
Rural area	123	54.1	16.9
Suburban area	310	58.3	16.2
Urban area	118	58.9	16.6
Type of School Students Attended			
City school	110	66.7	17.9
Local school	229	53.7	14.8
Private school	212	56.8	15.9

Differences Between Pretest Scores and Type of School Attended

One way analysis of variance was used to test the null hypothesis that there was no difference between the type of school fourth grade students attended and pretest knowledge scores on animal agriculture in Ohio. The null hypothesis of no significant difference between pretest knowledge scores and the type of school fourth grade students attended was not rejected. There was no significant difference among the three groups (city, local/exempted village, private). The analysis of the data yielded an F value of 2.01 with a p of .13 as reported in Table 3.

Table 3.
Analysis of Variance of Pretest Knowledge Scores on Animal Agriculture by Type of School Fourth Grade Students Attended

Source	df	SS	MS	F	p
Between Groups	2	686.000	343.00	2.01	.13
Within Groups	580	98630.380	170.05		
Total	582	99316.380			

Differences Between Posttest Scores and Type of School Attended

One way analysis of variance was used to test the null hypothesis that there was no difference between the type of school fourth grade students attended and posttest knowledge scores on animal agriculture. The null hypothesis of no significant difference between posttest knowledge scores and the type of school fourth grade students attended was rejected. There was a significant difference among the three groups (city, local/exempted village, private). The analysis of the data yielded an F value of 25.1 with a p < .001 as reported in Table 4. Fourth grade students attending a city school scored significantly higher on the posttest (mean = 66.7 percent) than did students who attended private schools (mean = 56.8 percent) and local/exempted village schools (mean=53.7 percent).

Table 4.
Analysis of Variance of Posttest Knowledge Scores on Animal Agriculture by Type of School Fourth Grade Students Attended

Source	df	SS	MS	F	p
Between Groups	2	12660.116	6330.06	25.11	<.001
Within Groups	547	137877.384	252.06		
Total	549	150537.500			

Differences Between Pretest Scores and Type of Community Where Students Lived

One way analysis of variance was used to test the null hypothesis that there was no difference between the type of community where students lived and pretest knowledge scores on animal agriculture. The null hypothesis of no significant difference between pretest knowledge scores and the type of community where students lived was not rejected. There was no significant difference among the three groups (city, local/exempted village, private). The analysis of the data yielded an F value of .76 with a p of .47 as reported in Table 5.

Table 5.
Analysis of Variance of Pretest Knowledge Scores on Animal Agriculture by Type of Community Where Students Lived

Source	df	SS	MS	F	p
Between Groups	2	260.271	130.14	.76	.47
Within Groups	569	97062.588	170.58		
Total	571	97322.859			

Differences Between Posttest Scores and Type of Community Where Students Lived

One way analysis of variance was used to test the null hypothesis that there was no difference between the type of community where students were raised and posttest knowledge scores on animal agriculture. The null hypothesis of no significant difference between posttest knowledge scores and the type of community where students were raised was rejected. There was a significant difference among the three groups (rural, suburban, urban). The analysis of the data yielded an F value of 3.34 with a $p = .04$ as reported in Table 6. Fourth grade students living in a urban area (mean = 58.9 percent) or a suburban area (mean = 58.3 percent) scored significantly higher on the posttest than did students living in a rural area (mean = 54.1 percent).

Table 6.
Analysis of Variance of Posttest Knowledge Scores on Animal Agriculture by Type of Community Where Students Lived

Source	df	SS	MS	F	p
Between Groups	2	1810.413	905.21	3.34	.04
Within Groups	536	145158.325	270.82		
Total	538	46968.738			

Differences Between Pretest and Posttest Scores

t-test for dependent groups was used to test the null hypothesis that there is no difference between pretest and posttest knowledge scores of fourth-grade students on animal agriculture. The hypothesis was rejected. There was a significant difference between pretest and posttest scores assessing fourth-grade students' knowledge on animal agriculture. The analysis of the data yielded a t value of -14.29 with a $p < .001$ as reported in Table 7. Fourth grade students scored significantly higher on the posttest (mean = 57.5 percent) than they did on the pretest (mean = 47.9 percent). Fourth-grade students scored 9.6 points higher on the posttest than they scored on the pretest.

Table 7.
Scores of Pretest and Posttest Assessing Fourth Grade Students' Knowledge About Animal Agriculture

Variable	n	Mean	t	p
Pretest	551	47.9	-14.29	.001
Posttest		57.5		

When comparing pretest and posttest scores for type of community where students lived and type of school they attended, fourth grade students living in an urban area had the greatest gain between the pretest and the posttest (12.1 points) while fourth grade students living in a rural area had the lowest gain of 6.2 points. Fourth grade students attending a city school had the highest gain between the pretest and the posttest (16.7 points) while fourth grade students attending a local/exempted village school had the lowest gain of 6.4 points.

Conclusions/Recommendations/Implications

Fourth grade students in Ohio have knowledge about the importance of animal agriculture in Ohio. Knowledge scores on the pretest and posttest adminitered in this study were higher than test scores of agricultural knowledge reported in other studies (Horn & Vining, 1986; Oliver, 1986; Williams & White, 1991). However, the pretest and posttest used in this study were subject specific about animal agriculture while tests used in other studies were general knowledge tests about the broad field of agriculture. Care must be taken when comparing the results of this study to the results of other studies due to the content used in the tests for each study.

Receiving instruction about agriculture through the integration of the content of AgVenture Magazine into the core curriculum does increase fourth grade students' knowledge about the importance of animal agriculture in Ohio, as indicated by the comparison of pretest and posttest scores. However, can receiving instruction about agriculture through the integration of AgVenture Magazine into the core curriculum be the only reason for the gain of knowledge? Could fourth grade students be exposed to history, such as taking field trips to farms, that might influence their knowledge about animal agriculture? What about the fact that they took a pretest? Students taking the test a second time usually do better than those taking the test the first time (Anastasi, 1958; Cane & Heim, 1950). While the results of the study suggest that receiving instruction about agriculture through the integration of content from a magazine does make a difference in fourth grade students' knowledge scores about animal agriculture, additional design measures need to be built into future studies to rule out any threats to validity that could also cause knowledge scores to increase.

Significant differences did not exist between the type of school fourth grade students attended and their pretest knowledge scores on the importance of animal agriculture in Ohio. The same is true for type of community where students lived and pretest knowledge scores. However, there was a significant difference between fourth grade students' posttest knowledge scores on animal agriculture and the type of school they attended and the type of community where they lived. Furthermore, students attending a city school had higher posttest knowledge scores than did students attending private or local/exempted village schools. Students living in urban areas had higher posttest scores than did students living in rural areas. Furthermore, the gains between pretest and posttest scores were greater for students living in urban areas and attending city schools.

Why would this be? Would one not expect higher scores for students attending local/exempted village schools where students are more likely to live in rural areas? What type of instruction and activities did fourth grade teachers provide in their classes when teaching their students about agriculture? Did fourth grade teachers in city schools take more seriously the integration of instruction about agriculture into the core curriculum? Did they use different learning activities to teach their students about agriculture? These questions cannot be answered from this study, but should be investigated in similar studies on integrating instruction about agriculture into the core curriculum.

The results from this study offer hope that worthwhile efforts exist in providing instruction about agriculture, making school-aged students more aware about the importance of agriculture. Other states are encouraged to develop similar efforts to promote instruction about agriculture, if they do not already exist, and evaluate their efforts to see if their efforts make a difference. When designing studies to evaluate the effectiveness of systematic instruction about agriculture, efforts should be taken to include control groups not providing systematic instruction to alleviate threats to validity that may affect the results of the study.

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SYSTEMATIC EDUCATIONAL EFFORTS TEACHING ABOUT AGRICULTURE AND THE EFFECT ON FOURTH-GRADE STUDENTS KNOWLEDGE OF ANIMAL AGRICULTURE IN OHIO

Discussant Remarks
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The introduction for this paper provided an adequate conceptual framework for the research problem. As a reader, I would have liked to have known more about the rationale for selecting fourth grade students to receive the treatment. Is this the most appropriate time to introduce agricultural concepts to elementary students? At the end of the introduction, the author raised some important questions, including "Is the AgVenture Magazine worthwhile?" I am not sure that this question was answered by this study.

The hypotheses were worded awkwardly. For example, in HO_1, I suspect the author really wanted to examine the difference in pretest scores for students who attended city, local, and private schools--not whether there was a difference between the scores of students and a type of school attended. Student scores and type of school are obviously different. The other hypotheses were similar in the way they were worded.

The sampling procedures used in this study also raised some questions. The author used a sampling formula based upon random sampling techniques and concluded that 385 subjects were needed to represent the population. Then cluster sampling was performed with 20 clusters (classrooms) from a total of 6,255 classrooms being selected. The first question is what was the unit of analysis, the student or the classroom? The sampling procedure used resulted in 650 students in the accessible sample. This was 265 more than the sampling formula suggested would be needed. One might question why the researcher oversampled the population? Another approach to sampling in this experimental design might be to determine the sample size in each group needed to reach the desired effect size. I am assuming that part of the explanation was the need to represent proportionally the number of schools in each of the strata, but this was not clear from the paper.

Internal consistency as a measure of the reliability of the instrument was low. This was acknowledged by the author. It was not clear whether more than 20 items were field tested. Being able to eliminate items with low item-test correlations could have improved the reliability of the instrument.

It seems that the real importance of pretest scores in this study was to provide baseline information and to determine if there were pre-existing differences among the treatment groups. The researcher found there were no pre-existing differences, which made the analyses simpler. Given this finding, it appears the difference in gain scores would be the next most important finding. Perhaps ANOVAs and post hoc tests should have been reported for gain scores on the treatment groups rather than overall gain scores.

The author pointed out the possible effects of history and testing as threats to the internal validity of this study. The author raised several questions in the Conclusions section of the paper, indicating there are possibly more questions than answers in this paper.

Experimental studies have the potential of raising a large number of questions. However, it is important that we use this methodology to answer some of the important questions facing the profession. One of those questions deals with the effectiveness of educational programs. When we answer the questions, it is probably important that we go beyond the findings of statistical significance and determine if the differences found are large enough to be of practical importance.

PERCEPTION OF AGRICULTURE AS A CONTEXT FOR ELEMENTARY SCIENCE TEACHING: A CASE OF CHANGE IN SANILAC COUNTY, MICHIGAN

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Introduction

For over a decade calls have sounded to educate a larger audience about agriculture and the human food system. Mawby (1985), one of the first, suggested that "few issues are of greater importance to the world than adequate food supplies, proper food use, and knowledge about the components of the agricultural industry" (p.7). Since the late 1980's, educators have advocated for the integration of agricultural concepts into the elementary school science curriculum (NRC, 1988; Trexler and Miller, 1992; Leising and Zilbert, 1994; Birkenholz et al., 1994; Frick, Birkenholz, and Machtmes, 1995). The National Research Council (1988) coined the term "agricultural literacy" and suggested that agriculture was too important to be taught to only those in vocational education. They urged that more agriculture be taught in the country's schools. The Council suggested that:

> "Teaching science through agriculture would incorporate more agriculture into curricula, while more effectively teaching science" (p.11).
>
> "Curriculum integration is a more reasonable approach to achieve the agricultural literacy goal. By incorporating agriculture into existing subjects in the core curriculum, such as science, time pressures need not be aggravated" (p.12).
>
> "In many elementary schools, the most realistic way to teach science through agriculture is to introduce modules, or units of instruction that supplement and eventually replace existing curricula and textbooks" (p.13).

Concomitant to the agricultural education's move toward redefining its audience, the American Association for the Advancement of Science (AAAS) cried out for increased scientific literacy. The society argued that "the boundaries between traditional subjects should be softened and more emphasis placed on the connections among the science disciplines, and science, technology, and society" (AAAS, 1989, p.5). Practitioners began to explore ways to broaden science's scope through curriculum integration with agricultural education.

In 1991 the Sanilac County Intermediate School District (SISD), and the seven local school districts it serves, embarked upon a county-wide program to improve both scientific and agricultural literacy by creating a process of capacity-building and curriculum development. Grant proposals were written to carry out their plan. In the spring of 1991, the SISD submitted a proposal to the W. K. Kellogg Foundation and received three years of funding beginning February 1992. The grant's overarching goal was to increase agri-scientific literacy of elementary students. Its intermediate goals were to:

- Increase awareness of the interrelationship of science, agriculture, and the environment;
- Develop a K-6 science curriculum based on food, agriculture, and the environment; and
- Empower K-6 teachers to deliver an agriculturally-based science curriculum.

Conceptual / Theoretical Framework

Fishbein and Ajzen's (1975) work in determining intentions to participate set the theoretical framework. They argued that participant knowledge, observation, or other information about an issue could predict intention to participate. This suggested that teachers' intent to participate in or principals' intent to facilitate an elementary agriscience program may be predicted by analyzing his/her beliefs about agriculture and science. Greenwald (1989) supported this theory, reporting that individuals with positive attitudes toward a subject or situation tend to evaluate them positively.

The problem addressed by this action research was to identify areas where program leaders should direct resources to enhance elementary teachers' and principals' adoption of agriscience curricular change. The USDE (1994) identified teachers and principals as the primary change agents in science education and suggested that principals shape the organizational conditions necessary for success in the implementation of change. In the agricultural education realm, (Terry, R., Herring, D., and Larke, A., (1992); Humphrey, Stewart, and Linhardt, (1994) noted that preservice and inservice teachers in Texas and Missouri respectively, possessed low levels of agricultural content knowledge. This is particularly salient in light of Hashew's (1986) finding that prior teacher knowledge of subject matter contributed to the transformation of written curriculum into classroom use.

This study's conceptual model emphasized the need to provide teachers and principals with support in both agricultural and science education simultaneously, as comfort in both areas influence adoption of a curriculum innovation in agriscience. Consistent with this conceptual model, the SISD hired staff with formal training and extensive practical experience in agricultural and elementary science education. The staff, in cooperation with teachers and principals, designed and conducted capacity-building activities for the rural, isolated school districts. These activities included, but were not limited to: quarterly grade level inservices on science and agricultural concepts, creation of a teacher-driven curriculum development process, development of kits of materials to support the curriculum, principal updates, week-long summer workshops, etc.

Purposes / Objectives

The study's purpose was twofold. First, it sought the perceptions of teachers and principals relative to agriculture as a context for science instruction. And second, the study attempted to determine how an elementary agriscience curriculum development program affects perceptions about teaching State-mandated science competencies through the context of food, agriculture, and the environment. Initially, data were collected to assist program leaders set priorities for the teacher and principal capacity-building activities. After three years of intervention, teachers and principals were again surveyed to determine the program's impact. The specific research questions addressed by this study were:

1. What were elementary teachers' and principals' perceptions relative to agriculture and science as topics for instruction and, more generally, their perceptions about these fields on a broader level prior the inception of the program?
2. What differences existed, prior to the program, between teachers and principals perceptions about agriculture and teaching science through agricultural examples?
3. What were the needs of teachers and principals to implement an agriculturally-based science curriculum?
4. How did the elementary program effect teacher and principal perceptions about teaching science through an agricultural context?

Methods / Procedures

Population

This study was conducted in Sanilac County, Michigan. The population for this study included all Sanilac County kindergarten-sixth grade teachers (N=161) and building principals (N=15).

Instrumentation

This study utilized a one-group pretest-posttest design (Cook and Campbell, 1979). Data were collected via survey questionnaires. The data collection instruments consisted of self-administered questionnaires with both closed and open-ended questions. Project 2061: Science for All Americans (1989), Michigan's Essential Goals and Objectives for Science Education (1991), and Understanding Agriculture: New Directions for Education (1988), the basis for the program's objectives, served as a foundation for instrument development. The instruments were validated by staff members in the Department of Agricultural and Extension Education at Michigan State University and Sanilac ISD staff members. Questionnaires took no more than 10 minutes to complete; their relative simplicity was intentional given that a similar instrument was administered to fifth grade students in the program. A five-point Likert-type scale, with 1=never, 2=rarely, 3=sometimes, 4=usually, and 5=always, was used to measure perceptions and attitudes. The instruments were field-tested to ensure usability and reliability. A Cronbach's alpha of (.88) and (.85) was determined for scales pertaining to perceptions about agriculture and science, respectively.

Data Collection

In April 1992, prior to the program's onset, principals were contacted to assist with survey distribution. Project staff hand delivered the questionnaires to principals. Principals then dispersed the surveys to teachers along with a cover letter explaining the importance of the survey, guaranteeing confidentiality, and appealing for prompt response. Teachers and principals returned their surveys via inter-county school mail to the researchers. By May 1992 questionnaires from 147 teachers (91% response rate) and 12 principals (80% response rate) were received.

In April 1995, after three years of treatment, the researchers followed the exact same protocol to collect data and to determine the program's impact. By May 1995 questionnaires from 146 teacher (91% response rate) and 15 principals (100% response rate) were received.

Analysis of Data

All data were analyzed using the SPSS/PC+ computer software program. Frequency counts, percentages, means and standard deviations were used to describe findings. A *t*-test statistic was used to determine significant differences between perceptions and comfort levels for pre and post capacity building activities. An alpha level of 0.05 was set *a priori*. It should be noted that because the study was a census, these statistical tests were used only as a tool to assist in decision making and examining in detail, not as an inferential tool. Qualitative analysis was performed for open-ended questions. Whenever questionnaires contained incomplete items, they were treated as "missing values" and were not counted toward the sample statistics.

Results / Findings

Research Question One

What were elementary teachers' and principals' perceptions relative to agriculture and science as topics for instruction and, more generally, their perceptions about these fields on a broader level prior the inception of the program?

Teachers and principals believed that agricultural jobs "usually" require much education, and that agriculture "usually" includes more than farming (Table 1). They believed that many agricultural jobs "usually" require an understanding of science and that research in science has improved agriculture. School principals indicated a strong support with a mean of 4.17 on a 1 to 5 scale to the statement "science can be taught through agricultural examples", while teachers "sometimes" 2.92 agreed with the statement. In addition, principals felt that "students 'usually' can solve science-related problems", although teachers thought students only "sometimes" can.

Table 1.
Perceptions about agriculture and teaching science through agriculture

STATEMENTS	Teacher Mean (N=161/147) †	Teacher SD	Principal Mean (N=15/12)	Principal SD
Agriculture items				
a) Agricultural jobs require much education	3.90	1.15	3.75	1.14
b) Agriculture is more than farming	3.90	1.18	4.10	1.17
c) Many agricultural jobs require an understanding of science	4.10	0.85	4.25	0.87
d) Research in science has improved agriculture	4.02	1.09	4.33	1.16
Teaching science through agriculture				
e) Students can solve science-related problems	3.20	0.89	3.82	0.75
f) I/teachers like to teach science through agricultural examples	2.92	0.88	4.17	0.84

Scale: 1 = Never, 5 = Always
†-in the tables below N=population, followed by number of responding

Teachers and principals thought teaching science was "usually" fun and useful in life (Table 2). They believed that scientific activities help people test ideas. Both groups felt that science helps develop student questioning skills. Respondents thought science is "rarely" boring. They also indicated that science was "usually" one of their favorite subjects to teach. Teachers and principals believed that scientists "sometimes" discover information that is difficult to understand. Teachers stated that students can solve science problems "sometimes", while principals thought they "usually" can.

Table 2.
Perceptions about science and teaching science

STATEMENTS	Teacher Mean (N=161/147)	Teacher SD	Principal Mean (N=15/12)	Principal SD
Teaching science is fun	3.86	0.79	3.58	0.79
Things taught in science are useful in life	3.90	0.80	3.83	0.72
Scientific activities help people test ideas	3.51	0.87	3.67	0.99
Teaching science helps develop questioning skills	3.77	0.92	3.83	0.84
Teaching science is boring for students	2.10	1.02	2.08	0.90
Science is one of my favorite subjects to teach	3.56	1.05	4.08	1.08
Scientists discover information that is difficult to understand	3.30	0.65	3.33	0.49
Students can solve science problems	3.18	0.71	3.82	0.75

Scale: 1 = Never, 5 = Always

Research Question Two

What differences existed, prior to the program, between teachers' and principals' perceptions about agriculture and teaching science through agricultural examples?

For this analysis, perceptions were assessed by creating a composite score for variables in Table 1. pertaining to both agriculture and teaching science through agricultural examples. The agriculture composite score was calculated based on items a., b., c, and d., while teaching science through agriculture included items e. and f.. Findings indicate that principals' mean composite score for agriculture 4.10 (SD 0.94) was slightly greater than teachers 4.02 (SD 0.79) , while the principals' teaching science through agricultural examples composite was nearly a full point higher 4.00 (SD 0.59) compared to 3.06 (SD 0.64) for teachers.

Research Question Three

What were the needs of teachers and principals to implement an agriculturally-based science curriculum?

Teachers perceived themselves as being "usually" comfortable with conducting hands-on science activities and using real-world examples to teach science, with mean scores of 4.05 and 4.07 on a 1 to 5 scale, respectively (Table 3). Similarly, teachers were "usually" comfortable using the problem solving method of teaching, connecting science teaching to community problems, and teaching life science, physical science, and earth and space science. They were "sometimes" comfortable with using agriculture as a context for science and implementing Michigan's new science objectives.

Principals were asked to rate the comfort level of their teachers in using these various scientific methods (Table 3). In general, principals felt less confident with their teachers' comfort with using many of the same methods. They felt that their teachers were "usually" comfortable with conducting hands-on activities, using real-world examples to teach science, and teaching life sciences. Principals perceived that their teachers were "sometimes" comfortable with using the problem solving method, connecting science teaching to community problems, using agriculture as a context for science, and implementing Michigan's new science objectives. In addition, they believed that teachers were only "sometimes" comfortable with physical and earth and space science.

Table 3.
Perceived level of teacher comfort with teaching science

	Teacher	Teacher	Principal	Principal
Conducting hands-on	4.05	0.89	3.75	0.97
Using the problem solving	3.71	0.88	3.33	1.07
Using real-world examples	4.07	0.85	3.67	0.89
Using agriculture as a context for science	3.13	0.97	2.92	0.90
Implementing Michigan's new science objectives	3.37	0.98	3.25	0.75
Connecting science teaching to community problems	3.57	0.96	2.83	0.72
Teaching earth and space science	3.70	0.93	3.42	0.79
Teaching life science	3.78	1.00	3.67	0.65
Teaching physical science	3.54	0.97	3.25	0.73

Scale: 1 = Never, 5 = Always

Principal and teacher need

When asked an open-end questions related to what support services the program staff could provide teachers to help implement the agriscience program. Representative statements made by teachers and principals included the following:

Teachers:

"Show me new ways to teach scientific concepts."

"Give me areas to work on and ideas to use at this grade level."

“Gathering and organizing materials - no it isn’t such a time consuming task. Showing how to integrate science into other subjects.”

"By designing lesson plans for my students, then gathering materials (no district money for this) showing methods to motivate students whose parents have not valued education."

“A specialist could come in and give students real-life situations.”

"Demonstrate effective strategies, lessons - define what is actually useful."

Principals:

"Keep staff up-to-date."

“Lessons ideas appropriate for students that will turn then on to learning, problem solving, critical thinking and in doing a good job.”

“Putting usable ideas together in units where materials and research has already been done.”

"Gather and organize materials, show how to integrate science in other subject areas."

"Teach staff how to use experimentation and demonstration in conjunction w/book information."

"To bring current curriculum to our staff. To act as a support person and provide in-service."

Research Question Four

How did the elementary program effect teacher and principal perceptions about teaching science through an agricultural context?

Teacher perception significantly changed in two areas related to agriculture and teaching science through agriculture from 1992 to 1995 (Table 4.).

Table 4.
Change in teacher perceptions about agriculture and teaching science through agriculture

STATEMENT	Mean 1992 (N=161/147)	SD 1992	Mean 1995 (N=161/146)	SD 1995
Agriculture is more than farming.	2.85	1.18	3.19*	1.00
I like to teach science through agricultural examples.	2.92	0.88	3.35*	0.80

Scale: 1 = Never, 5 = Always
*p<.05

Teacher comfort with science significantly changed from 1992 to 1995 in four categories (Table 5). These areas included their confidence with implementing Michigan's new science objectives; using the problem solving method of teaching; using agriculture as a context for science and teaching life science.

Table 5.
Change in teachers' level of comfort with teaching science

STATEMENTS	Mean 1992 (N=161/147)	SD 1992	Mean 1995 (N=161/146)	SD 1995
Implementing Michigan's new science objectives.	3.37	0.98	3.67*	0.91
Using the problem solving method of teaching.	3.71	0.88	3.95*	0.91
Using agriculture as a context for science.	3.13	0.97	3.59*	0.93
Teaching life science.	3.78	1.00	4.11*	0.91

Scale: 1 = Never, 5 = Always
*p<.05

Principals, when responding to the statement "Teaching science is fun for teachers", changed their perceptions (Table 6.).

Table 6.
Change in principals' perceptions about agriculture and teaching science through agriculture

STATEMENT	Mean 1992 (N=15/12)	SD 1992	Mean 1995 (N=15/15)	SD 1995
Teaching science is fun for teachers.	3.58	0.79	4.13*	0.52

Scale: 1 = Never, 5 = Always
*p<.05

Perceptions of principals changed relative to teacher comfort in two areas (Table 7). They were: using agriculture as a context for science and connecting science teaching to community problems. In both cases, the 1995 mean perception score was significantly higher than in 1992.

Table 7.
Change in principals' perception of teachers' level of comfort with teaching science

STATEMENTS	Mean 1992 (N=15/12)	SD 1992	Mean 1995 (N=15/15)	SD 1995
Using agriculture as a context for science.	2.92	0.90	3.67*	0.90
Connecting science teaching to community problems.	2.83	0.72	3.67*	0.72

Scale: 1 = Never, 5 = Always
*p<.05

Summary

Prior to treatment, Sanilac County K-6 principals and teachers held positive perceptions of science and science teaching. They believed that science and agriculture were interrelated. Elementary principals of Sanilac County held very positive perceptions with regard to teaching science through agricultural examples, while teachers held significantly more negative perceptions.

Teachers were more comfortable with teaching science than principals believed. Principals thought teachers were uncomfortable teaching science through community-based problems. The needs of teachers were practically oriented and immediate. They thought program personnel could enhance their capacity to teach an agriscience curriculum by defining grade level science concepts; teaching them strategies to integrate science into other subject areas; and gathering and organizing materials. Principals felt that the program could help teachers in two ways. First, scientific process and higher order thinking skills could be targeted for professional development emphasis. And second, the program could assist teachers by gathering, organizing and integrating materials into units of instruction.

After three years of treatment, Sanilac County teachers' perceptions of agriculture expanded beyond farming and their enjoyment of teaching science through agricultural themes increased. Teacher comfort with integrating agricultural contexts into Michigan's model science objectives improved. In addition, they felt more comfortable with teaching problem solving and life science.

Principals perceived that teachers enjoyed teaching science more than before the program began. Further, they felt teachers were more comfortable with teaching science through the context of food, agriculture and the environment and with connecting teaching through community-based problems.

Conclusions

1. Participation in the capacity-building activities that focus on helping teachers become more comfortable with the subject of agriculture is critical in the development of a successful elementary agriscience curricula.

2. Teachers are aware of the opportunity to use agriculture as a context for science instruction, but lack understanding of and comfort with agricultural concepts.

3. Teacher ignorance of and discomfort with agricultural concepts limits their use of agriculture as a context for science instruction.

4. Principals and teachers require and request assistance to model the use of agriculture as a context for science teaching and in the development of materials.

5. A sustained, multi-year program of capacity-building activities, with accompanying support services, enhances teachers perceptions about agriculture, while decreasing their reluctance to use agricultural themes as a context for teaching at the elementary level.

Recommendations / Implications

Prior to program implementation

Since teaching science through an agricultural context is new to Sanilac County, support systems for teachers and principals are needed as they traverse the path to adoption of curriculum changes. Senge (1990) stresses "resistance to change is neither capricious nor mysterious. It almost always arises from threats to traditional norms and ways of doing things" (p.88). Therefore, efforts to involve principals and teachers in changes concerning programmatic thrusts may reduce resistance to a non-traditional way of teaching. In addition, employing a resource person(s) with experience in agricultural and elementary science education to serve as a link between the Sanilac Intermediate School District and teachers and principals could do much to facilitate "ownership".

Given that teachers expressed only moderate interest in teaching science through agricultural examples and that principals perceived teachers as being only somewhat comfortable with agriculture as a context for science instruction, it is prudent to heed the observation of Fullan; "Educational change depends on what teachers do and think" (Fullan, 1982, p.107). Provided the lack of teacher knowledge of and comfort with agriculture, it is recommended that a systematic capacity-building process be established. Its goal should be twofold: 1) improving teachers' perceptions and 2) increasing their knowledge of agricultural and science concepts. To accomplish this, a variety of approaches can be drawn upon: summer institutes in local community settings, guest speakers, quarterly inservices, newsletters, teacher mentoring, teacher curriculum development activities, etc.

End of funding for program

Given that the program continues even after the initial funding from the W. K. Kellogg Foundation has ended, further qualitative research could shed light of the processes that institutionalized the program. It could also bring to the fore reasons why teachers and principals decided to become involved in the program. In addition, further quantitative research could be conducted to determine the program's impact on student knowledge and perceptions of agricultural and science concepts.

This case study supplies only a single portrait of one rural county's teachers and principals as they worked to implement a K-6 agriculturally-based science curricula. Further research in other contexts can add to the body of knowledge related to the merging of the agricultural and science disciplines in elementary school settings and to the assistance needed by those in the field who bring about change.

To educate more people about food, agriculture, and renewable resources, non-traditional programs should be developed in the formalized elementary school curricula. For this to happen, elementary educators will need understanding of the human food system and curriculum integration theory. Agricultural educators that prepare preservice teachers may consider expanding their audience by including elementary education majors or by networking with teacher educators who traditionally prepare elementary teachers (Humphrey, Stewart, and Linhardt, 1994).

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PERCEPTION OF AGRICULTURE AS A CONTEXT FOR ELEMENTARY SCIENCE TEACHING: A CASE OF CHANGE IN SANILAC COUNTY MICHIGAN

Discussant Remarks
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The authors provided a conceptual framework based upon the literature for teaching science using agricultural concepts. This was followed by a theoretical rationale based upon knowledge leading to intention to participate in educational programs and the need for all participants in the program (principals and teachers) to have adequate knowledge of agriculture. Incidentally, this theoretical rationale was also incorporated nicely into the Implications section of the paper.

The methods and procedures used to conduct this study were appropriate. The researchers should be commended for the careful instrumentation procedures and the excellent response rate achieved. Even though they stated that inferential statistics were used in this census study only as a decision-making tool, the need to use inferential statistics was questionable.

The authors did not mention the type of t-tests that were used. Were correlated t-tests or t-tests for independent samples used? How did the researchers account for mortality in this study? Were the 161 teachers and 15 building principals in 1995 the same individuals that participated in the study in 1992? If not, what might be the implications for the findings?

In interpreting the results, the reader might benefit from a description of how mean scores were interpreted. For example, what range of scores described "sometimes" and "usually"? In this study we have an example of a situation in which mean scores might not give us a true picture. A score of 3.90 could result when 80% of the teachers responded "Always" and 20% "Never". While I am not suggesting that was the case, a description of the percentage of teachers on each end of the scale might provide a clearer picture of the situation.

The largest difference in mean scores was for the statement "I/teachers like to teach science through agricultural examples (Teachers Mean = 2.92; Principals Mean = 4.17). This may tell us that principals are not in tune with the feelings of their teachers, or that they did not have the information they needed to respond to this question.

This study shows the positive effects of a structured agricultural literacy program -- at least from the perspectives of the teachers and principals. It also shows that teacher and principals' perceptions can change based upon their experiences in such a program. This was an interesting paper that was well-done. It should provide encouragement to those who are implementing innovative programs in this area.

ADMINISTRATORS' ATTITUDES TOWARD AGRICULTURAL EDUCATION AT THE PRIMARY SCHOOL LEVEL IN BELIZE AND THEIR RELATIONSHIP WITH SELECTED VARIALBES

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Introduction

Agriculture is important to the economy of Belize (USAID, 1988). Most citizens of Belize earn their living from agriculture with important sources of income from fishing, forestry, and livestock (Compton, 1994). Because of Belize's economic dependency on agriculture, the Belize Ministry of Education has attempted to include instruction about agriculture at the primary school level (Green, Eck, Hurwitz, Keith, & Massey, 1988). This level was targeted because as Massey (1986) reported, most of Belize's population only obtains a primary school education. Green et al. (1988) suggested that including instruction about agriculture at the primary school level would help the youth of Belize become agriculturally literate and thus eventually contribute to the economic well-being of the country. Thus, seeking out administrators' attitude toward agricultural education at the primary school level would strengthen position statements to promote efforts to include instruction about agriculture at the primary school level in Belize.

Literature Base

Although there is limited information on the institutionalization of agricultural education in developing countries (Swanson, Sigman, Koehmen, & Rassi, 1981), countries in Latin American, Africa, Bangladesh and the Commonwealth of Dominica are making strides to do so. Macias-Lopez (1990) reported that in Latin America agricultural education is a relatively new discipline and only limited research is available. In several African countries, efforts have failed to regularize agricultural education within the school system, in part due to lack of policy (Craig, 1990; Galabawa, 1990; Magalula, 1990). Eaton and Bruening (1994) reported that school administrators in the Bangladesh Ministry of Education were taking steps to regularize instruction about agriculture within the school system. The Commonwealth of Dominica was in the process of integrating instruction about agriculture within the established school curriculum area (Education Sector Plan for Education Development in the Commonwealth of Dominica, 1994).

Belize, like many other countries, has struggled to systematically include instruction about agriculture in the primary school curriculum. In this effort, the Belize Ministry of Education attempted to include instruction about agriculture in the primary level schools by integrating it into the academic curriculum. In 1975, with the assistance of the Cooperation of American Relief Everywhere or (CARE), the Ministry of Education introduced the Relevant Education for Agriculture and Production (REAP) program to work toward this goal (Green et al., 1998; Eck, 1986).

Of the 150 rural primary schools of Belize, 55 schools were involved in the REAP program during the first decade of its existence. Unfortunately, as CARE phased out REAP, the program gradually declined (Green et al., 1988). Bennett and Eck (1990) attributed program decline and eventual demise to the lack of policy for program continuity and support by senior level administrators in the Ministry of Education.

Administrator support is vital to the success of educational programs. School administrators provide the human, financial, and instructional support necessary for program development and implementation (Rebore, 1991). Burnett and Miller (cited in Magill & Leising, 1990) suggested that "the role of school administrators in agricultural programs may be a function of their attitude toward these programs" (p.147). Fishbein and

Ajzen (1975) indicated that attitudes can be used to predict a person's behavior. Therefore, as efforts are advanced to institutionalize instruction about agriculture at the primary school level in Belize, it is important to determine the attitudes senior level administrators in the Belize Ministry of Education have toward agricultural education at this level.

Purpose and Objectives

The purpose of this study was to determine the attitudes of senior level administrators in the Belize Ministry of Education toward agricultural education at the primary school level in Belize, and to determine the association of demographic factors with administrators' attitudes. The following objectives guided the study:

1. Examine selected demographic characteristics of senior level administrators in the Belize Ministry of Education.
2. Determine the attitudes of senior level administrators in the Belize Ministry of Education toward agricultural education at the primary school level.
3. Determine the relationship between attitude toward agricultural education at the primary school level and selected demographics characteristics of senior level administrators in the Belize Ministry of Education.

Procedures

The design of the study was descriptive-correlational research (Ary, Jacobs, & Razavieh, 1996). The population under investigation consisted of all senior level administrators in the Belize Ministry of Education during the 1994-1995 academic school year. In this study, senior level administrators were defined as those persons who have administrative responsibilities and a direct impact of educational decisions in Belize. Because the number of senior level administrators in the Belize Ministry of Education was small (*N*=40), a census study was employed.

Instrumentation

Data were collected using an instrument developed by the researchers to accomplish the objectives of the study. The data collection instrument consisted of two sections.

Section one contained a 7-point semantic differential scale ranging from 1 (Unfavorable) to 7 (Favorable) and contained 15 bipolar adjectives. Isaac and Michael (1990) served as a source of reference in developing the structure of semantic differential scale as means of assessing attitudes. Respondents were asked to rate the construct, Agricultural Education at the Primary School Level, on each bipolar adjective. Examples of such bipolar adjectives include: Desirable/Undesirable, Important/Unimportant, Positive/Negative. Using an equidistant line drawn between each paired expression, with the assumption that a mark in the middle represents a response that is neutral, respondents could rate the construct on a scale from 1 to 7. To reduce ambiguity and misinterpretation of the construct, an adaptation of the National Research Council's (1988) definition of agricultural education was provided: Instruction that integrates basic concepts of food and fiber and its related historic, economic, and environmental factors within the established school curriculum. To reduce response set, the direction of the bipolar items was reversed in random fashion.

Section two of the instrument was designed to gather personal characteristics of the respondents, including age, gender, education level, years employed in public education, and prior enrollment in courses pertaining to agriculture and/or agricultural education.

Face and content validity were established using a panel of five experts in the Department of Agricultural and Extension Education at New Mexico State University (NMSU) consisting of three faculty and two graduate students with knowledge about instrumentation. The instrument was revised to reflect the panel's input regarding clarity of directions. Additionally, the instrument was assessed for reliability through a pilot test using 35 purposefully selected international students at NMSU whose characteristics approximated the subjects under investigation. All pilot test subjects were either graduate or undergraduate students who had administrative experience in the field of agriculture and/or education. From the pilot test data, a Cronbach's alpha coefficient (as a form of internal consistency) was calculated. The instrument yielded a reliability estimate of .88, which was deemed acceptable. Therefore, no changes were made to the instrument.

Data Collection

To facilitate data collection, one researcher traveled to Belize to distribute the questionnaire to the subjects. While in Belize and before collecting data, the researcher contacted subjects to solicit their participation and notify them of the forthcoming questionnaire. Because of the slow mail system in Belize, the questionnaires were hand delivered. At delivery, subjects received a packet containing a cover letter structured according to Dillman (1978), the questionnaire, and a self-addressed return envelope. Two weeks after the initial delivery, 90% (N=36) of the questionnaires were completed and returned. In efforts to gather data from the four nonrespondents, the Director of the Vocational Technical Training Unit in Belize made follow-up visits to these individuals. Unfortunately, the attempts were futile and the four questionnaires remained outstanding. The four non-respondents pose a limitation to the study.

Data Analysis

The data were analyzed using SPSS/PC (Version 6.1). Descriptive statistics such as measures of central tendency and variability appropriate for the level of measurement of the data were reported. Correlational analyses such as Pearson Product-Moment, Point-biserial, and Spearman's rho correlation coefficients were used to describe the magnitude and direction of relationships between variables. The magnitude of the relationships were interpreted using Davis' (1971) conventions. Because the study was a census, population parameters were used and no attempt was or should be made to extrapolate these data beyond the subjects studied.

Results

The majority of the respondents, 58.3%, were male (Table 1). The average age was 41.4 years with a range from 24 to 63 years. In terms of educational level attained, respondents ranged from having a high school diploma (5.6%) to a doctorate (5.6%) as the highest level of education. However, the greatest percent (44.4%) of respondents reported having a bachelor's degree, followed by a master's (33.3%), and an associate's degree (11.1%). The number of years of work experience in public education reported by respondents ranged from 3 to 33 with a mean of 18.9 years.

Table 1.
Characteristics of Senior Level Administrators in the Belize Ministry of Education (*N*=36)

Characteristics	Frequency	Percent	Mean	Std. Dev.	Range
Gender					
Female	15	41.7			
Male	21	58.3			
Age	41.4	8.43			24 to 63
Highest Level of Education					
High School	2	5.6			
Associate	4	11.1			
Bachelors	16	44.4			
Masters	12	33.3			
Doctorate	2	5.6			
Work Experience in Public Education (years)			18.9	9.73	3 to 33

In addition to providing demographic information, subjects were asked to report their participation in courses related to agriculture and/or agricultural education. Of the 36 respondents, 44.4% indicated they were enrolled in agriculture and/or agricultural education courses at some time during their formal education.

Using a 7-point semantic differential scale (1 being unfavorable and 7 favorable) respondents were asked to indicate their attitude toward agricultural education at the primary school level on 15 bipolar adjectives. Overall, respondents expressed a mean attitude score of 5.38 (Table 2). The standard deviation from the mean attitude score was .87 with individual scores ranging from 2.2 to 6.6.

Table 2.
Attitude of Senior Level Administrators in Belize Toward Agricultural Education at the Primary School Level (*N*=36)

Construct	Mean	Std. Dev.	Range
Agricultural Education	5.38	.87	2.2 to 6.6

Note. Scale is based on: 1=Unfavorable to 7=Favorable.

To determine factors (demorgraphic characteristics) associated with respondents' attitude toward agricultural education at the primary school level, correlational coefficients were calculated. The data indicated that gender had a negligible (ρ_{pb}=-.03) relationship with respondents' attitude toward agricultural education at the primary school level (Table 3). Similarly, the number of years respondents worked in public education had a low inverse (ρ=-.13) relationship with their attitude toward agricultural education at the primary school level.

Table 3
Relationship Between Attitude Toward Agricultural Education at the Primary School Level and Selected Demographics (N=36)

Factor	Correlation Coefficient	Magnitude*
Gender	ρ_{pb}=-.03[a]	Negligible
Age	ρ = .11	Low
Years in Public Education	ρ =-.13	Low
Highest Level of Education	ρ_s = .10[b]	Low
Enrollment in Agriculture Courses	ρ_{pb}= .07[c]	Negligible

Note. Attitude scale is based on: 1=Unfavorable to 7=Favorable.
*Based on Davis' (1971) convention.
a: Coded: 0=Female; 1=Male.
b: Coded: 1=High School; 2=Associate; 3=Bachelors; 4=Masters; 5=Doctorate.
c: Coded: 1=No; 2=Yes.

Conversely, age (ρ=.11), level of education (ρ_s=.10), and prior enrollment (ρ_{pb}=.07) in agriculture and/or agricultural education courses had a positive relationship with subjects' attitude toward agricultural education at the primary school level.

Conclusions and Recommendations

Information about agricultural education in developing countries is limited. The literature available suggests that efforts are being made to include instruction about agriculture in existing curricula with varying rates of success.

Administrators are central to any educational endeavor. The success or failure of any program rests upon the decisions and support offered by its administrators. The Belize Ministry of Education has been unsuccessful in systematically reinstating instruction about agriculture at the primary school level since the REAP program was phased out in the early 1970s. Agriculture is too important in Belize to leave idle the efforts to seek support for instruction about agriculture at the primary school level. Toward this effort, the following conclusions and recommendations are offered.

The results from this study reveal that senior level administrators in the Belize Ministry of Education possess an attitude that is moderately favorable (μ=5.38) toward agricultural education at the primary school level. As such, there remains a margin for improving attitudes in senior level administrators in the Belize Ministry of Education. On strategy to adjust senior level administrators' attitudes toward agricultural education at the primary school level in a more favorable direction is to offer in-service education programs. At these in-service education programs, the attention and focus of senior level administrator should be drawn to the importance of agriculture to the economy of Belize, agricultural literacy as an educational issue, and the long-term benefits to its citizens by educating the youth about agriculture through the integration of agricultural education into the curriculum beginning at the primary level.

A second strategy could be that individuals or groups of individuals attempting to initiate instruction about agriculture at the primary school level in Belize should seek out administrators who possess characteristics that were positively associated with attitude toward agricultural education at the primary school level. Older male *or* female senior level administrators with high education levels and senior level administrators who have taken coursework in agriculture or related areas should be sought. In working with these senior level administrators, efforts should be exerted to pursue and develop policy that supports and delivers agricultural education at the primary school level.

Senior level administrators who possessed a higher number of years in public education were found to have a negative attitude toward agricultural education at the primary school level. These senior level administrators should be specifically targeted for in-service education.

An overall strategy to influence positively all senior level administrators' attitude toward agricultural education at the primary school level would be to showcase exemplary agricultural education programs within and outside Belize.

It is recommended that stakeholders, administrators, and policy makers in Belize should use these findings, conclusions, and recommendations as foundation for making decisions in the move to revitalize agricultural education at the primary level.

While failed attempts to implement agricultural education at the primary school level can be attributed to a myriad of factors, through the efforts of this study, administrative attitude can be identified as a potential barrier. Research should be continued to identify other barriers that go beyond the scope of this study that have kept the Belize Ministry of Education from pledging its full support for instructional programs so central to the economy. Research questions should focus on teachers related factors such as attitudes, teacher training, and competencies. Additionally, curriculum availability and development, and Ministry of Education budgetary issues, should be investigated as plausible barriers.

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ADMINISTRATORS' ATTITUDES TOWARD AGRICULTURAL EDUCATION AT THE PRIMARY SCHOOL LEVEL IN BELIZE AND THEIR RELATIONSHIP WITH SELECTED VARIABLES

Discussant Remarks

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As this paper demonstrates, agricultural literacy is not only a problem we have in the United States. Other countries whose economy is highly dependent on agriculture have a problem with agricultural literacy among their citizens, and attempts to address the problem are being made through educational programs in schools.

The introduction for this paper provided an adequate background for two of the research objectives. I would have liked to have seen ore in the introduction to support the selection of the demographic characteristics of the senior level administrators in the Belize Ministry of Education. Also, the importance of administrators' attitudes toward the success of the implementation of this program seemed to be of primary importance in this study and may have deserved more emphasis.

The researchers followed appropriate methodology for this census study. The data collection techniques resulted in a 90% response rate, and although the researchers would have liked to have had the other four administrators in the population respond, it would not seem that there was serious nonresponse error. The instrument development procedures were appropriate, including using faculty and graduate students who were familiar with instrument design to validate the content and a similar group of international students to field test the instrument. Even the possibility of response set was addressed.

When we are dealing with dichotomous variables, such as gender, why are we interested in relationships such as the relationship between gender and attitude toward agricultural education? Why not simply ask if there are differences in the attitudes of male and female administrators? This is especially awkward when one reports there is a negative relationship between gender and attitude. Isn't the direction of the relationship a function of which gender is arbitrarily assigned a higher code number by the researcher?

It is interesting that age and years in public education, two variables that one would expect to be positively correlated, have opposite relationships with the dependent variable of attitude. This finding may need additional exploration. We may need to understand how and why this happens.

The conclusions and recommendations were consistent with the results reported in this study. Due to the low relationships between the demographic variables examined in this study and the administrators' attitudes toward agricultural education, it may be important to determine what factors do contribute to administrators' attitudes toward agricultural education.

COMPUTER INTEGRATION BY AGRICULTURE TEACHER EDUCATORS

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Introduction

In the 1980s, no single instruction-related innovation caused as much excitement as the computer. Bork (1985) declared that computer use in education is a highly dynamic technology and would become the dominant delivery system in education in the next 25 years. Schools steadily acquired computers, and a recent study found that 98% of public and private elementary and secondary schools in the United States had computers (Quality Education Data, 1992).

Despite this enormous financial investment, computers appear to have made little impact on today's schools. Use of the computer in public schools is often infrequent (Becker, 1991; Bosch, 1993) and centers on skill acquisition, rather than utilizing the computer as a tool to enhance the learning process (Becker, 1991). Dyrli and Kinnaman (1994) stated, "Technology has transformed every segment of American society--except education . . . schooling today remains much the same as it was before the advent of the personal computer" (p. 92).

Like other educational areas, agricultural education programs acquired computers; a nationwide study in 1990 indicated that approximately 90% of the responding agricultural education teachers had computers in their department. The level of usage appears minimal, however, with an average use of one to three hours per week (Fletcher & Deeds, 1994).

Theoretical/Literature Base

One of the obstacles to more effective utilization of computer technologies in the classroom appears to be the lack of training for teachers (Topp, Thompson, & Schmidt, 1993; Walker, Keepes, & Chang, 1992). Throughout the literature addressing computer usage in agricultural education, a need for teacher training was noted (Birkenholz & Stewart, 1991; Fletcher & Deeds, 1994; Newman & Johnson, 1994; Raven & Welton, 1989).

To better prepare future teachers for educational computing, an integrated approach in which computers and related technologies are incorporated throughout the teacher preparation curriculum and teacher educators model appropriate uses has been proposed (Callister & Burbules, 1990; Wetzel, 1993). This approach, however, requires teacher educators who actively use technology in their teaching--a challenge for both faculty members and administrators.

Identifying demographic variables and other factors that facilitate computer use in both agricultural and general educational settings has been the focus of recent studies (Birkenholz & Stewart, 1991; Camp & Sutphin, 1991; Hirschbuhl & Faseyitan, 1994; Raven & Welton, 1989). Raven and Welton (1989) found a significant positive relationship between teachers' years of teaching experience and the number of computers in their agriculture departments.

In particular, Ely's (1990, 1991, 1993) eight proposed conditions that facilitate the implementation of educational technology innovations has gained attention in educational computing circles, although it has received little research-based testing. These eight conditions are:

1. Knowledge and skills exist. The individual must possess computer skills and knowledge to teach these technologies to students.
2. Resources are available. Without necessary hardware and software, it is almost impossible to implement changes.
3. Rewards and incentives exist for participants. Because change involves risk, there must be some type of incentive.
4. Participation is expected and encouraged. Each individual affected by changes in his or her work should have an opportunity to comment through shared decision making, communication, or representation.
5.. Leadership is evident. Individuals attempting implementation require support and encouragement from people they respect.
6. Dissatisfaction with the status quo. There is a need to improve, or a necessity to change.
7. Time is available. "Company" time to learn, adapt, integrate, and reflect is necessary to learn new skills.
8. Commitment by those who are involved. An endorsement and continuing support from a higher level is crucial for successful implementation.

Purpose and Objectives

The purpose of this study was to investigate the integration of computer technology into undergraduate courses by agriculture teacher educators. Based on the concept of Ely's integration model of computer training, the objectives of the study were to:

1. Assess the level and types of integration of computer technology into undergraduate courses by agriculture teacher educators.
2. Determine if education, gender, age, years of experience, or academic rank are statistically significant predictors of level of computer integration.
3. Determine which selected conditions proposed by Ely are statistically significant predictors of level of computer integration.

Results of this study provide a baseline measurement of the level of computer integration in agriculture teacher education programs, as well as identify variables that may be helpful in encouraging computer use by teacher educators working with preservice teachers.

Methods and Procedures

This study was a one-shot case study (Campbell & Stanley, 1963). A mailed survey instrument developed by the researchers following Dillman's (1978) Total Design Method was used to collect the data.

The target population for the study was all agricultural teacher educators in agricultural education programs during the 1993-94 academic year. A total of 96 institutions offering degrees in agricultural education and 375 teacher educators were identified using the Directory of Teacher Educators in Agriculture (Whaley, 1992). To reduce frame error, teacher educators listed in the 1992 Directory were double checked for accuracy by teacher educators in the Department of Agricultural and Extension Education.

Systematic random sampling was used to select the sample. After a roll of the die, each fourth institution was selected from the directory. Within each selected institution, a teacher educator was randomly chosen to receive the survey instrument by an additional roll of the die. Because this study focused on the use of computers in the classroom, department chairpersons or other administrators with a possible high percentage of non-teaching duties were not included in the sampling process. The few academic departments with more than 6 faculty members in agriculture teacher education is a threat to frame error and a limitation of the study. The final sample included 50 agriculture teacher educators.

After initial and follow-up mailings, responses were received from 32 agriculture teacher educators for a response rate of 64%. Early and late respondents were identified by whether they returned the first survey or the follow-up survey. T-tests were used to test for differences between early and late respondents on their answers to survey questions. No significant differences were found. Miller and Smith (1983) stated, "research has shown that late respondents are often similar to nonrespondents." Because there were no significant differences the results were generalizable to the target population.

A nine-page questionnaire containing three sections was designed by the researchers. Section 1 was designed to collect data to test for Ely's (1990, 1991, 1993) eight proposed conditions. Thirty statements from a previous study (Bauder, 1994) that addressed Ely's conditions were revised for higher education. The statements were rewritten to include positive and negative wording to discourage response bias. The arrangement of the items in the instrument was randomly determined. A Likert-type scale was selected to identify the level of agreement with each statement. The five response choices ranged from Strongly Disagree=1 to Strongly Agree=5. A total score for each condition was calculated by recoding negatively worded statements and summing the responses.

Section 2 investigated the types of computer resources agriculture teacher educators and their students utilize as tools in their undergraduate courses. Respondents were asked to indicate how often they, or their students, used 18 computer-related resources as tools in the courses they teach. These 18 computer-related resources were selected by the researchers after consultation with several computer specialists. Specific instructions were provided that directed respondents not to include uses designed for skill acquisition, e.g., a word processing course, or personal uses for non-instructional activities. A Likert-type scale was utilized to assess the level of usage for each resource. The response choices were: Never=1, Sometimes=2, Often=3, and Quite Often=4. Resources were placed in the following categories:

1. Computer-assisted instruction: Computer simulations and games, drill and practice, tutorials, and discipline-specific programs.
2. Graphic applications: Graphics, presentation, and desktop publishing software.
3. Interactive technologies: Authoring software, multimedia, and CD-ROM.
4. Productivity software: Word processing, spreadsheet, database management, and integrated software.
5. Telecommunications resources: Electronic mail, the Internet, commercial on-line services, and electronic bulletin boards.

Categorical usage scores were determined by summing the appropriate responses. A total usage score was calculated by summing the responses to each of the provided items. Section 3 consisted of questions relating to personal, institutional, and computer-related demographic data.

Content and face validity of the instrument was determined by a panel of experts from the Colleges of Education and Agriculture. Based on comments by the panel, three of Ely's conditions were deemed redundant and eliminated from the final questionnaire. The revised questionnaire contained five of Ely's original eight conditions: knowledge and skills, resource availability, rewards and incentives, participation, and leadership. These modifications resulted in four statements designed to address each of the five remaining conditions for a total of 20 conditions statements in Section 1.

The questionnaire was field tested for reliability with a group of vocational teacher educators from the University of Idaho and Washington State University. Cronbach's alpha reliability coefficients for the subscales in Section 1 were .79 for knowledge and skills, .55 for resource availability, .69 for leadership, .58

for participation and .49 for rewards and incentives. It should be noted that several of the reliability coefficients were below acceptable levels. However, because of the small number of subjects in the pilot study (N=24), these coefficients were considered adequate.

Data Analysis

The data received from the actual study were used to further validate Section 1 of the survey instrument prior to data analysis. The researchers utilized confirmatory factor analysis with varimax rotation to group the 20 statements into common factors. Six categories were identified. One factor, composed of a single statement, was discarded by the researchers. The remaining 19 statements were regrouped into five factors and new scales were computed. Individual reliability coefficients were .87 for knowledge and skills, .82 for resource availability, .74 for participation, .77 for leadership and .60 for rewards and incentives. Means, standard deviations and stepwise multiple regression analysis were used to analyze the data. Alpha was set a priori at .05.

Results

Research Objective One sought to determine the level and types of computer integration into undergraduate courses by agriculture teacher educators. Table 2 indicates that productivity software received the highest categorical usage score, while interactive technologies received the least use. Within individual resource uses, eight resources had a mean usage score of 2.0 (Sometimes) or greater: word processing, integrated software, spreadsheets, databases, graphics software, presentation software, electronic mail and the Internet.

Objective Two sought to identify demographic variables that are statistically significant for predicting integration of computer technology into courses. Because of the small number of subjects in this study, only three variables were selected for inclusion in the analysis: age, years of computer use, and institution enrollment.

These three variables were included because previous research had investigated their relationship to computer usage. Delfrate (1987/1988) and Marburger (1987/1988) both determined that age was not a significant factor in predicting computer usage by teachers. Sheingold and Hadley (1990) reported that it takes 5 to 6 years of teaching with computers to master computer-based practices and approaches. Novak and Berger (1991) suggested that resources available to education and faculty may be determined by the overall size of the institution.

Table 1.
Individual Computer Resources Ranked by Mean Usage

Resource	Mean	SD
Productivity software	2.36[a]	
Word processing	2.94	1.08
Integrated software	2.28	.92
Spreadsheet	2.21	.98
Database	2.00	.72
Graphics applications	1.99[a]	
Graphics software	2.19	.92
Presentation software	2.09	1.00
Desktop publishing	1.69	.82
Computer-assisted instruction	1.69[a]	
Discipline-specific programs	1.87	.92
Simulations	1.72	.73
Tutorials	1.59	.71
Drill and practice	1.59	.71
Telecommunications activities	1.86[a]	
Electronic mail	2.22	1.18
Internet	2.03	1.15
Electronic bulletin boards	1.69	.86
On-line commercial services	1.50	.76
Interactive technologies	1.58[a]	
CD-ROM	1.63	.79
Multimedia	1.81	.82
Authoring software	1.31	.69

[a]categorical mean
Scale: 1=Never, 2=Sometimes, 3=Often, 4=Quite Often

The mean age of the teacher educators who responded was 44.9 years. The predominantly male (91%) group had an average of 14.1 years of college teaching experience. Nearly all respondents (97%), used the computer for personal and professional tasks, and 72% indicated a computer requirement within the undergraduate courses they taught. Table 2 shows the demographic information for agriculture teacher educators who responded to the questionnaire.

Table 2.
Demographic information for agriculture teacher educators (N=32)

Characteristic	N	%
Gender		
Male	29	91.0
Female	3	9.0
Age		
30-39	10	31.3
40-49	10	31.3
50-59	10	31.3
≥60	2	6.1
Highest Degree		
Baccalaureate	0	0.0
Masters	1	3.1
Specialist	1	3.1
Doctorate	30	93.8
Years of College Teaching Experience		
0-10	14	43.8
11-20	9	28.1
≥21	9	28.1
Academic Rank		
Instructor	2	6.2
Assistant Professor	10	31.3
Associate Professor	13	40.6
Professor	7	21.9

Stepwise multiple regression was performed to determine if any demographic variables were statistically significant predictors of computer integration, or lack thereof. Table 3 indicates that age was the sole significant predictor variable of total usage score, accounting for 26% of the total variance. A moderate negative correlation ($r=-.51$) existed between age and total usage score (Davis, 1971).

Table 3.
Regression Analysis for Total Usage Score by Selected Demographic Variables[a]

Predictor Variable	B	SE B	β	t
Age	-.25	.07	-.51	-3.28**
Constant	23.76	3.58		6.62

Note. R^2=.26, multiple R = .51, Adjusted R^2=.24, df=30
[a]Age, years of computer usage, institution enrollment
**p<.01

Objective Three sought to identify significant predictors of level of computer integration from five of Ely's proposed conditions. Table 4 shows that participation accounted for 31% of the total variance, while knowledge and skills explained an additional 15% of the variance. A moderate positive correlation existed between knowledge and skills (r=.62) and participation (r=.54) and total usage score. A low correlation existed between leadership and total usage score (r=.38) (Davis, 1971).

Table 4.
Regression Analysis for Total Usage Score by Ely's Five Conditions[a]

Predictor Variable	B	SE B	β	t
Participation	1.16	.56	.31	2.06*
Knowledge and Skills	1.25	.41	.46	3.03**
Constant	1.37	7.68		.179

Note. R^2=.46, multiple R = .67, Adjusted R^2=.42, df=29
[a]Knowledge and skills, resource availability, leadership, participation, rewards and incentives
*p<.05
**p<.01

Conclusions

The following conclusions can be drawn from the results:

1. Traditional uses of computers in preservice education, e.g., word processing, spreadsheets, etc., still receive the greatest emphasis, while newer resources do not receive as much attention.
2. One of the newer computer technologies that is receiving a great deal of use is the Internet and electronic mail.
3. The age of the agriculture teacher educator was a significant predictor of computer integration. The younger teacher educators integrated computers into their instruction at a greater level than experienced professors.
4. Teacher educators' computer knowledge and skills and their participation in computer related decisions were the significant predictors of their computer usage. This indicates that the more knowledge and skills teacher educators possessed, and the more they were involved in computer related decisions, the greater their overall computer integration.

Educational Implications

Agriculture teacher educators are providing preservice teachers with some exposure to traditional uses of the computer, especially in the area of productivity software. As technology continues to expand at an exponential rate, their challenge lies in exploring newer resources, determining appropriate uses for the computer in the agricultural education classroom, and sharing these potential uses with the agriculture teachers of tomorrow.

It is possible that the level of computer integration may naturally increase as younger faculty members who may be more knowledgeable and comfortable with these new technologies continue to join teacher education programs. Administrators wishing to increase the level of computer integration must provide opportunities for all teacher educators to gain the knowledge and skills needed to utilize these technologies in the preservice agricultural education classroom. In addition, including teacher educators in decision-making processes may facilitate increased uses of these valuable instructional tools.

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COMPUTER INTEGRATION BY AGRICULTURE TEACHER EDUCATORS

Discussant Remarks
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This study adds to the growing body of research regarding the use of educational technology in agricultural education. As transfer agents who enjoy the opportunity to model appropriate use of computer technologies in instruction, teacher educators can assist preservice teachers in developing appropriate instructional techniques. Considering the emphasis placed on the use of electronic instructional technologies, this well-conceived study is very timely and valuable. The authors provided an introduction and theoretical framework that effectively highlighted and incorporated previous research completed by agricultural educators. Likewise, the authors carefully incorporated the educational technology literature to include a noted framework. Drawing from these sources, the researchers constructed a meaningful and clear purpose and set of objectives for the study.

The authors are to be commended for their concise and clear explanation of methods and procedures. However, I question why the researchers chose not to administer surveys to a sampling of the non-respondents. Likewise, I question the rationale for the acceptance of the adequacy of the reliability coefficients for the conditions on Section One of the instrument.

The findings indicate agricultural education teacher educators use productivity software the most in their preservice courses. However, the only type of computer resources used "often" is word processing software. The remainder of the resources, including telecommunications activities, are only incorporated into classrooms "sometimes". Based on these findings, are we currently providing adequate exposure of computer integration to our preservice teachers?

The authors conclude there are three predictors of computer integration in preservice agricultural education courses by teacher educators. They are the age, level of involvement in making computer integration related decisions, and knowledge and skill of the teacher educator. Are these findings similar to previous research findings concerning Ely's seven conditions that facilitate the implementation of educational technology innovations? Why? Why not? Likewise, what are possible explanations for the moderate relationship (negative) between age and the level of computer integration while previous research (Marburger, 1987, 1988) found no relationships?

With regard to implications in agricultural education, would the level of computer integration be enhanced if agricultural education teacher educators received needed computer hardware and software resources; rewards and incentives; and support from their leaders while maintaining the current levels of skill and participation?

What recommendations for practice and research do you have for your colleagues as a result of this study? This study is sure to generate considerable dialogue and opportunities for additional inquiry!

SCIENCE CREDIT FOR AGRICULTURE: RELATIONSHIP BETWEEN PERCEIVED EFFECTS AND TEACHER SUPPORT

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Introduction and Theoretical Framework

During their July 1994 business meeting, members of the Arkansas Vocational Agriculture Teachers Association (AVATA) voted to investigate the possibility of science credit for agriculture. An *ad hoc* committee, composed of six teachers, was charged with the responsibility of evaluating the feasibility and possible methods of securing science credit.

The committee met for the first time in August 1994. During the course of the meeting, committee members realized that meaningful plans could not be made until more information was available concerning Arkansas teachers' perceptions concerning science credit for agriculture. Due to this need, the AVATA requested and funded a statewide study.

This article is based on further analyses of a portion of the data collected to provide the information requested by the AVATA ad hoc committee. Specifically, this article explores the relationship between teachers' support for science credit and their perceptions concerning the effects of offering science credit for agriculture.

Recent researchers have attempted to use demographic characteristics to predict agriculture teachers' support for curriculum change (Newman and Johnson, 1993; Norris and Briers, 1989; and Peasley and Henderson, 1992). In each of these cases, the researchers failed to identify demographic characteristics capable of explaining more than 10% of the variance in teacher support for and/or acceptance of change. Newman and Johnson summarized the situation by stating, "The relationship between teacher demographic variables... and perceptions have little practical significance" (p. 57). Thus, it would seem that researchers desiring to predict teacher acceptance of curriculum innovations should examine variables other than demographic characteristics.

Vroom's (1964) expectancy theory of human motivation offers a promising model for studying the acceptance of educational change and formed the theoretical framework for this study. According to Robbins (1993), expectancy theory posits the following relationship between motivation, expectation and outcome:

> The strength of a tendency to act in a certain way [motivation] depends on the strength of an expectation that an act will be followed by a given outcome and on the attractiveness of that outcome to an individual. (p. 226)

In this study, teacher support for science credit was considered to be a form of motivation in that support represented a "tendency to act in a certain a way" (Robbins, 1993, p. 226). Teachers' perceptions concerning the effects of offering science credit for agriculture were considered to be a measure of the attractiveness of the outcome. Since, for the purpose of this study, the outcome (science credit) was assumed a priori, assessment of the strength of the expectation linkage between motivation and outcome was not necessary.

Purpose and Objectives

The purpose of this study was to explore the relationship between Arkansas agriculture teachers' perceptions of the effects of offering science credit for agriculture and their level of support for offering science credit for agriculture. Specific research objectives were to:

1. determine teachers' level of support for offering science credit for agriculture;
2. determine teachers' perceptions concerning the effects of offering science credit for agriculture;
3. determine the relationship between perceived effects and teachers' support for offering science credit for agriculture; and
4. determine if a linear combination of perceived effect components could explain a practically significant portion of the variance in teachers' support for science credit.

Procedures

The population for this census study was composed of all Arkansas agriculture teachers employed in state-reimbursed agricultural education programs during the fall 1994 semester (N = 259). Personnel in the agricultural education section of the Arkansas Department of Education provided the researcher with a current database containing the name and school address of each teacher.

This study employed the descriptive-correlational research design (Ary, Jacobs and Razavieh, 1990), using a mailed survey instrument. This paper is based on data collected in two sections of the instrument used in the overall study.

The first instrument section used a 1 to 5 Likert-type scale (1="strongly disagree"; 5="strongly agree") to assess teacher, school and community support for granting science credit for agriculture. Two items in this section assessed agriculture teachers' support for granting science credit for agriculture.

The second section of the instrument contained 20 statements concerning the effects of offering science credit for agriculture. Respondents rated their level of agreement with each effect statement using a 1 to 5 Likert-type scale (1="Strongly disagree"; 5="Strongly agree"). Several effect statement were negatively worded in order to avoid response-set.

The overall instrument was developed by the researcher based on input from the AVATA *ad hoc* committee on science credit for agriculture. A draft version of the instrument was administered to 11 senior agricultural education majors enrolled in the professional (student teaching) semester to determine if the instructions, items and response modes were clear. Based on individual written input and group discussion, minor wording changes were made.

Next, the instrument was reviewed for face and content validity by a committee of agricultural education state staff members. The committee, composed of the AVATA president, three district supervisors and the state supervisor of agricultural education, one postsecondary agriculture teacher, and seven teacher educators from three universities, judged the instrument to be valid.

Finally, the instrument was mailed to the AVATA *ad hoc* committee on science credit for agriculture. The teachers were instructed to critically examine the instrument for face and content validity and clarity using explicitly stated criteria. One week after the instruments were mailed, the researcher telephoned the committee members to get their input. The committee members responded positively to each of the six specified evaluation criteria. Thus, based on these two reviews (by the state staff and the teacher committee), the instrument was judged to possess face and content validity as well as clarity.

In order to establish test-retest reliability, a pilot-test was conducted with seven upper-division pre-service agricultural education teachers enrolled in a methods of teaching agriculture course. The students completed the instrument twice (at 14 day intervals). The coefficient of stability for the two teacher support item was .70; for the 20 perceived effect statements, the overall coefficient of stability was .85.

Data were collected during October - December 1994 following the Dillman (1978) procedure for mailed questionnaire administration. An 82% (213 of 259) response rate was obtained after three mailings. To determine if non-response bias was a threat to the study, a random sample of six (13%) non-respondents was conducted by telephone and data were obtained on 32 (39.5%) of the items on the overall survey. Comparison of respondents to non-respondents did not indicate any differences between the two groups. Therefore, the researcher determined that the results were generalizable to the population.

Descriptive statistics were used to summarize and analyze the data. Principal components analysis was used as a data reduction technique (Hatcher and Stepanski, 1994). Correlation and multiple regression analyses were used to identify the individual effect components which best predicted teacher support for science credit (Hair, Anderson and Tatham, 1987). Since data collected for this study were from a population, inferential statistics were not used.

Results

The average teacher-respondent was 39.1 years of age (SD=9.4), had 14.2 years (SD=9.0) of teaching experience, and worked in a single teacher department (74.5%). The mean student enrollment per teacher was 84.4 students (SD=30.8).

Over one-half (56.1%) of the respondents reported the bachelors degree as the highest degree earned; 42.9% reported earning a masters degree; and 0.9% held the associate degree. Approximately one in every four (26.9%) respondents reported holding a valid certificate to teach science in Arkansas.

Objective One -- Support for Science Credit for Agriculture

The teachers strongly supported granting science credit for agriculture. As shown in Table 1, teachers agreed that high school students completing agriculture courses should receive science credit toward high school graduation. The teachers also agreed that agriculture should be accepted as a science credit for meeting admission requirements for Arkansas colleges and universities.

Table 1.
Teachers' Level of Support for Granting Science Credit for Agriculture

Item	Statement	$\bar{X}^a$	SD	Med.
Q1.	I believe students should receive science credit toward high school graduation for agriculture courses.	4.49	.91	5.0
Q6.	I believe Arkansas colleges and universities should accept agriculture courses as a science credit for meeting admission requirements.	4.37	.89	5.0
	[b]Overall level of support for granting science credit for agriculture.	4.43	.83	5.00

[a]Based on 1=strongly disagree, 2=mildly disagree, 3=neither disagree nor agree, 4=mildly agree, 5=strongly agree.
[b]Calculated as (Q1 + Q6)/2.

Table 1 also shows the mean and standard deviation for the composite variable, "Overall level of support for granting science credit for agriculture." This variable was created by summing responses to items Q1 and Q6 and dividing the sum by two (so as to maintain the original scaling). The coefficient alpha reliability estimate for the variable, which was used as the criterion in subsequent analyses, was .82.

Objective Two - Perceived Effects of Science Credit

Teachers responded to 20 statements dealing with the possible effects of offering science credit for agriculture. Responses to the 20 items were subjected to principal components analysis with an oblique (promax) rotation. Principal component analysis was selected as the data reduction technique (as opposed to common factor analysis) because the primary objective was to "summarize most of the original information (variance) in a minimum number of factors [components] for prediction purposes" (Hair, Anderson, Tatham, and Grablowsky, 1979, p.221). Additionally, since no a priori assumptions were made about an underlying causal model, principal components analysis was deemed to be the most appropriate data reduction technique (Hatcher and Stepanski, 1994).

Based on the Kaiser criterion (Kaiser, 1960), examination of the scree plot of eigenvalues, and on conceptual soundness, only the first five components were retained for rotation. The five component solution accounted for 63% of the total variance in the 20 items. The first four principal components were composed of from three to seven effect statements. The names and coefficient alpha reliability estimates for these four principal components were as follow: Student Benefits (r = .87), Negative Impact (r = .84), Program Benefits (r = .68), and Enrollment (r = .57). The fifth principal component, Science Content, was variable specific, thus a measure of internal consistency could not be calculated. For this reason, readers should exercise caution in interpreting results related to the Science Content principal component. Table 2 lists the five principal components, the individual items in each component and the factor loading for each item.

Table 2.
Rotated Principal Components and Descriptive Statistics for Perceived Effects of Offering Science Credit for Agriculture (n = 212)

Item #		Factor loading	$\bar{X}$[b]	SD
First Principal Component = Student Benefits				
25	Increase student interest in agriculture	.83	4.06	.84
24	Increase student interest in science	.80	3.80	.94
22	Benefit students in my school	.79	4.35	.85
26	Result in higher student science achievement	.77	3.60	.94
14	Improve student attitudes toward agriculture as a career	.71	4.14	.93
11	Make science more meaningful to students	.65	4.06	.95
20	Increase importance of agriculture program	.62	4.07	1.02
Second Principal Component = Negative Impact				
19[a]	Prevent teaching of important vocational skills	.80	3.72	1.22
21[a]	Cause me to teach fewer practical skills	.79	3.42	1.29
12[a]	Not serve needs of local agriculture industry	.73	4.00	1.18
13[a]	Make me feel like a "second-rate" science teacher	.70	4.14	1.13
23[a]	Cause agriculture to be thought of as "watered-down" science	.67	3.47	1.31
10[a]	Weaken my FFA chapter	.65	4.22	1.08
Third Principal Component = Program Benefits				
8	Enhance agriculture program's image	.77	4.28	.90
7	Increase enrollment in agriculture	.76	4.42	.85
9	Cause me to work more closely with science teacher	71	4.17	.86
Fourth Principal Component = Enrollment				
16	Cause more high-ability students to enroll	.81	3.57	1.26
15[a]	Cause more low-ability students to enroll	.78	2.58	1.27
17	Cause more average-ability students to enroll	.45	3.81	.90
Fifth Principal Component = Science Content				
18	Require me to increase science content of courses	.85	3.52	1.25

[a]Negative items reverse-coded prior to analysis.
[b]Based on 1 = strongly disagree, 2 = mildly disagree, 3 = neither disagree nor agree, 4 = mildly agree, 5 = strongly agree.

Objective Three -- Relationship Between Perceived Effects and Support for Science Credit

The intercorrelation matrix for the five principal components and support for science credit are reported in Table 3. Based on the descriptors suggested by Davis (1971), the Student Benefits component was substantially related to support for science credit; the Negative Impact and Program Benefits components were moderately related to support for science credit; and the Enrollment and Science Content components had negligible relationships with support for science credit.

Table 3.
Intercorrelations Between Principal Component Scores and Support for Granting Science Credit for Agriculture (n = 211)

	Intercorrelations					
Variable	1	2	3	4	5	6
1. Student benefits	1.0					
2. Negative impact[a]	.53***	1.00				
3. Program benefit	.43**	.27**	1.00			
4. Enrollment	.35**	.36***	.23*	1.0		
5. Science credit	.15*	.08	.31**	.06	1.0	
6. Support for science credit	.58***	.49**	.41**	.08	.02	1.0

[a] Items were reverse-coded prior to analysis.
* Low association, ** moderate association, *** substantial association (Davis, 1971).

As shown in Table 3, the intercorrelations between the five principal components ranged from low to substantial. Both of the two components having negligible correlations with support for science credit (Enrollment and Science Content) had low to moderate correlations with one or more of the first three principal components (Student Benefits, Negative Impact, and Program Benefits).

Objective Four -- Variance in Support for Science Credit Explained by Perceived Effects

To satisfy this objective, support for science credit scores were regressed on a linear combination of the five principal components. All five potential predictor variables (principal components) were included in the regression analyses because, according to Pedhauzer (1982), "Inspection of the zero-order correlations is not sufficient to reveal the potential usefulness of variables that are used simultaneously to predict or explain a dependent variable" (p. 104). When potential predictor variables are correlated, variables having near-zero correlations with the criterion variable may explain a significant portion of the variance. Pedhauzer termed such variables suppressor variables and stated that:

> The inclusion of a suppressor variable in the analysis... serves to suppress, or control for, irrelevant variance, that is variance that is shared with the predictor and not with the criterion, thereby ridding the analysis of irrelevant variation, or noise. (p. 104)

The multiple regression equation containing the five predictor variables accounted for 47% of the variance in support for science credit. As shown in Table 4, the Student Benefits component (which had the largest zero-order correlation with support for science credit) entered the multiple regression equation first, explaining 34.1% of the variance in support for science credit. Taken together, the remaining four components explained an additional 12.9% of the variance and entered in the following order: Negative Impact, Enrollment, Program Benefits and Science Content.

Table 4.
Multiple Regression Analyses Predicting Support for Science Credit (n=211)

Predictor	Partial R^2	Model R^2	Beta[a] Weight	Uniqueness[b] Index
Student Benefits	.341	.341	.420	.108
Negative Impacts	.047	.388	.294	.059
Enrollment	.035	.423	-221	.040
Program Benefits	.033	.456	.242	.044
Science Content	.014	.470	-.124	.014

Note: Adjusted R^2 = .457. [a]Standardized multiple regression coefficients. [b]Squared semi-partial correlations obtained when partialling out variance in support for science credit shared with the other four predictors.

The beta weights (standardized multiple regression coefficients) and uniqueness indices (squared fourth-order semi-partial correlations) in Table 4 indicate the Student Benefits component was the most influential predictor of support for science credit, followed (in descending order) by the Negative Impact, Program Benefits, Enrollment, and Science Content components.

Comparison of the R^2 increments associated with the Enrollment and Science Content Components (Table 4) and the zero-order correlations between these components and support for science credit (Table 3), indicated that Enrollment and Science Content served as suppressor variables. The inclusion of these two components in the multiple regression equation resulted in the explanation of an additional 5.4% of the variance in support for science credit.

Discussion

Arkansas agriculture teachers clearly support granting science credit for agriculture. On measures designed to assess teachers' support for science credit, mean responses were in the mild to strong agreement range. Furthermore, the median response to each of these three measures was "5" on a 1-5 scale (1=strongly disagree; 5=strongly agree).

The results of principal components analysis indicated that a majority (63%) of the variance in teachers' responses to 20 items concerning the effects of offering science credit for agriculture could be accounted for by five principal components. These components were: Student Benefits, Negative Impact, Program Benefits, Enrollment, and Science Content.

The Student Benefits component was substantially related to support for science credit. Both the Negative Impact and Program Benefits Components were moderately related to support for science credit. Thus, teachers supporting science credit for agriculture tended to agree that offering science credit will benefit students, enhance agriculture's status within the schools, and will not adversely affect the existing agriculture program. Although causality cannot be established in a correlational study, these relationships between support for science credit and the perceived effects are both intuitively appealing and consistent with Vroom's (1964) expectancy theory of human motivation.

Negligible relationships existed between support for science credit and the Enrollment and Science Content components. The coefficients of determination (r^2) indicate that neither component shared as much as 1% of its variance with support for science credit.

A linear combination of the five principal components explained 47% of the variance in support for science credit. Thus, the correlation between actual and predicted levels of support, as calculated using the multiple regression equation developed, was .686. According to Davis (1971), this represents a substantial association. The magnitude of this correlation should be interpreted in view of the relative homogeneity of the criterion variable (support for science credit). According to Hinkle, Wiersma, and Jurs (1982), "The homogeneity of the group affects the correlation in such a way that increased homogeneity tends to limit the size of the correlation coefficient" (p.114).

Based on examination of the beta weights and uniqueness indices (Table 4), it appears that the Student Benefits component is the most influential predictor of teachers' support for science credit. Conversely, the Science Content component appears to be the least influential predictor of support for science credit.

The results of this study support the efficacy of Vroom's (1964) expectancy theory of human motivation in predicting agriculture teachers' support for curriculum change. In contrast to previous research (Newman and Johnson, 1993; Norris and Briers, 1989; and Peasley and Henderson, 1992) which failed to identify practically significant relationships between teacher characteristics and support for change, the present study identified perceived effect components having practical significance in predicting teacher support for science credit.

Conclusions and Recommendations

The following conclusions were made based on the results of this study:

1. Arkansas agriculture teachers support granting science credit for agriculture, both for high school graduation and for college admission.
2. Overall, teachers feel that offering science credit for agriculture will have positive effects on students and on agriculture programs.
3. As a group, the teachers did not feel that offering science credit for agriculture will have any serious negative impact in agriculture programs.
4. Teachers' support for offering science credit for agriculture was positively related to their perceptions of: (a) benefits to students, (b) lack of negative program effects, and (c) benefits that would accrue to the agriculture program.
5. A practically significant portion of the variance in teachers' support for science credit can be explained by a linear combination of the five effect components.
6. Teachers' perceptions of the Student Benefits component is the most powerful predictor of support for science credit.
7. Vroom's (1964) expectancy theory appears to be an effective model for use in predicting support and/or acceptance of educational change.

The following recommendations were made based on the results of this study:

1. Arkansas agricultural educators should initiate the dialogue, study and planning necessary to explore the possibility of securing science credit for agriculture.
2. The primary objective of any science credit for agriculture initiative should be to benefit students by using agriculture as a context through which to increase student interest and achievement in science. This objective appears consistent with both teacher perceptions and ethical practice.
3. If a science credit for agriculture initiative is successful in Arkansas, further research should be conducted to determine agriculture teachers' perceptions of the actual effects of offering science credit.
4. Researchers studying teachers' support for a new policy, program or other innovation should consider the potential predictive power of teachers' perceptions concerning the effects of the proposed change.

5. This study should be replicated in other states in order to determine the repeatability of both the principal components and their capacity to predict agriculture teachers' perceptions of the effects of offering science credit for agriculture.
6. Further research should be conducted to test the efficacy of Vroom's expectancy theory in predicting support and/or acceptance of educational change.

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SCIENCE CREDIT FOR AGRICULTURE:
RELATIONSHIP BETWEEN PERCEIVED EFFECTS AND TEACHER SUPPORT

Discussant Remarks
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Agricultural educators, local program and school administrators, and advisory personnel from numerous secondary agricultural departments though out the United States have struggled with the idea of providing science credit for agricultural courses over the past decade. The researcher is to be congratulated for his sustained and programmatic research efforts.

The researcher provided a brief introduction and theoretical framework that reported recent research completed by agricultural educators. This was followed by a concise description of Vroom's Expectancy Theory. After reading the theoretical framework two questions came to mind. First, what related research was completed by researchers in other disciplines regarding teacher support for curricular change that could inform your inquiry? Secondly, how has the expectancy theory informed other researchers concerned with curricular or program changes?

The purpose and objectives were clear and appropriate for this study. However, the type of science credit to be awarded to students enrolled in Arkansas agriculture courses was never disclosed. Are the education leaders and agricultural educators interested in awarding biological, earth, or physical science? All elements of the procedures component of the paper were addressed in a comprehensive and clear manner. The findings and subsequent conclusions and recommendations were carefully articulated and sound.

For the purpose of discussion, I offer the following questions:

1. This study has addressed instructor support levels and their perceptions of the effects of awarding science credit for agriculture courses. The results are very encouraging! Considering that students, parents, administrators in various education systems will be involved, should their perceptions be assessed and compared to the current findings before initiating additional study and planning?

2. Considering the quality instructional design efforts of Buriak, Osborne, Newman, Burton, Herren, and others, is it time to consider offering physical, biological, and/or earth science credit to agricultural students? Should we offer a social studies credit since we now teach so much about agriculture and its impact on society and the environment?

3. Determining the level of support for the awarding of science credit for agriculture credits is an important step in the entire process of bringing the idea to fruition in the schools. What other considerations need to be addressed by agricultural educators and leaders in agriculture prior to awarding science credit for agriculture courses? How do the outcomes of this process affect agricultural teacher preparation and inservice activities?

The researcher is to be commended for reporting his study in a well written paper! I encourage you to continue your research efforts as recommended in your list of recommendations.

EVALUATION OF INFORMATION SOURCES ABOUT AGRICULTURE: NATIONAL NEWS PUBLICATIONS

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Introduction and Theoretical Framework

The need for a society knowledgeable about agriculture is based on two primary factors. First, as consumers of agricultural goods, people need to understand basic principles of food and fiber sources, marketing, distribution, and nutrition. Second, because of the role citizens play in policy decisions, people need to understand the impact of agriculture upon society, the economy, and the environment.

Because of the importance of agricultural literacy, the mission, goals and strategic plan of professionals in agricultural education emphasizes enhancing the knowledge and perceptions of agriculture for all populations (Strategic Plan, 1989). To that end, agricultural literacy has become an important topic for educational programs and research efforts. Frick, Birkenholz & Machtmes (1995) stated, "The first step in improving the agriculture literacy level of a population is to determine the current literacy level." (p. 44) To that end, most of the research conducted by agricultural educators on this topic has focused upon assessment of knowledge about and/or perceptions of agriculture.

Numerous studies have been conducted investigating various populations such as elementary school students (Horn & Vining, 1986), high school students (Frick, Birkenholz, Gardner & Machtmes, 1995), university students (Terry & Lawver, 1995; Flood & Elliot, 1994), and adults (Frick, Birkenholz, Machtmes, 1995). More specifically, researchers have looked at groups within these populations such as 4-H members (Frick, Birkenholz & Machtmes, 1995) elementary school teachers (Terry, Herring, & Larke, 1992), television reporters (Terry, 1994), heads of households (Behavior Research Center of Phoenix, 1989). In each case, these studies have concluded that people do not have an adequate knowledge about agriculture and have inaccurate perceptions about the industry.

A logical next step in agricultural literacy research is to investigate why people do not better understand agriculture. Several possibilities have been proposed. Sorensen (1987) stated that population shifts from rural areas and the resulting lack of contact with production agriculture have contributed to ignorance about agriculture. A USDA (1983) report stated that people fail to understand the value of agriculture because most Americans do not have to be concerned about the supply or quality of food. Elliot and Frick (1995) proposed a conceptual framework to explain factors that contribute to knowledge and opinions about agriculture. These factors were personal factors, participation in agricultural activities, and education. Figure 1 illustrates this conceptual framework.

While a case can be made for the contributions of each of these factors, research by Terry (1994) and Terry and Lawver (1995) indicates that activities related to education are among the most important contributors to agricultural literacy. Within the education factor, news, or mass media is a major source of information about agriculture. Rogers (1983) pointed out that the mass media is the primary source used by people to gather initial awareness. He further stated that mass media sources have a great influence upon public perception citing examples from marketing and political arenas. He referred to this influence as the Hypodermic Needle Model. In this model, information can be figuratively injected into society through the mass media resulting in "direct, immediate and powerful effects" (p 272).

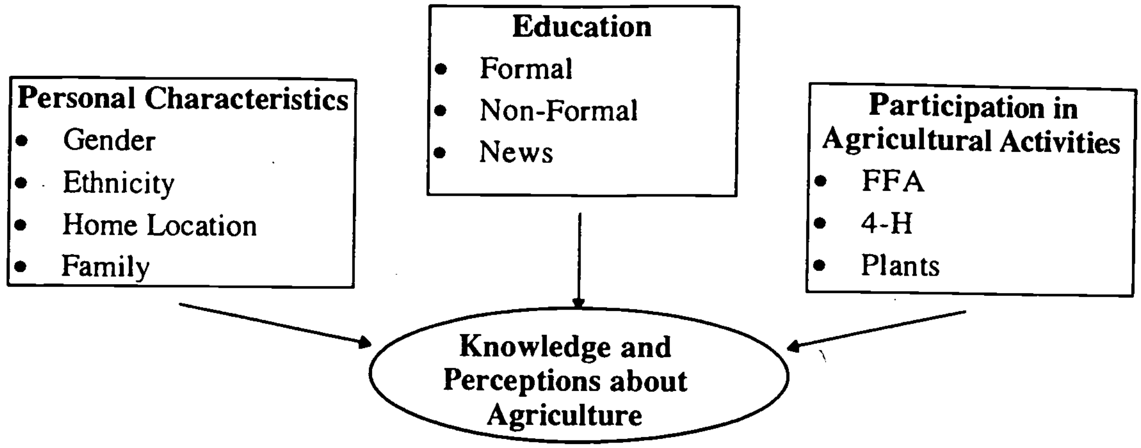

Figure 1. Conceptual framework for agricultural literacy

With this thought in mind, consideration must be given to the accuracy of information presented to the public about agriculture through the mass media. Fico and Soffin (1995), in discussing the importance of fairness in news reporting, stated that if one point of view on an issue is given more attention than others, its public salience will increase, thus altering public debate on that issue. With the increasing number of policy issues related to agriculture coming before the public, fairness, or lack of bias, in mass media coverage of agriculture is of concern. To appropriately structure programs to increase agricultural literacy, particularly in adult populations, the amount and quality of information supplied to the public from the mass media should be investigated.

Purposes and Objectives

The purpose of this study was to evaluate the coverage of agriculture available by popular news periodicals for one calendar year. The following objectives were formulated to accomplish this purpose:

1. Identify all of the articles written about agriculture in the most popular news magazines.
2. Categorize the identified articles into agricultural literacy concept areas.
3. Determine the level of bias in the identified articles.
4. Determine favorability of judgment statements in the identified articles.

Methods and Procedures

For Objective 1, The 1995 Gale Directory of Publications and Broadcast Media (Troshynski & Ulener, 1995) was used to determine that the three most popular news periodicals based upon circulation were *Newsweek* (3,227,010), *Time* (5,405,246), and *U.S. News & World Report* (21,281,369). Each issue of the three publications for the year 1994 was reviewed, and articles pertaining to agriculture were identified and copied for use with succeeding objectives. In addition, the number of articles for other subjects were counted for the purpose of comparison in coverage.

The agricultural literacy concept areas developed by Frick, Birkenholz, Gardner, and Machtmes (1995) were used to categorize the articles into topical groups for Objective 2. The categories were: a) Societal and Global Significance of Agriculture; b) Public Policy in Agriculture; c) Agriculture's Relationship with the Environment and Natural Resources; d) Plant Science; e) Animal Science; f) Processing of Agricultural Products; and, g) Marketing and Distributing of Agricultural Products.

A panel of experts composed of faculty and graduate students from the Department of Agricultural Education and The Department of Journalism placed the articles into the categories on consensus basis. Each article was placed into a primary category and, where appropriate, a secondary category.

The term "news bias" was defined by Stevenson and Greene (1980) as "the failure to treat all voices in the marketplace of ideas equally" (p. 116). This definition was used in carrying out Objectives 3 and 4. While many scholars have used a variety of methods to attempt to objectively evaluate news bias through the formulation and use of categories for statements found in the publications, most have not been validated (Lowry, 1985). The Hayakawa-Lowry method is an exception to this situation. Linguist and former U.S. Senator from California, S. I. Hayakawa (1949) developed a system where sentences in a news articles are analyzed and placed into one of three categories:

1. Report sentences -- factual and verifiable.
2. Inference sentences -- subjective and not immediately verifiable.
3. Judgment sentences -- expressions of the writer's or quoted speaker's opinions.

Report sentences are considered to be unbiased and, therefore, accurate. When a reporter makes an inference, the accuracy of the statement is weakened. Finally, judgment sentences are considered to be biased by the reporter or the source used by the reporter.

Lowry (1971) went on to expand these sentence types into nine categories, taking into consideration attribution of the information and favorability:

1. Report Attributed -- information is factual and attributed to a source.
2. Report Unattributed -- information is factual without citing someone as the source.
3. Inference Labeled -- statements about the unknown based on the known. Often interpretations or generalizations of events. Labeled inferences use "tip-off" specific words such as appear, could, may, perhaps, possible, ... to let the reader know the information is subjective to some extent.
4 Inference Unlabeled -- same characteristics described for category three, only without "tip-off" words. Considered to have more bias because the "tip-off" is not used to "warn" the reader.
5. Judgment Attributed, Favorable -- statements of the writer's approval or disapproval or an event, person, object or situation that are attributed to a source and favorable toward the subject.
6. Judgment Attributed, Unfavorable -- same as category six, only unfavorable to the subject.
7. Judgment Unattributed, Favorable -- statements of the writer's approval or disapproval or an event, person, object or situation that are not attributed to a source, but are favorable toward the subject.
8. Judgment Unattributed, Unfavorable -- same as category seven, only unfavorable to the subject.
9. Other -- all other sentences. Normally includes rhetorical questions, and introductory statements.

Lowry successfully established the construct validity of the Hayakawa News Bias Categories and also dealt with problems of inter-rater reliability through the development of a tested rater manual. The researchers spoke to Lowry (1995) and secured a copy of the manual and other recommendations. He also assured the researchers that this project was an appropriate use for the Hayakawa-Lowry method.

To classify the sentences, the four researchers individually evaluated each sentence of each article. They later met as a group, re-evaluated the articles and came to consensus for the classification of each sentence.

Statistical analysis was performed using Microsoft Excel® for the Macintosh® computer. Basic descriptive statistics were calculated for each variable.

Findings

Identification of Agricultural News Articles

A review of each weekly issue of the three most popular news magazines led to the identification of 13 agricultural articles. Three articles were found in *Newsweek,* four in *Time*, and six in *US News and World Report*. The titles of the articles and their source are listed below:

Elmer-Dewitt, P. (1994, May 30). Fried gene tomatoes. Time, 143, 54-55.

Shapiro, L., Wingert, P. & Springen, K. (1994, June 6). A tomato with a body that just won't quit. Newsweek, 118, 80-82.

Elson, J. (1994, July 4). The wine portfolio. Time, 144, 58.

Simons, J. (1994, July 18). The bird man from Arkansas. US News & World Report, 119, 42-46.

Isikoff, M & Hosenball, M. (1994, July 18). The chicken king plays hard-boiled politics. Newsweek, 124, 33-36.

Carpenter, B. & Busch, L. (1994, August 15). Not enough fish in the stormy sea. US News & World Report, 119, 55-56.

Cohen, W. (1994, August 22). Mississippi on the mend. US News & World Report, 119, August, 50-55.

Satchell, M. (1994, September 5). Trading tall trees for debt. US News & World Report, 119, 52-53.

Behar, R. & Kramer, M. (1994, October 17). Something smells fowl. Time, 144, 42-44.

Sidney, H. (1994, November 7). Amber tsunamis of grain. Time, 144, 54-56.

Boroughs, D. L. (1994, November 14). A media mogul moves into the meat market. US News & World Report, 119, 108.

Carpenter, B. & Busch, L. (1994, December 12). The comeback of the wolves. US News & World Report, 119, 76-78.

Shapiro, L. & King, P. (1994). Battle of the bottle. Newsweek, 144, 63.

The frequency of articles about agriculture were compared to other subject areas. The most common topic for articles in the three publications was international government and politics with 401 articles followed by 354 articles written about domestic government and politics. There were 219 articles about business, 162 articles about health and medicine, 104 about technology and 52 about education. There were more than twice as many articles about religion (27) than there were about agriculture. Figure 2 displays these data.

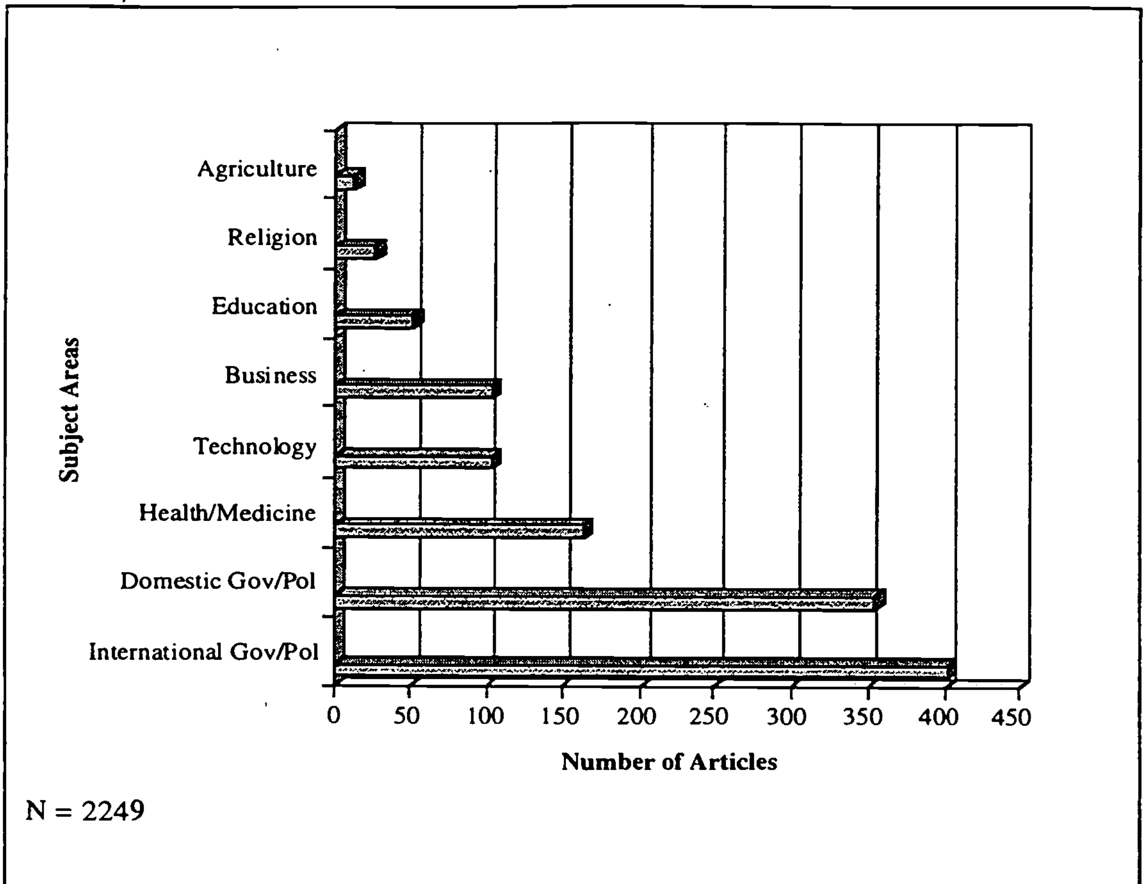

Figure 2. Frequency of articles in selected subjects in *Newsweek, Time, and US News and World Report.*

Categorization of Agricultural News Articles

Each article about agriculture was analyzed by the panel of experts and placed into a primary category based upon the major theme of the article. Twelve of the articles were placed into a secondary category as well. Figure 3 illustrates the number of articles placed in each agricultural literacy concept area as primary and secondary categories.

Almost one-third (4) of the articles were related to agriculture's relationship with the environment and natural resources. Three articles (23.1%) focused on agricultural public policy and two (15.4%) were about the societal and global significance of agriculture. There were also two articles on marketing and distribution of agricultural products (15.4%) and one article (0.8%) on each processing of agricultural products and animal science. No articles in these three major news publications had a primary focus on the topic of plant science.

The most common secondary category (n=4) was marketing and distribution of agricultural products. Plant science and public policy in agriculture were each determined to the secondary category for three articles (23.1%) and two (15.4%) of the articles were placed in the societal and global significance as well as processing of agricultural products categories. No articles were placed in the animal science or environment and natural resources categories. Table 1 lists the article title and source with their primary and secondary categories.

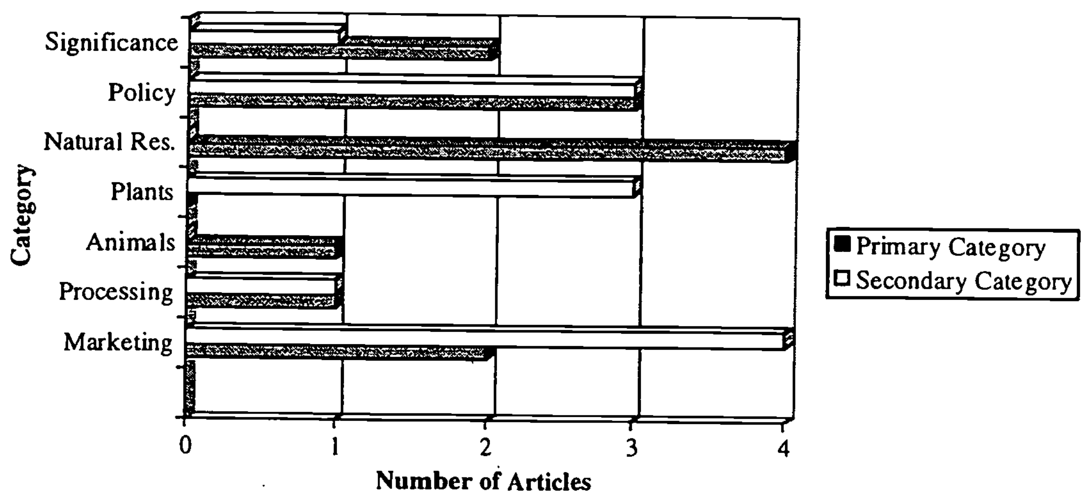

Figure 3. Articles by primary and secondary category.

Table 1.
Articles listed by primary and secondary category

Article	Primary Category*	Secondary Category*
Battle of the bottle	Mktg/Dist	None
The wine portfolio	Mktg/Dist	Plant Science
Mississippi on the mend	Natural Resources	Significance
The chicken king plays hard-boiled politics	Policy	Mktg/Dist
Something smells fowl	Policy	Processing
A media mogul moves into the meat market	Animal Science	Mktg/Dist
The comeback of the wolves	Natural Resources	Policy
Amber tsunamis of grain	Significance	Mktg/Dist
A tomato with a body that just won't quit	Policy	Plant Science
Fried gene tomatoes	Significance	Plant Science
Trading tall trees for debt	Natural Resources	Policy
The bird man from Arkansas	Processing	Natural Resources
Not enough fish in the stormy sea	Natural Resources	Policy

* Category labels are Agricultural Literacy Concept Areas developed by Frick, Birkenholz & Machtmes (1995).

Through application of the Hayakawa-Lowry News Bias Categories method, the researchers were able to rate the level of bias in the articles about agriculture. According to Hayakawa (1949) and Lowry (1971), report sentences are not considered to be biased since they are based on what was seen, heard or felt. They are exclusive of inferences or judgments. Inferences cannot be verified, but are based upon subjective interpretations, conclusions and generalizations. Labeled inferences are considered to have less bias because "tip-off" words are used to warn the reader of the inference. Judgments are based on the writer's or speaker's opinions with attributed judgments carrying less bias than unattributed because of the use of a source. Unfavorable judgments were placed after favorable judgments. Thus, the sentence categories form a continuum ranging from least bias (favorable attributed) to most biased (judgment unattributed unfavorable), so a mean was calculated for each article. The greater the mean, the greater the bias in the article.

The article with the highest mean (4.4) was entitled, "Something smells fowl," a story about a major food production and processing company, Tyson Foods, and its relationships with policy makers. Equaling that mean score was an article entitled, "Trading tall debt for trees," on the plans of a lumber company to harvest trees from a California Redwood forest. The article with the lowest mean (3.2), entitled, "Battle of the bottle," focused on the efforts of Washington vineyards to increase their presence in the wine market. Table 2 displays the classification of sentences and mean for each article.

Consolidating the categories revealed that 42.5% of the sentences in the 13 articles were classified as report sentences, 16.0% were inferences, 39.7% were judgments, and 1.8% were placed in the "other" category. When the articles were grouped by primary agricultural literacy concept area, the Marketing and Distribution of Agricultural Products group was found to have the highest percentage of judgment sentences (44.6%). Judgment sentences made up the highest percentage of all sentences in that group as well as for articles in the areas of Processing of Agricultural Products, Agriculture's Relationship with the Environment and Natural Resources and Societal Significance of Agriculture (see Figure 4).

Table 2.
Content category percentages for articles about agriculture

	Hayakawa-Lowry Category[a] (percent)									
Article	1	2	3	4	5	6	7	8	9[b]	Mean
Battle of the bottle	3.6	17.9	7.1	7.1	39.3	7.1	14.3	0	3.6	3.2
The wine portfolio	15.2	37.0	0	2.2	8.7	4.4	10.9	15.2	6.5	3.9
Mississippi on the mend	12.1	45.5	5.1	12.1	2.0	4.0	8.1	11.1	0.0	3.5
The chicken king plays hard-boiled politics	20.0	30.7	4.0	12.0	1.3	10.7	1.3	16	4.0	3.6
Something smells fowl	20.1	17.5	1.7	10.8	0.8	27.5	2.5	18.3	0.0	4.4
A media mogul moves into the meat market	15.0	30.0	0.0	17.5	7.5	10.0	17.5	2.5	0.0	3.9
The comeback of the wolves	16.2	27.0	1.4	16.2	4.1	18.9	1.4	13.5	1.4	4.0
Amber tsunamis of grain	9.8	29.4	1.1	14.1	8.7	14.1	15.2	6.5	1.1	4.2

Table 2.
Content category percentages for articles about agriculture

	Hayakawa-Lowry Category[a] (percent)									
Article	1	2	3	4	5	6	7	8	9[b]	Mean
A tomato with a body that just won't quit	14.8	29.6	0.0	14.8	19.8	11.1	0.0	6.2	3.7	3.6
Fried gene tomatoes	7.5	40.0	7.5	5.0	15.0	7.5	2.5	12.5	2.5	3.8
Trading tall trees for debt	8.9	26.7	8.9	13.3	2.2	8.9	6.7	22.2	2.2	4.4
The bird man from Arkansas	3.9	32.5	3.9	19.5	14.3	9.1	7.8	7.8	1.3	4.1
Not enough fish in the stormy sea	1.9	24.5	7.6	13.2	1.9	28.3	0.0	20.8	1.8	4.0

a 1= report attributed, 2= report unattributed, 3= inference labeled, 4= inference unlabeled; 5= judgment attributed favorable, 6= judgment attributed unfavorable, 7= judgment unattributed favorable, 8= judgment unattributed unfavorable, 9= other.

b Sentences classified in category 9 (other) were excluded from the mean calculations.

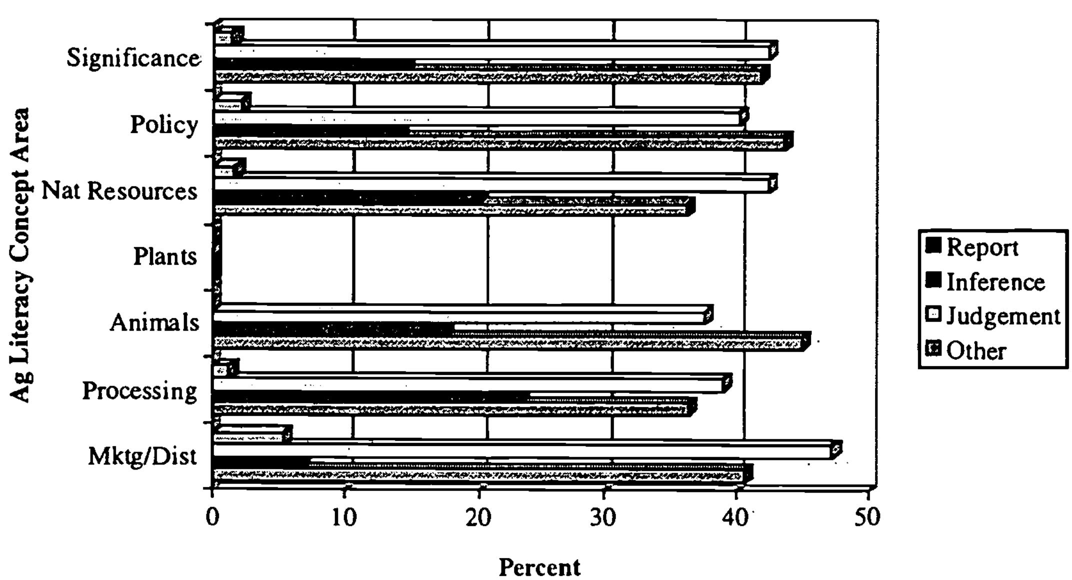

Figure 4. Classification of sentences within agricultural literacy concept areas.

Favorability of Judgment Statements in Agricultural News Articles

When the judgment sentence categories were condensed into favorable or unfavorable, regardless of attribution, almost two-thirds of the judgment sentences were found to be unfavorable for the 13 articles. Figure 5 shows the percentage of favorable and unfavorable judgment sentences in each article. Five of the 13 articles had more favorable than unfavorable judgment sentences. They included articles about wine marketing, Ted Turner's venture into the marketing of buffalo meat, high yields of the 1994 grain harvest, genetically engineered foods, and one on the globalization of Tyson Foods. Among the articles with more unfavorable judgment sentences were articles on the recovery of the Mississippi River valley, two articles about the relationship between Tyson Foods and the Clinton administration, and three articles about the environmental impact of agriculture. When clustered into the agricultural literacy content areas, data indicated that in Public Policy in Agriculture and Agriculture's Relationship with the Environment and Natural Resources areas, the unfavorable statements far exceeded the favorable statement (80.2% and 87.7% unfavorable judgment sentences, respectively).

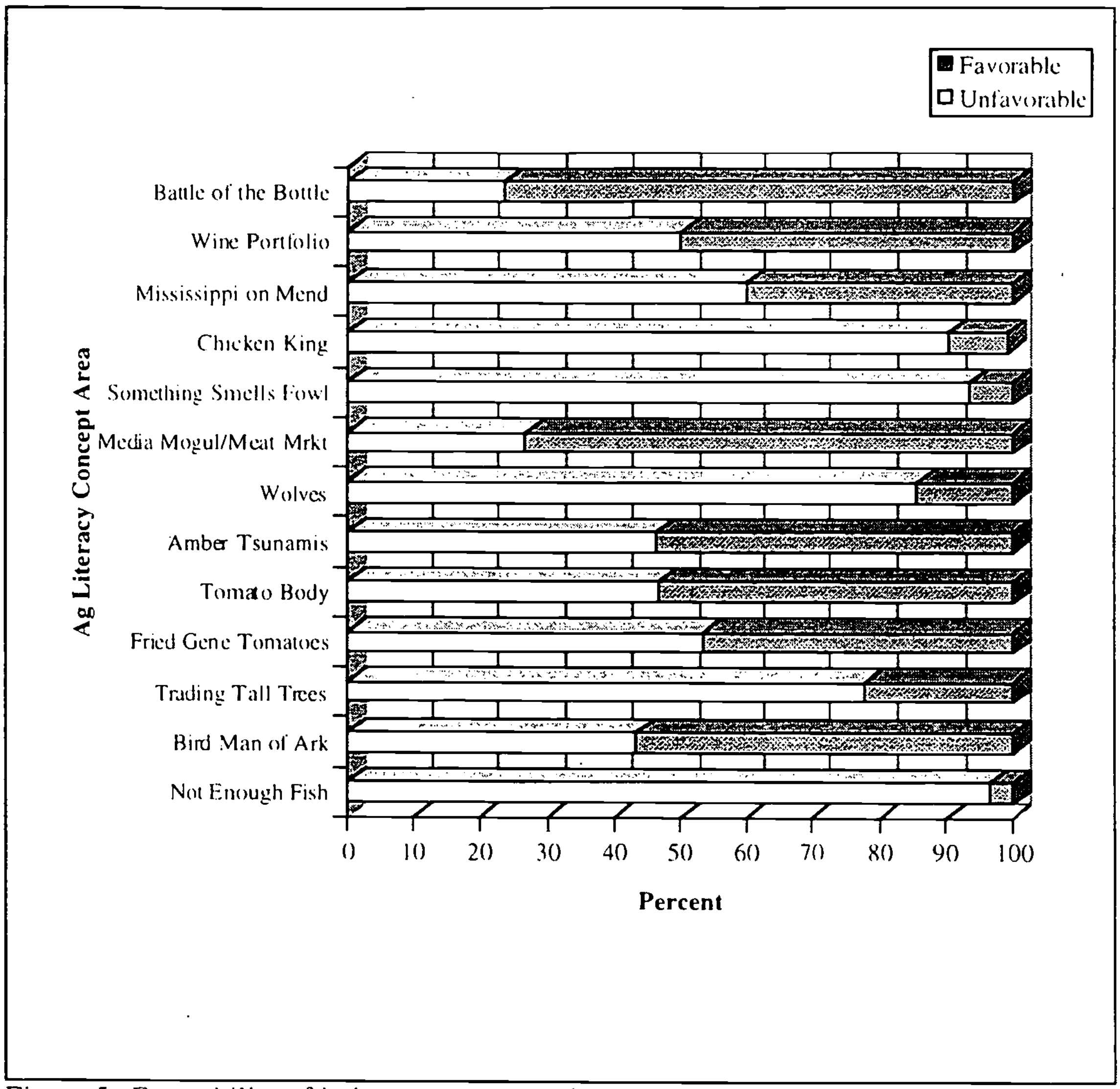

Figure 5. Favorability of judgment sentences in each category.

Conclusions and Recommendations

Conclusions

1. Despite the substantial impact agriculture has on the society, economy, environment, governmental policy and human health, it receives very little coverage in the three most popular national news magazines. Articles on agriculture numbered far fewer than comparable topics such as education, health and medicine, and technology. This lack of coverage of agriculture in national news periodicals represents missed opportunities to develop agricultural literacy in adult populations.
2. Of the articles published in the three news magazines, most focused upon agriculture's relationship with the environment and natural resources, marketing of agricultural products and policy. Areas such as significance of agriculture, animal science and processing of agricultural products were not covered as much.
3. Specifically, there were three articles about depletion of natural resources, three about Tyson Foods company, two articles about the wine industry, and two on genetic engineering of foods.
4. Application of the Hayakawa-Lowry New Bias Categories method revealed that articles about agriculture have a high degree of bias in them. Only three of the articles had more than 50% of the sentences classified as reports. Overall, four out of every ten sentences were judgments. The percentage of judgment sentences is very high compared to articles written about political figures and campaigns (Lowry 1971, 1971).
5. Most of the judgment statements made in articles about agriculture were unfavorable toward agriculture. In particular, articles focusing on agriculture's relationship with the environment and public policy in agriculture had high percentages of unfavorable judgment sentences.

Recommendations

1. While agricultural educators cannot expect to have an influence upon what is published in these three major magazines, the results of this study do point out the need to work with local and state level publications. Agricultural educators should work with their colleagues in agricultural colleges to develop presentations to the media about the impact of agriculture and advances in the industry. Further, agricultural educators and agricultural communicators should work with students and faculty in journalism and communications programs to better their knowledge and understanding of agriculture.
2. It is important for accurate information, based on scientific study, be diffused to members of the media. Agricultural organizations should work to provide accurate, unbiased information about the industry in publications other than those intended for agricultural audiences. In addition, educators in agriculture should write and submit their work to popular magazines and serve as resource persons to journalists who write for these publications.
3. The Committee on Agricultural Education in Secondary Schools (1988) recommended that agriculturally literate persons should know about each of these concept areas in order to make logical decisions about agriculture. The mass media cannot be depended upon to provide balanced coverage of each of the agricultural literacy concept areas. It is important for parties interested in agriculture to explore other ways to effectively educate people about agriculture.
4. The Hayakawa-Lowry News Bias Categories method should be used to evaluate future volumes of these and other popular publications to provide a broader data base for the development of agricultural literacy programs for all populations.
5. Research should be conducted to evaluate articles found in agricultural publications and those from the agricultural extension service to determine what bias might exist in those information sources. Newspapers and other local publications should also be evaluated.

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EVALUATION OF INFORMATION SOURCES ABOUT AGRICULTURE: NATIONAL NEWS PUBLICATIONS

Discussant Remarks

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Over the past decade the importance of understanding various aspects of agricultural literacy has been reflected by the large number and variety of studies reported in the Journal of Agricultural Education and presented at Regional and National Agricultural Education Research Meetings. The researchers of this innovative study skillfully investigated the degree of reporting bias in the agricultural articles presented in the three largest United States popular press news magazines. They are to be congratulated for this exhaustive effort to examine important aspects of the print and electronic media that may affect the agricultural knowledge of many American citizens!

The theoretical framework efficiently provided a concise notation of some of the constructs and populations of previous agricultural literacy studies. Drawing upon Rogers (1983) researchers propose that agricultural literacy information can be figuratively "injected into society through the mass (print and electronic) media resulting in "direct, immediate, and powerful effects". Though we desire unbiased reporting in the print media, do we ever receive the complete story? What does the literature suggest about the degree of bias of current magazine news articles?

The problem, purpose, and objectives of the study were clear. The methods and procedures were described with helpful details. However, considering the ability of the mass media to target selected consumer markets, I was left wondering (a) if the constituents in the markets of the three news magazines are representative of the U.S. population, and (b) if there was historical data available concerning article content and subjects for each selected news magazine?

Effective use of a variety of figures and tables made the findings easy to read. Additional explanation of how the mean was calculated for the Hayakawa-Lowry New Bias Categories method is needed since the data were originally placed into nine categories and reported as percentages.

The researchers conclude there is limited coverage of agriculture by the three major news magazines. Can we confidently conclude it is due solely to agricultural illiteracy? Is there historical data to suggest the percent of articles relating to agriculture in these news magazines has changed in recent decades? The researchers accurately conclude the agricultural articles contain a high degree of bias. However, what is an acceptable standard for non-agriculture and agriculture articles? How do the findings and conclusions of this study expand, support or refute findings of earlier agricultural literacy studies?

The researchers should to limit their recommendations to the purview of the study. This study only addressed the three United States news magazines with the greatest annual circulations. I encourage the researchers and their associates to continue their research efforts!

CRITICAL ISSUES FACING SECONDARY AGRICULTURAL EDUCATION PROGRAMS

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Introduction

Within the last decade secondary agricultural education programs have experienced significant changes. A large number of programs have moved away from a production agriculture focus to emphasize agricultural science, biotechnology, sales or marketing. We've also seen a renewed interest in agricultural education and the FFA organization. In many states agricultural education enrollment has increased significantly and the National FFA Organization has witnessed membership growth over the past several years. Yet there is always concern with what lies ahead. What new problem will challenge agricultural education professionals in the next five years?

Webster's Collegiate Dictionary defines "issue" as a final outcome that usually constitutes a solution or resolution. Issues facing agricultural education programs and teachers are forever presenting new and difficult problems. Agricultural education professionals regularly try to identify and discuss these issues. This study was undertaken to systematically utilize the expertise of secondary agriculture teachers, state supervisors and agriculture teacher educators to identify the leading critical issues that secondary agricultural education programs will face over the course of the next five years.

Theoretical Framework

The future of agricultural education is dependent on the profession being proactive and addressing issues that secondary agricultural education programs will face. The identification of issues relevant to the operation of an enterprise is vital to the enterprise's success (Campbell, 1983). Issue identification serves as the first step of a process known as issue management (Chase, 1977).

The emphasis on the future of agricultural education is nothing new. Almost 20 years ago, Stewart and Shinn (1977) reported that, "The five areas of greatest concern to teachers, supervisors and teacher educators...were: curriculum development, funding, teacher education, teacher shortage and evaluation" (pg. 25).

In an article on managing change in agricultural education, Herring (1995) stated, "In a dynamic, ever-changing world, I believe that perhaps the greatest challenge we face in agricultural education is that of anticipating and managing change." In his article, Herring identified ten challenges he thought would face agricultural education in the next 5-10 years. Herring's list included the mission of agricultural education, clientele, delivery system, modernization of supervised experience programs, teacher education programs, in-service education programs, reform of agricultural mechanics instruction, tech-prep, and updating of curriculum. As agricultural education prepares for the year 2000, it is important that critical issues be identified and addressed.

Purpose and Objectives

The purpose of this Delphi study was to utilize the expertise of secondary agriculture teachers, state supervisors of agricultural education and agriculture teacher educators to identify critical issues facing secondary agricultural education programs over the next five years. Specific objectives of the study were:

1. To identify a list of critical issues likely to face secondary agricultural education programs over the next five years.
2. To determine a priority ranking of critical issues identified by agricultural education professionals.
3. To determine if differences exist between secondary agriculture teachers, state supervisors of agriculture and agriculture teacher educators on their ranking or level of agreement with the critical issues identified.

Methods

This study was conducted using a Delphi technique to identify the critical issues likely to face secondary agriculture programs in the near future. The Delphi is a group process technique for eliciting, collating, and generally directing informed (expert) judgement towards a consensus on a particular topic (Delp et al., 1977, pg 168).

The population for the surveys included secondary agriculture teachers, state supervisors of agricultural education, and agriculture teacher educators throughout the Western Region of the American Association for Agricultural Education (AAAE). In addition, the national officers of the AAAE, National Association of Supervisors of Agricultural Education (NASAE) and National Vocational Agriculture Teachers' Association (NVATA) were included in the study. The total number of teachers, supervisors and teacher educators included in the study was 82.

This Delphi study included a series of four surveys. All surveys were developed and checked for content validity by a panel of experts which included a secondary agriculture teacher, state supervisor and teacher educator. The first survey contained an open ended question that asked respondents to list the 10 most critical issues they feel secondary agricultural education programs will face in the next five years.

The resulting list of critical issues was placed into 20 categories. These categories were then used to write 20 statements that made up the second survey. Respondents ranked each of the 20 statements from 1-not important to 4-extremely important. The responses were then combined to provide a ranking of the 20 critical issues. Survey three contained 20 statements related directly to the ranking from survey two. Respondents were asked their level of agreement with the statement. The Likert scale used for survey three was 1-strongly disagree to 4-strongly agree.

The fourth and final survey included 22 statements developed from the previous surveys. To better refine the respondents opinions related to the statements they were asked to either 1-disagree or 2-agree with the statement. Survey four also included space for respondents to provide written comments. Telephone follow-ups (dunning) were made to non-respondents on survey four to increase the response rate.

Results

The average response rate for all four surveys was 71%. AAAE members responded 78% of the time, NASAE members 81% of the time and NVATA members responded 61% of the time. Over 48% of the respondents completed all four surveys.

The response rate for survey one was 63.4%. The 52 respondents listed over 400 critical issues. These were then grouped into 39 different categories. The top 20 categories were then used in the second survey. These 20 categories are listed in Table 1.

Respondents were asked to rank the 20 categories using a four point Likert scale ranging from 1-not important to 4-extremely important. The response rate for survey two was 70.7%. Only two categories: funding local agricultural education programs and recruitment and retention of secondary agriculture teachers were ranked as extremely important issues. The remaining 18 categories were ranked as very important issues. None of the 20 categories was ranked as somewhat or not important. Results from survey two are presented in Table 2.

The rankings from survey two were then used to create statements related to the ranked categories. Respondents were asked to determine their level of agreement with each statement by using a Likert scale ranging from 1-strongly disagree to 4-strongly agree. Fifty-seven respondents (69.5%) completed and returned survey three. Respondents strongly agreed with 13 of the 20 statements. The remaining seven statements had mean scores in the agree range. No statements had means in the disagreed range. Table 3 shows the results from survey three.

The final survey contained 22 statements created as a result of the previous survey. Respondents had to narrow their responses to either agree or disagree with the statement. The response rate for survey four was 81.7%. The largest percentage of respondents, 98.5%, agreed with the statements that it is the agriculture teacher's responsibility to develop support from the community and school administration for their program, all agriculture teachers should integrate academics into the curriculum, and every student should have a SAE program. Table 4 shows the results from survey four.

Table 1.
Categories of Issues Identified in Delphi Survey One

Category	Number
Funding local programs	27
Curriculum (funding, development, up-to-date)	22
FFA organization (recruitment, programs, role)	22
Recruitment and retention of high school agricultural education students	19
Federal presence and leadership (FFA organization, mission, location, AAAE/NVATA/NASAE collaboration)	18
Instruction (9-12, K-14, delivery methods, #programs, ag literacy)	17
Technology	16
Professional development, In-service	15
State staffing (supervisors)	13
Teacher recruitment and retention	12
Program assessment/evaluation, standards, quality, image	12
Teacher education (# of university programs, quality, communication, etc.)	11
Integration of academics (science, math, English) and vocational education.	11
School-To-Work, 2+2+2	11
Community and administrative support of programs	10
Teacher supply (shortages/surplus)	10
Program articulation (Tech Prep)	8
Supervised agricultural experience (SAE) (computer record book, urban/suburban)	8
Federal/state funding	7
Industry needs, collaboration	6

Table 2.
Ranking of Categories from Delphi Survey Two

Category	Mean	SD
Funding local agricultural education programs.	3.74	.52
Recruitment and retention of secondary agriculture teachers.	3.52	.68
Recruitment and retention of high school students into agricultural education.	3.48	.63
Federal and state funding of agricultural education programs, including block grants.	3.48	.60
The development of collaborative relationships with business and industry.	3.47	.57
Developing community and administration support for agricultural education.	3.41	.62
Development of advanced, up-to-date curriculum.	3.38	.67
FFA organization and leadership, including funding, programs and recruitment.	3.29	.62
Providing supervised agricultural experiences (SAE) for urban, suburban and rural students.	3.28	.72
The quantity and quality of university teacher education programs in agriculture.	3.28	.72
Developing professional inservice activities for secondary agriculture teachers.	3.21	.67
The reduction in agricultural education state supervisors by state education agencies.	3.19	.79
Improving the image and quality of agricultural education programs through the development of program standards.	3.16	.79
The incorporation of the latest technological advances into agricultural education.	3.07	.62
The reorganization of the federal presence and leadership of agricultural education including the mission, location of FFA headquarters, and collaboration between AAAE, NVATA and NASAE.	3.03	.88
Academic requirements for high school graduation and university admissions.	2.97	.82
The integration of academics (science, math, English) and vocational education.	2.95	.76
School reform issues including School-to-Work, Tech-Prep, 2+2 and program articulation.	2.93	.77
Instructing students with different backgrounds, socio-economic levels and personal problems (i.e. drug usage, gang membership, etc.).	2.90	.67
Instructional delivery methods (i.e. 9-12, K-14, ag literacy and number of programs).	2.72	.67

Note. 1=not important, 2=somewhat important, 3=very important, 4=extremely important

Table 3.
Mean Ranking of Statements from Delphi Survey Three

Category	Mean	SD
Community and administration support is essential for a successful agricultural education program.	3.86	.35
Adequate funding is essential for local agricultural education programs.	3.70	.46
Advanced, up-to-date curriculum is needed for agricultural education programs.	3.65	.48
Secondary agriculture teachers need quality inservice activities to remain current on new advances in agricultural technology and instructional methods.	3.63	.49
The reduction in agricultural education state supervisors by state education agencies should be a concern to agricultural education professionals.	3.63	.56
More secondary agriculture teachers must be recruited and retained.	3.60	.49
Maintaining the quantity and quality of university teacher education programs in agriculture is very important.	3.58	.50
Agricultural education programs should incorporate the latest technology into the instructional program.	3.56	.50
Collaborative relationships with business and industry are essential for a successful agriculture program.	3.54	.54
More high school students should be recruited into agricultural education.	3.53	.50
Agriculture teachers should integrate academics (science, math, English) into the curriculum.	3.52	.57
Quality FFA leadership, funding, and programs are essential to the future of agricultural education.	3.52	.60
A federal presence for Agricultural Education, FFA, NVATA, AAAE, and NASAE is vital to the future of agricultural education.	3.52	.60
Agricultural Education must be included in school reform activities including School-to-Work, Tech-Prep, 2+2 and program articulation.	3.49	.54
Academic requirements for high school graduation and university admissions should be a concern of all agriculture teachers.	3.49	.54
Agricultural education programs need to improve their quality and image with the general public.	3.47	.57

Note. 1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

Table 3. (continued)

Category	Mean	SD
Supervised agricultural experiences (SAE) opportunities for urban, suburban and rural students need to be developed.	3.45	.54
Agricultural education programs must address the needs of students with different backgrounds, socio-economic levels and personal problems (i.e. drug usage, gang membership, etc.).	3.25	.63
Federal and state funding for agricultural education programs should be increased through block grants.	3.18	.80
New instructional delivery formats (i.e. 9-12, K-14, ag literacy, new programs) need to be developed for agricultural education.	3.09	.64

Note. 1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree

An analysis of variance found that there was a significant difference in the way teacher educators and state supervisors ranked the importance of the reduction in agricultural education state supervisors by state education agencies. Teacher educators indicated the issue was very important while state supervisors indicated it was an extremely important issues.

Chi-square analysis of the dichotomous (agree, disagree) questions in survey four indicated significant differences in the respondents' answers to three questions depending on their affiliate organization (NASAE, NVATA, AAAE). A large percentage, 88%, of secondary teachers agreed that school funding for FFA programs (activities) should be increased, while only 56.5% of the teacher educators agreed with the statement.

When asked if the quality of university teacher education programs has declined over the last 10 years, 56.5% of secondary teachers and 66.7% of state supervisors agreed. Almost 80% of teacher educators responding disagreed with the statement.

Sixty-five percent of state supervisors and 88% of secondary teachers agreed that many students are unable to enroll in agricultural education because of high school graduation requirements. Teacher educators were evenly split, 50% agreeing and 50% disagreeing with the statement. Results of the chi-square analysis are shown in Table 5.

Table 4.
Level of Agreement with Survey Four Statement

Statement	Agree (%)	Disagree (%)
It is the agriculture teacher's responsibility to develop support from the community and school administration for the agricultural education program.	98.5	1.5
All agriculture teachers should integrate academics into their agriculture curriculum.	98.5	1.5
Every agricultural education student should have a Supervised Agricultural Experience program.	98.5	1.5
Agriculture educators should play a key role in school reform activities.	93.8	6.2
Business and industry should play a greater role in agricultural education.	92.5	7.5
New curriculum materials developed by the National Council for Agricultural Education and other organizations benefit secondary agricultural education programs.	92.4	7.6
There is a shortage of qualified agriculture teachers to fill existing and future secondary agriculture programs.	91.0	9.0
The percentage of high school agriculture students that join the FFA needs to be increased.	90.8	9.2
Secondary agriculture teachers need to recruit more high school students into agriculture classes.	87.9	12.1
Agriculture educators should be prepared to deal with drug users, gang members or violent students in their classrooms.	84.6	15.4
More supervision and assistance is needed from State Supervisors of Agricultural Education	78.8	21.2
School funding for FFA programs should be increased.	73.8	26.2
Agricultural education programs should offer instruction in agriculture for students from kindergarten through adults.	70.3	29.7
Many students are unable to enroll in agricultural education because of high school graduation requirements.	67.7	32.3
The national headquarters of the National FFA Organization should stay in Alexandria Virginia.	53.8	46.2

Table 4. (continued)

Statement	Agree (%)	Disagree (%)
The general public has a poor image of agricultural education programs.	48.5	51.5
Ensuring adequate funding for local agriculture education programs is the most important issue facing secondary agricultural education.	46.9	53.1
The quality of university teacher education programs has declined over the last 10 years.	45.2	54.8
Agricultural education and the FFA should be located within the U.S. Department of Education in Washington D.C.	41.3	58.7
Current inservice educational offerings meet the needs of secondary agriculture teachers.	38.8	61.2
Block grant funding will benefit agricultural education programs.	21.1	78.9
Agricultural education programs utilize the latest in state-of-the-art technology in their instructional programs.	19.7	80.3

Table 5.
Chi-Square Analysis of Survey Four Dichotomous Questions

Question	State Supervisors		Secondary Teachers		Teacher Educators		Chi-Square
	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)	Agree (%)	Disagree (%)	
School funding for FFA programs should be increased.	76.5	23.5	88.0	12.0	56.5	43.5	6.22*
The quality of teacher education programs has declined over the last 10 years.	66.7	33.3	56.5	43.5	20.8	79.2	9.73*
Many students are unable to enroll in ag. ed. because of high school graduation requirements.	64.7	35.3	87.5	12.5	50.0	50.0	7.81*

*$p<.05$.

Respondents provided written comments to the statements contained in survey four. In response to statements on program funding one respondent stated, "Funds follow quality programs." One respondent writing about recruiting stated, "Recruiting is the key to encouraging top students to enroll." The following is a sample of the comments written by respondents concerning teacher education programs, school reform, the location of agricultural education and FFA leadership, state supervisors and the image of agricultural education.

> "They [teacher educators] are not in tune with what is needed <u>NOW</u>!"
> "My son is in his second year of teaching-was much better prepared than I was."
>
> "Show teachers how to live with Block Schedules, Portfolios, etc."
> "I believe we can be leaders in school reform."
>
> "FFA will not fail or fall apart if it moves."
> "Significance of Geo. Wash. estate can't be overlooked."
>
> "Ag Ed in USDA/CREES, FFA in USDE."
> "USDA if they are willing to put emphasis on education."
>
> "The trend needs to be reversed that keeps supervisors out of the schools."
> "Supervisors are overloaded with other jobs."
>
> "They [general public] have a poor image of some Agri-practices which reflect on Ag Ed programs."

Conclusions

1. The top two most critical issues as identified by the respondents were funding of local agricultural education programs and recruitment and retention of secondary agriculture teachers.
2. Additional issues of concern were the recruitment and retention of high school students into agricultural education, federal and state funding of agricultural education programs including block grants, and the development of collaborative relationships with business and industry.
3. The location of the National FFA Organization headquarters was not an extremely important issue, ranking only 15th out of 20 critical issues facing secondary agriculture programs. However, 54% of respondents agreed that the national headquarters of the FFA should stay in Alexandria, Virginia.
4. The majority of respondents disagree that Agricultural Education and the FFA should be located within the U.S. Department of Education in Washington D.C. This would indicate that the majority of respondents would like to see Agricultural Education and the FFA be under the authority of the U.S. Department of Agriculture.
5. Over 78% of the respondents disagreed that agriculture education programs utilize the latest in state-of-the-art technology. This suggests that state supervisors, secondary teachers and teacher educators all see a need for updating the technology equipment, including computer hardware, that are utilized in secondary agriculture programs.

Recommendations

The list of critical issues that resulted from this Delphi study are not very different from those identified almost 20 years ago by Stewart and Shinn (1977). Agricultural education professionals are continually concerned about future funding for programs and the recruitment and retention of both secondary agriculture students, and the secondary agriculture teachers needed to teach them. What this study does indicate, however, is the importance of an open dialogue concerning the future of agricultural education. All stakeholders including state supervisors, secondary teachers and teacher educators must continually and systematically discuss issues of concern to the profession.

The results of this study should be reviewed by the boards of directors of the NASAE, NVATA, AAAE, the National Council and the National FFA Organization so they can keep up-to-date with the concerns of the profession. This type of study should be replicated in other regions of the country or conducted nationally to better gauge the pulse of the profession. Finally, all agricultural education professional associations should work together to develop an action plan to address many of these concerns. This could be accomplished under the auspices of the National Council for Agricultural Education's *Reinventing Agricultural Education for the Year 2020* task force or the National FFA Organization's *Leadership for a New Millennium* task force.

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CRITICAL ISSUES FACING SECONDARY AGRICULTURAL EDUCATION PROGRAMS

Discussant Remarks
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This research addressed, as the title indicates, the critical issues facing secondary agricultural education programs. The author is to be commended for selecting and researching a most relevant topic.

The purpose and objectives were stated in a clear and concise manner. Excellent use of the Delphi technique to identify the critical issues presented a model for other researchers to follow. Except for the author not indicating whether a sampling of non-respondents were any different from the respondents, correct research methodology was used.

The findings were presented using a table to report each round of the Delphi. Each of the following rounds of the study resulted in a refinement of the preceding round. It is interesting that only two categories: funding local agricultural education programs and recruitment and retention of secondary agriculture teachers were ranked as extremely important issues.

The conclusions made by the author were based on the results reported in the four tables. However, a concern is: which table do I draw my conclusions? The following is not a criticism but merely an observation. It appears that the way an issue is stated will determine the ranking of its' importance. The rankings of the issues changed significantly between Table 2 and Table 3 based upon how the issue was stated. For example, "Federal and state funding of agricultural education programs, including block grants" was ranked fourth in Table 2, once the statement was changed to, "Federal and state funding for agricultural education programs should be increased through block grants: the ranking dropped to 19 in Table 3. Furthermore, Table 4 reports 78.9 percent disagree that "block grant funding will benefit agricultural education programs."

An interesting topic for future research emerged from the following finding: "When asked if the quality of university teacher education programs has declined over the last 10 years, 56.5 percent of secondary teachers and 66.7 percent of state supervisors agreed. Almost 80 percent of teacher educators responding disagreed with the statement." Why and where is the difference in perception of quality teacher education programs? The author has given us another question to ponder.

AN UPDATE ON THE ESPOUSAL AND PRACTICE OF SUPERVISED AGRICULTURAL EXPERIENCE (SAE) IN NEW YORK STATE

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A national study on agricultural education in the secondary schools was initiated in 1985 because of concerns about declining enrollments, instructional content, and quality in agricultural education programs (National Research Council, 1988). A national committee developed a vision of education and recommended new directions for helping Americans and others to better understand agriculture. The concept of supervised agricultural experience (still called supervised occupational experience until the late 80s) was endorsed by the committee as one of the foundational components of agriculture education (still referred to then as vocational agriculture). The national committee recommended updating and adapting SAE to address current and future needs in agriculture. New directions for SAE included use of a broader range of activities that represent new areas of agriculture, expanded use of on-site laboratory facilities, more special opportunities in the summer, more emphasis on learning, and loosening of mandatory SAE participation requirements. The committee still recommended that four years of SAE be pursued by every student, if appropriate. Publication of the new directions for agricultural education, commonly called the "green book", was intended to provide a basis for development of a new understanding and practice of agricultural education. How much change has occurred since this national study?

This paper presents and analyzes data collected from a survey of agricultural educators in New York state. The purpose is to update the status of SAEs and provide a basis for monitoring progress in light of espoused agricultural education standards.

Theoretical Framework

Experiential learning is a foundational philosophy integrated into every aspect of agricultural education. It is espoused by most agricultural educators in the state of New York, throughout the United States of America, and around the world. It offers many practical applications that are utilized by agricultural educators, including laboratories, internships, work-study, etc. The most common experiential learning element incorporated into the curriculum for agricultural education at the secondary level in the United States is currently termed the "supervised agriculture experience" (SAE). The SAE consists of a set of practical activities of educational value conducted by students outside of class or laboratory for which teachers, parents, or employers provide supervised and systematic instruction and supervision. Most of the theoretical underpinnings for experiential learning articulated by agricultural educators are associated with the influence of John Dewey earlier in this century.

Agricultural educators have conducted considerable research on experiential learning through the SAE approach in a variety of different contexts. Dyer and Osborne examined publications in all the relevant literature on SAE-related research and found that "*SAE programs lacked definition, focus, and direction* (Dyer & Osborne, 1995)." Another study reported that teachers generally support SAE but find great difficulty in implementing the concept with students (Osborne, 1988).

It has been obvious, for at least that past 30 years, that a change in focus of agricultural education away from agricultural production to a wider array of interests has contributed to ambiguity and discrepancy, creating uncertainty about the purpose and make-up of the SAE (Miller, 1980) (Boone, Doerfert & Elliot, 1987) (Leising & Zilbert, 1983). As a result, participation in SAE has declined. Penrod reported that as few as 30%

of the students enrolled in agricultural education programs at the high school level in New York state had SAEs (Penrod, 1984). Other states report better involvement, with the highest indicating that over two-thirds of their agricultural students have an SAE program (Dyer & Osborne, 1995).

Many are suggesting that a new major effort is needed nation-wide to incorporate SAE principles into science-oriented and specialty areas of instruction. It is interesting to note that secondary teachers of agriculture still espouse their support of the concept of experiential learning but have a general difficulty utilizing these concepts in their instructional design (Berkey & Sutphin, 1983). There are even indicators that our current teachers think SAE's are even more important than in previous eras (Bobbitt, 1986). Foster found that the deterrents to SAE effectiveness were lack of facilities, low student desire, inadequate teacher time for supervision, student participation in other school activities, and various economic factors (Foster, 1986). Lambreth identified lack of agricultural background, inadequate resources, and large student-teacher ratios as additional inhibiting factors. He also indicated that agricultural teachers were dissatisfied with the assistance they were able to provide students with their experiential learning activities (Lambreth, 1986).

Agricultural educators are confronted with a dilemma. On the one hand, they continue to espouse a theory of learning that requires involvement in SAE. On the other hand, their students are practicing fewer and fewer SAEs. The various dimensions of this dilemma have been addressed by researchers in agricultural education, but with little visible impact.

Purposes/Objectives

With this dilemma in mind, a study was undertaken in 1996 to describe the current status and importance of SAE in New York state. These data provide a snapshot of the SAE status in New York state and show measurement of attitudes agricultural educators have toward various aspects related to SAE. Data were collected so that comparison could be made with results from a precedent study conducted by Berkey and Sutphin in 1983. The information collected in 1983 was intended by the researchers to "operationalize guidelines, implementation strategies and resource materials to improve" SAE in New York state (Berkey & Sutphin, 1983). Some reflection on changes evidenced in comparison of the two sets of data is warranted and discussed in the findings section. Since there have also been other dynamics that have influenced agricultural education in New York state over the past 13 years, they must also be considered, and some are mentioned where appropriate.

The objectives of the 1996 study were to:

1. Describe characteristics of New York state agricultural educators, especially related to the SAE portion of their educational programs.
2. Measure perceptions of New York state agricultural educators toward the benefits, current practices, and importance/support of selected factors related to SAE.
3. Compare and contrast the characteristics of agricultural educators in New York state and their SAE programs in 1996 with agricultural educators and their SAE programs in 1983.
4. Recommend follow-on research activities for SAE in New York state and suggest national implications.

Methods/Procedures

The design of the study was a descriptive survey in the form of a mail questionnaire. The population consisted of New York secondary school agricultural educators (N=222). The New York state agricultural educators directory was used as the source of names and addresses (Instructional Media Service, 1995). The list was validated and adjusted after examination by Cornell University faculty and staff. The total population was used for the study.

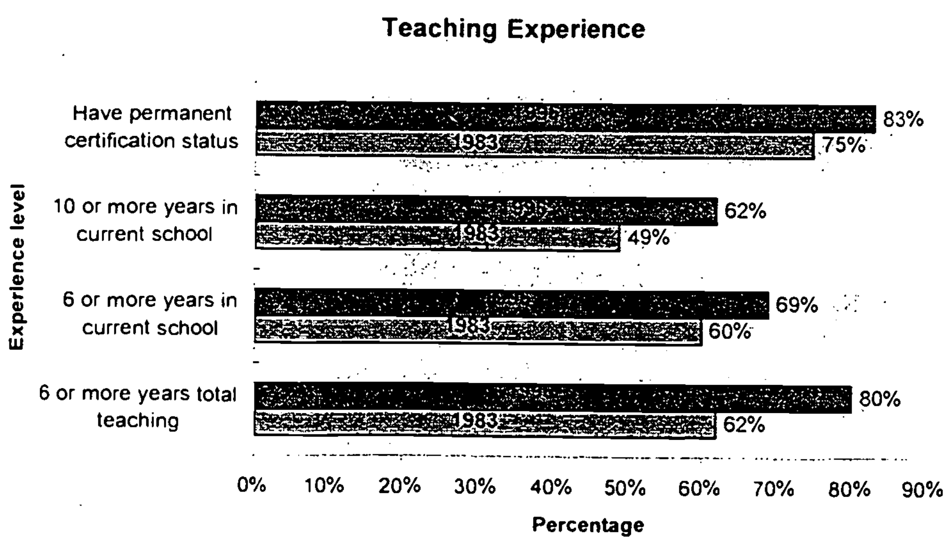
An instrument used in 1983 was adopted for this study (Berkey & Sutphin, 1983). Minor updates in format and language were the only changes made to allow for comparison of data collected in both 1983 and 1996. The questionnaire included items on (a) type of school; (b) teacher background in agricultural education, teaching experience, and certification status (c) type and scope of school laboratory facilities; (d) percentage of students in FFA; (e) type and scope of SAE; (f) teacher attitude toward the value of SAE; and (g) current practice and importance regarding SAE practice. There was one section added that was not part of Berkey and Sutphin's 1983 questionnaire. Penrod, in surveying the same population during 1982, had asked agricultural educators to indicate to what degree selected factors either inhibited or enhanced SAEs in their schools (Penrod, 1984). A set of 19 factors were included to allow for comparison with her 1982 data. Content validity of the instrument items had been determined and documented by previous researchers. (Penrod, 1984) (Berkey & Sutphin, 1983).

Questionnaire packets were mailed to the total population of New York agricultural educators (N=222). A follow-up reminder postcard was mailed to everyone after one week. Replacement questionnaire packets were sent to all non-respondents after four weeks (Dillman, 1978). There were 135 surveys returned for a usable response rate of 61%. An identical response had been received in 1983.

A telephone follow-up of 24 randomly-selected non-respondents indicated that they differed from respondents in one, two, or three ways: (1) they did not consider themselves teaching agriculture subject matter (e.g. taught only technology or mechanics); (2) they did not use SAE; or (3) they were located in the New York city area. These are the same three characteristics that Berkey and Sutphin used to describe their non-respondents in 1983. As was true in 1983, the findings, conclusions, and recommendations of the 1996 study must be interpreted in the context of non-respondent differences. Since individual response data from the 1983 study by Berkey and Sutphin were not available, only summary statistics from 1983 were used to compare with the 1996 replication.

Results from 1996 Survey and Comparisons with 1983 Survey

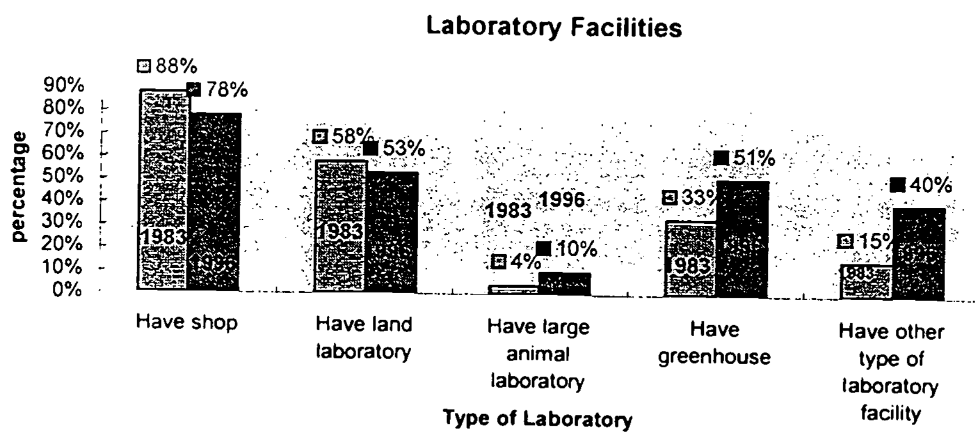
As a group, New York agricultural educators who responded in 1996 were more experienced and had stayed in their current teaching assignment for more years than respondents in 1983. A higher percentage had also achieved permanent certification in 1996.



A similar percentage of 1996 and 1983 respondents had been enrolled in an agricultural education program (44-47%), been an FFA member (44-46%), and completed an SAE project as part of their own high school experience (38%). The percentage of respondents who reported some formal college study of SAE was almost the same, in spite of the 13 year time span. A course, or some SAE instruction, was reported by 58% in 1983 and by 61% in 1996. Slightly more than one out of three respondents (36%), for both 1983 and 1996, indicated that they did not have any SAE coursework during their college preparation.

One out of five 1996 respondents did not have any FFA program in their current school. In 1983, it was reported by 17% of teachers that they did not have an FFA program. Only 34% of the 1996 respondents had 100% FFA membership, compared to 46% of 1983 teachers with 100% membership.

Teachers in 1996 reported a small decrease in percentage of shop and land laboratory facilities, about the same percentage of woodlots (33%), with a small increase in percentage of large animal laboratories compared to 1983. Greenhouses are used more extensively by teachers in the 90's. A variety of other laboratory facilities were mentioned by the 1996 respondents that were not itemized by respondents in 1983 -- including a veterinary clinic, fish tank, nature center, gardens on school grounds, harness track, creek, community resources of all types, flower shop, and fish hatchery.

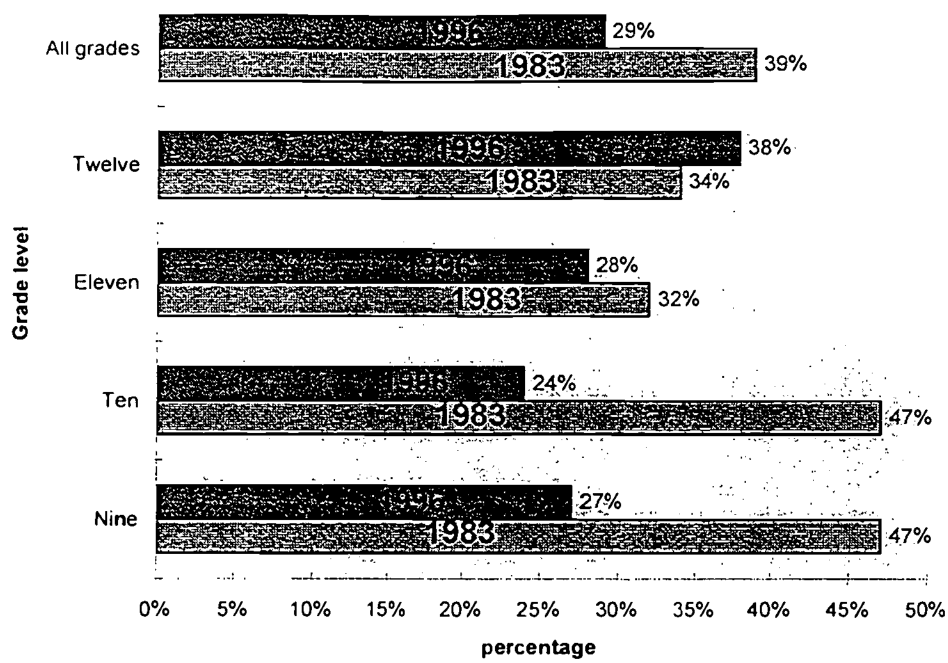


In 1983, the 202 teachers returning surveys reported having 7,620 students – making for an average of 38 students per respondent. In 1996, the 135 teachers returning surveys reported having 6,457 students – making for 48 students per respondent.

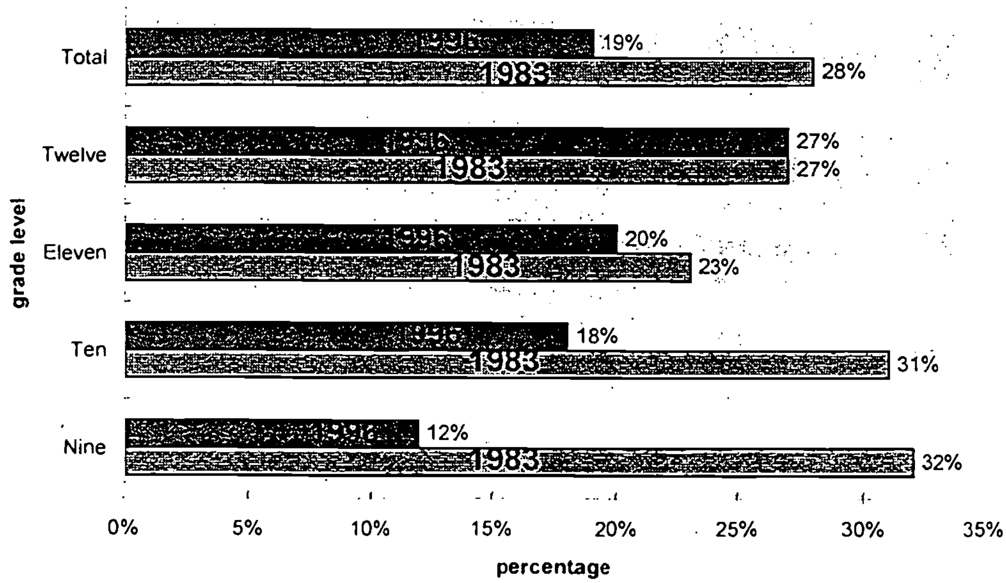
The reported distribution of students between classes also shifted. A slightly higher percentage of students enrolled in agriculture were in grade nine and ten classes (49% total in 1996 versus 44% total in 1983).

The percentage of students with SAE projects in grades nine and ten dropped considerably from 47% in 1983 to 27% for grade nine and 24% in grade ten in 1996. The percentage of students with SAE projects in grade eleven decreased by only 4% over the 13 year period, while the grade twelve students actually experienced an increase of 4% in SAE involvement. The total percentage of students reported to have SAE projects in 1983 was 39%. By 1996, only 29% of students were reported by respondents to have SAE projects, representing a 10% drop. A similar magnitude of change occurred in the percentages of students reported to have SAE projects of 300 hours or more.

Percentage of students with SAE by grade level



Percentage of students with 300 or more SAE hours by grade level



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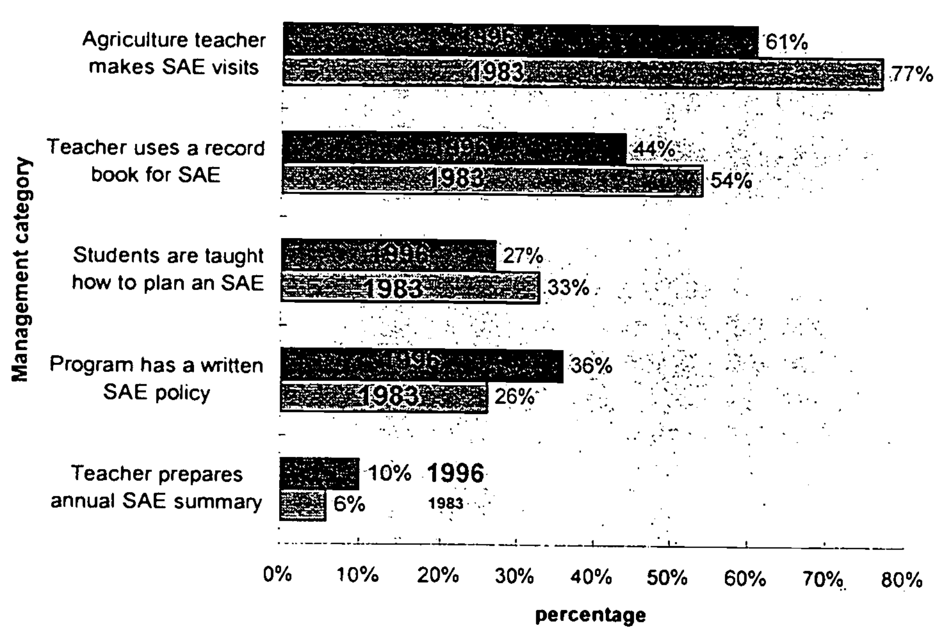
A slightly higher percentage of 1996 respondents prepare an annual summary of SAE (10%) and have a written SAE policy (36%) than in 1983 (6% and 26%). An instructional sequences on how to plan an SAE was taught by 27% of 1996 respondents and had been taught by 33% of 1983 respondents. Only 44% of 1996 respondents used a record book for SAE, compared to 54% in 1983. An examination of data on SAE visitation patterns reveals that 61% of agricultural educators were making SAE visits in 1996, whereas 77% reported making visits in 1983.

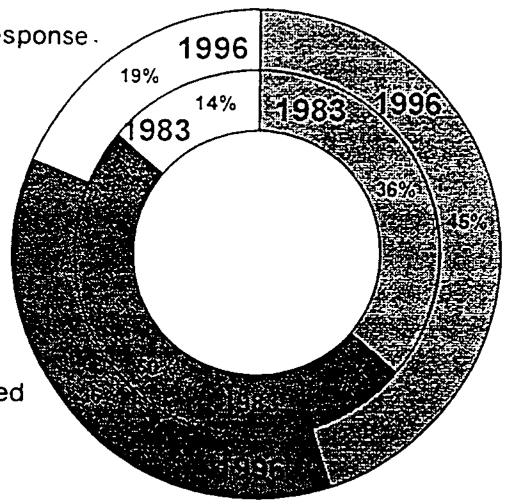
Characteristics of SAE program management



Summer program activities have been reduced, with summer employment reported by only 32% of respondents in 1996, a decrease of 10% from 1983. In 1996, only 8% reported being hired 21 days or more during the summer, compared to 18% in 1983. The percentage of respondents who conduct student SAE visits during the summer dropped also. Only 30% of 1996 respondents visit students once or more during the summer, compared to 43% of respondents making a least one visit in 1983. Over half of the 1996 respondents (51%) admitted making no summer visits at all. In 1983, only 30% reported no summer SAE visitation.

The 1996 respondents were more satisfied with their existing competence in SAE. Over one in three (36%) of the 1996 New York agricultural educators reported a medium or high need for additional competence in SAE. Half of the 1983 respondents had expressed medium or high needs. Almost half (45%) of the 1996 teachers expressed little or no need for additional competence in SAE, compared to 36% for the 1983 respondents.

Need for added competence in SAE



Three potential benefits of SAE were explained to respondents on the questionnaire: (1) SAE develops favorable attitudes, values, and habits; (2) SAE develops technical skills and knowledge; and (3) SAE benefits the agriculture program, school, and community. Respondents were asked to rate each of the three items on a five point likert-type scale (1=strongly disagree to 5=strongly agree). As in 1983, agricultural educators endorsed and demonstrated their solid agreement with the stated benefits of SAE projects. All three mean scores were in the 4.2 to 4.5 range for both the 1983 and 1996 sets of data.

Espoused philosophy of SAE

It is evident from the findings that New York teachers continue to believe in the fundamental and philosophical principles of SAE. Teachers overwhelmingly endorsed statements listing benefits of the SAE, including technical skill development, change in student attitude, and linkage with the broader community. There was even an increase in the percentage of 1996 respondents who have written SAE policy statements and prepare annual SAE summaries.

Overall, this study provided few, if any, indications of decline in teacher attitudes or beliefs about the importance of SAE and its place in the agricultural education curriculum. In fact, the finding that almost half of the 1996 respondents were satisfied with their current competence in SAE, hints that they might even have a higher level of confidence in current understanding about SAE than respondents did in 1983. It seems that a belief in the role and importance of the SAE paradigm has survived even during a period of decline in SAE participation.

Actual Practice of SAE

Participation in SAE is clearly in decline among respondents. The percentage of agriculture enrollees with SAE was at an already low level of 39% in 1983, and slipped 10% lower by 1996. Fewer teachers are helping students select, plan, and keep the records necessary for successful SAEs. A gap between the belief that New York agricultural educators have in SAE and their actual practice was evident in 1983, but appears even more pronounced in 1996.

Less than one student in five (19%) was reported to have 300 or more hours of SAE. This small group of agriculture students appears to be the main beneficiaries of SAE in New York state and are probably well-served by the traditional SAE philosophy. It is the other four students who are not being sufficiently served by SAE that raise the most concern.

Respondents offered a plethora of factors that inhibit their activities in support of SAE in their written comments on the questionnaires. Perhaps most damaging is that summer contracts have too often been reduced or eliminated, leading to a reduction in the number of summer SAE visits by teachers.

Laboratory facilities have undergone transformation, apparently to meet needs of students in a more diversified agriculture. Teachers traditionally use laboratories to help students acquire knowledge and to practice skills necessary for success in their out-of school SAEs. Respondents in 1996 commented on how an increasing percentage of their students are only able to conduct SAE if they are provided with school-managed laboratory facilities. Respondents also commented that more of these newer facilities (fish tanks, nature centers, etc.) must be made available to supplement traditional agricultural mechanics shops and production land laboratories. New York schools have not been able to provide the necessary financial resources for this type of laboratory expansion.

Other inhibitors, which have already been documented in the literature about SAE, were repeated by the 1996 respondents (Foster, 1986). Inhibitors of SAE include lack of time for supervisory visits, limited financial support by the school, limited wages for students, and poor community awareness of SAE -- each contributing to the decline in actual practice of SAE in New York state.

Implications

The reader should note that the findings of this study do not describe SAE status and trends in other states, or attempt any broader generalization of findings. It is certainly true that New York and the northeastern portion of the United States have experienced rapid transitions away from agriculture, shifting to more industrialization and urbanization. There have also been recent structural reforms in New York schools that appear to be working against the purposes of agricultural education. However, agricultural education is still very much alive and important in New York state. Agriculture has long been, and continues to be, the number one industry in the state of New York. Farms in New York state produce well over $2.6 Billion worth of commodities annually, and the property value of all farms in New York approaches $10 Billion. Clearly, agriculture has far reaching effects upon all citizens in the state of New York. These effects are especially true in the rural areas of New York. Of the 725 public schools in New York, nearly 75% are classified as rural.

Generation of parallel data about SAE in other states for comparative analysis would be very useful. Other states are probably experiencing pressures on SAE similar to New York, but some may be slower to see same magnitude of measurable negative impact. This study should signal a warning to agricultural educators across the country, provoking them to candidly examine what is happening to SAE in their own area. There is a pressing need for them to strategically create the type of proactive change that is desirable for a sustainable future in agricultural education.

It should also be noted that agricultural educators in New York have been anything but passive observers of the decline in SAE. They have consistently provided state, regional, and national leadership in attempted revitalization and reform of the SAE (Berkey & Sutphin, 1985). The decline in SAE has occurred despite these efforts.

Conclusion

What new direction has agricultural education turned? It is certainly bad news that, in New York state, the number of agricultural educators has been reduced by approximately one-third over a 13 year period. The good news may be that the surviving teachers and schools are among the more capable and strong, forming a solid foundation of expertise for a potential reform movement. A large number of the current group of New York agricultural educators have been permanently certified with considerable experience in teaching, many with long tenure at one school. These individuals have the potential to either use their experience to lead the revitalization of agricultural education or hang on to the existing situation until retirement.

Without a doubt, agricultural educators in New York state are confronted with a dilemma of various and serious dimensions. On the one hand, they continue to espouse a theory of learning that emphasizes SAE. On the other hand, evidence from this study adds to findings from earlier studies that they are actually employing fewer and fewer experiential learning techniques of SAE in practice. While they may be doing a great job in the classroom and with students in FFA leadership activities, a high percentage of agricultural educators in New York state are not "walking the talk" about SAE.

There are certainly no easy solutions to the problem of decline in quantity and quality of SAEs. Agricultural educators have been wrestling with this problem and experimenting with changes for decades. Perhaps, in light of this ongoing lack of success, it is time to consider an overhaul, or at least to attempt more lateral thinking about the concept of SAE. As a start, agricultural educators might be well-served to inquire into various aspects of the broader conceptualization about experiential learning, agriculture systems, or action research as a way of expressing SAE-type activity (Argyris, 1993) (Argyris, Putman & McLain Smith, 1985) (Bawden, 1992) (Bawden, 1995) (Brookfield, 1995) (Checkland & Scholes, 1990) (Jarvis, 1992) (Kolb, 1984) (Röling, 1995) (Schon, 1987).

If a this survey is replicated in another 13 years, about the year 2009, what changes in agricultural education and SAE will be revealed? It is possible that creation of an improved paradigm of espoused and practiced SAE may be necessary to insure survival of agriculture education in New York state and elsewhere.

The next phase of this SAE research initiative will use elements of reflective practice, systemic development, and experiential learning to work on describing behavior and changing the thinking that creates and sustains discrepancies between theory and practice of SAE. The research will be conducted using an action science approach in collaboration with selected agricultural educators and their colleagues in New York and other nearby states.

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AN UPDATE ON THE ESPOUSAL AND PRACTICE OF SUPERVISED AGRICULTURAL EXPERIENCE (SAE) IN NEW YORK STATE

Discussant Remarks

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One of the major components of a quality agricultural education program is Supervised Agricultural Experience Programs (SAE) of the students. SAEs are based on a solid foundational philosophy of experiential learning which also includes laboratories, internships and work - study. The researcher is to be commended for studying a very relevant and integral part of our agricultural education program.

The purpose of the research was to describe the current status and importance of SAEs in New York state. The four objectives of the study were clearly stated.

The design of the study was a descriptive survey in the form of a mail questionnaire. Appropriate methods and procedures were used which included content validity of the instrument; follow up remainder post cards and even replacement questionnaire packets to increase response rate; and a telephone follow - up of 24 randomly selected non - respondents to compare how their data differed from the respondents data. The author is to be plaudit for an excellent and honest assessment of SAEs in New York. Other states can learn much from this research. I have nothing but praise for the reporting of the findings, implications and conclusions.

A few comments from the research will follow which I believe agricultural educators in states other than New York need to know: (1) There is a significant decline in SAE participation. (2) Perhaps, in light of the lack of success of SAE, it is time to consider an overhaul. As a start, agricultural educators might be well - served to inquire into various aspects of the broader conceptualization about experiential learning, agriculture systems, or action research as a way of expressing SAE - type activity. (3) To know is not to do: New York teachers continue to believe in the fundamental and philosophical principles of SAE. However, a high percentage of agricultural educators in New York state are not "walking the talk" about SAE. (4) Which came first? The chicken or the egg: Did the reduction of summer contracts come because teachers were not making summer SAE visits, or did the reduction of summer contracts lead to the reduced number of SAE visits? (5) Only 29% of the teachers are helping students select, plan and keep the necessary records for successful SAEs. (6) Laboratory facilities have undergone and will need to further undergo transformation to meet the needs of present day students. Examples: veterinary clinic, fish tanks, nature center, gardens on school grounds, horse tracks, creek, flower shop, fish hatchery, etc.

ATTITUDES OF ILLINOIS AGRISCIENCE STUDENTS AND THEIR PARENTS TOWARD AGRICULTURE AND AGRICULTURAL EDUCATION PROGRAMS*

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Introduction

Enrollments in colleges of agriculture have experienced steady growth in many states in the past five years. At the University of Illinois enrollment in agricultural curricula in the College of Agriculture plummeted to 1,174 students in 1989. This represented a drop of 642 students (35%) from the peak enrollment in 1977 of 1,816 students. Enrollments have gradually increased since 1989 to 1,473 students in 1995 (Office of Academic Programs, 1995). Decreasing enrollments in university agriculture programs across the country during the late 1970s and 1980s coincided with a more severe decline in high school agriculture enrollments. As a result, some colleges of agriculture successfully directed their recruiting efforts more toward suburban and urban students with little or no agricultural background in an attempt to reverse the trend of declining enrollments. Russell noted that for the three-year period 1983-85, 46.3% of incoming College of Agriculture freshmen at the University of Illinois had completed one or more high school agriculture courses. This percentage declined to an average of 32.3% during 1986-88. In 1995 only 15% of University of Illinois College of Agriculture freshmen reported completing one or more high school agriculture courses (Office of Academic Programs, 1995).

These data suggest that secondary agriculture programs have become a much less important feeder program for the University of Illinois College of Agriculture.

However, high school agriculture curriculum development and redesign efforts in the state in the 1990s have led to major changes in course offerings and student enrollments. Due in part to the introduction of a series of four, one-semester Science Applications in Agriculture courses (BSAA and PSAA), secondary agriculture enrollments in Illinois have increased by over 5,000 students (more than a 40% increase) since 1990 (FCAE/ISBE, 1995). In addition, agriculture teachers have reported that these courses have attracted a greater percentage of the higher-achieving students in their schools. If these new agriscience courses attract a larger number of higher-achieving students, then high school agriculture programs in Illinois could become a more significant contributor of students to agriculture programs at the university level. These students should be more highly sought by colleges of agriculture because (1) they have agricultural backgrounds that enhance effective and efficient instruction at the university level and (2) once enrolled, they are more likely to complete a degree in agriculture than students without high school agriculture course work (Dyer, Lacey, and Osborne; 1995).

The fundamental theoretical basis for this study lay in the work of Fishbein and Ajzen (1975). As adapted to this research, this theory suggests that student and parents' personal experiences, observations, knowledge, and values about agriculture affect their attitudes about agriculture, which in turn, affect their beliefs, intentions, and decisions to participate. Thus, knowledge of students' attitudes toward agriculture and educational programs in agriculture will, theoretically, provide an indication of their interests in pursuing agriculture as a field of study and professional pursuit. In addition, students' career choices are influenced by significant others, especially parents (Scofield, 1995; Thompson & Russell, 1993). Thus, student and

*Illinois Agricultural Experiment Project No. 04-306

parent experiences with the new agriscience courses have the potential to influence their attitudes toward agriculture and subsequent career decisions.

Purpose and Objectives

The purpose of this study was to describe the attitudes of Illinois secondary agriscience students and their parents toward the agricultural industry and educational programs in agriculture. The following research questions were addressed:

1. What were the attitudes of students enrolled in the Biological Science Applications in Agriculture (BSAA) course and their parents toward agriculture as a career field and agricultural technologies?
2. What were the attitudes of Illinois BSAA students and their parents toward secondary agriculture programs?
3. What were BSAA students and their parents' perceptions of secondary science and agriculture program quality?
4. What was the influence of selected demographic variables on the attitudes and perceptions of BSAA students and their parents?

Procedures

A descriptive survey research design was used in the study. The target populations included (1) high school students in Illinois enrolled in the Biological Science Applications in Agriculture (BSAA) course during 1995 spring semester and (2) parents of these BSAA students. The student population was estimated to be 1140 students, assuming that the 76 schools offering the BSAA course had an average enrollment of 15 students per BSAA class. Each of the five FCAE District Field Advisors provided a list of schools offering the BSAA course during the 1994-95 school year. The parent population was assumed to equal the student population, in that data were to be obtained from one parent of each student in the sample. Using the formula suggested by Krejcie and Morgan (1970), a sample size 285 students was needed, based upon a 5% degree of accuracy and a 95% confidence level. A cluster sampling technique was used to randomly select BSAA students from the 76 schools offering the BSAA course. Twenty schools were randomly selected to participate in the study in order to achieve the desired sample size of 285 (20 BSAA classes with an average enrollment of 15 students). Schools offering the BSAA course were numbered from 1 to 76, and the 20 schools were selected using the random number generator in Microsoft Excel.

A postcard was mailed in March 1995 to the agriculture teacher at each of the 20 selected schools, requesting his/her participation in the study. Three of the 20 teachers declined to participate because the course was not offered that semester. The 17 participating teachers reported a total enrollment of 384 students, or 22.6 students per class.

The mailed questionnaire was adapted from one developed by the researchers and used in previous studies on guidance counselor, science teacher, and college freshmen attitudes toward agriculture. The questionnaire consisted of five parts, including a section on demographics. Cronbach's alpha estimates of internal consistency (reliability) for the study ranged from .63 to .82 for the student instrument and from .60 to .89 for the parent instrument on the following constructs: agriculture as a career field, agricultural technologies, high school agriculture programs, agriculture program quality, and science program quality. While the reliability estimates for two constructs (attitudes toward agricultural technologies and high school agriculture programs) were lower than desirable (.60 to .65), the researchers were reluctant to modify the questions comprising this construct, since reliability estimates of higher than .80 were found on these contructs in an earlier study with guidance counselors (Dyer & Osborne, 1994). Five-point, Likert-type scales were used to measure student and parent attitudes and perceptions. The 17 teachers who agreed to participate in the study were mailed copies of the student and parent questionnaires for distribution to students in their BSAA classes. Students were asked to give the questionnaire to one of their parents to complete and return the completed survey to their agriculture teacher. After two follow-up mailings, 15 of the 17 teachers returned data for BSAA students and their parents. No further follow-up of nonrespondents was conducted. Therefore, generalization of the results of the study beyond the data sample should be done with caution.

A total of 293 (76.3% response rate) student questionnaires were returned, of which 275 were usable. All of the 166 parent questionnaires (43.2% response rate) were usable. Measures of central tendency and association, as well as analysis of variance were used to summarize and analyze the data. Post hoc group comparisons were made using the Scheffe test with a .05 alpha level.

Results

Approximately two-thirds (63.3%) of the participating students were male, and about two-thirds (60.8%) of the responding parents were female. The percentage of students by class was 25 to 30% each for sophomore through senior standing and 13.5% for freshmen. Of the 24.9% of the students who planned to continue working/studying in agriculture, 7.3% indicated that they planned to take a job in agriculture after high school graduation, 5.9% planned to study agriculture at a community college, and 11.7% planned to pursue a four-year degree in agriculture. Another 24.5% were uncertain as to their plans after high school. Students ranked the following as most influential in their career plans: 1st - high school agriculture teacher, 2nd - parents/guardian, 3rd - other teachers, 4th - brother/sister, and 5th - high school counselor. Friends, other relatives, and employers were also cited as having influenced students' career plans. Students most liked the BSAA course because it was fun/interesting (63.3%) and it helped them to learn more about agriculture (10.5%). The only dislike cited by a substantial portion of students (34.9%) was the homework, reading, and tests required in the BSAA course.

While 30.1% of the parents had taken a high school agriculture course, only 13.3% had completed a college agriculture course and 4.8% majored in agriculture in college. About half (52.2%) of the parents reported having paid work experience in agriculture. The largest percentage of parents worked in sales and service occupations (26.5%). Other occupations reported included farmer (8.4%), teacher (7.8%), homemaker (10.2%), finance (12.0%), construction/manufacturing (11.4%), medical (5.4%), public service (4.8%), and truck driver (13.3%). Over half (59%) of the parents reported that they were familiar with the SAA courses. Data on respondents' familiarity with the agricultural industry and perceived quality of the SAA courses are shown in Tables 1 and 2. As these data indicate, a large majority of both groups felt that they were familiar with the agricultural industry and rated the quality of the SAA courses as good to excellent.

Table 1.
Frequency and Percentage of BSAA Students and Parents By Familiarity With the Agricultural Industry

	Students		Parents	
	f	%	f	%
Very Familiar	97	35.7	49	30.6
Somewhat Familiar	147	54.0	82	51.3
Not Familiar	28	10.3	28	17.5

Table 2.
Frequency and Percentage of BSAA Students and Parents By Perceptions of the Quality of SAA Courses

	Students		Parents	
	f	%	f	%
Excellent	105	38.4	18	18.8
Good	139	50.9	71	74.0
Fair	16	5.8	6	6.3
Poor	8	3.0	1	1.0

Students and parents were asked to report the size of the community in which they grew up (parents) and lived at the time of the study. Approximately 50% of the parents reported that they grew up in a rural setting, and over 75% of the students and parents indicated that they now live in a rural setting, with about 50% of each group living on a farm or in a rural area (not in town) (see Table 3).

Table 3.
Frequency and Percentage of BSAA Students and Parents By Community in Which They Grew Up and Now Live

Community Type	Grew Up - Parents		Now Live			
			Parents		Students	
	f	%	f	%	f	%
Large urban (over 100,000)	17	10.4	2	1.2	1	.4
Medium urban (25,000 - 100,000)	17	10.4	1	.6	4	1.5
Small urban (2,500 - 24,999)	32	19.5	35	21.5	55	20.3
Rural town (< 2,500)	25	15.2	43	26.4	65	24.0
Rural area, but not on a farm	22	13.4	46	28.2	86	31.7
On a farm	51	31.1	36	22.1	60	22.1

Both the BSAA students and their parents reported positive attitudes toward agriculture as a career field and toward agricultural technologies. However, they were uncertain about their attitudes toward educational programs in agriculture. In addition, both groups rated the quality of their high school agriculture and science programs as high (see Table 4).

Table 4.
Summated Means and Standard Deviations of BSAA Student and Parent Perceptions by Construct

Construct	No. of Items	Students*	Range**	Parents	Range
Ag as a Career Field	10	40.11 (5.12)	Agree	39.27 (4.73)	Agree
Ag Technologies	9	34.44 (4.14)	Agree	34.02 (3.74)	Agree
H.S. Ag Programs	18	60.99 (8.53)	Uncertain	60.80 (8.84)	Uncertain
Ag Program Quality	8	29.62 (4.86)	High	30.25 (4.82)	High
Science Program Quality	8	28.51 (4.71)	High	28.47 (4.51)	High

* standard deviation shown in parentheses
** 1 = strongly disagree or very low and 5 = strongly agree or very high

Students agreed ($\underline{M}$ = 3.50 - 4.49) with all 10 items comprising the construct "Agriculture as a Career Field." The highest rated items were (1) agriculture is one of Illinois' most important industries, (2) there are numerous opportunities for employment in agriculture, (3) agriculture is a scientific area of study, and (4) the field of agriculture incorporates many applications of scientific principles. Parents agreed with all items in this construct except "I have encouraged my son/daughter to pursue a vocation or professional pursuit in agriculture" ($\underline{M}$ = 3.30). Parents' highest ratings were for the following statements: (1) agriculture is one of Illinois' most important industries, (2) agriculture as a field is a blend of scientific principles and agricultural practices, and (3) agriculture is a scientific field of study.

With regard to the nine items comprising the Agricultural Technologies construct, both students and parents agreed with all statements except "agriculture has greatly contributed to the deterioration of the environment." Students and parents were uncertain about their attitudes on this item. Highest rated items were (1) agricultural technologies have a positive impact on the U.S. standard of living, (2) agriculture should do more to publicize its scientific contributions to society, (3) sustainable agricultural practices can help protect the environment and our natural resources, and (4) science-based technologies in agriculture can help resolve environmental concerns.

For their agriculture program, students and parents rated the competency of the teacher, ability of students, value and reputation of the program, quality of instruction, and overall program quality as high. By contrast, ratings of their science programs were slightly lower on some items, including competency of teachers, academic ability of students, and reputation of the science program among students. Students and parents rated their science programs as average in these areas and high in the remaining areas (see Table 5).

Table 5.
Means and Standard Deviations of Agriculture and Science Program Quality Rating By BSAA Students and Parents

	Agriculture Program Quality				Science Program Quality			
	Students		Parents		Students		Parents	
	M	SD	M	SD	M	SD	M	SD
Competency & preparation of teachers	3.77	.88	3.79	.82	3.57	.90	3.44	.82
Academic ability of students	3.52	.83	3.63	.75	3.40	.83	3.39	.80
Value of the program to students who plan to work upon graduation	3.72	.91	3.75	.81	3.54	.90	3.56	.82
Value of the program to students who attend college	3.75	.96	3.83	84	3.69	.91	3.82	.76
Quality of instruction	3.79	.90	3.73	85	3.66	.88	3.57	.80
Reputation of the program among faculty and administration	3.61	.95	3.73	.91	3.51	.83	3.61	.85
Reputation of the program among students	3.51	.96	3.64	.85	3.38	.92	3.44	.77
Overall quality of the program	3.93	.97	3.96	.79	3.72	.94	3.61	.77

Student and parent responses were very similar on the 18 items pertaining to attitudes toward high school agriculture programs. Both groups disagreed that high school agriculture courses are better suited for male students. Students expressed uncertainty about whether agriculture courses are too vocational, rigor of courses, effectiveness of agriculture courses with students of differing ability levels, the need for high school agriculture courses to become more science based, and the preparation of agriculture teachers in science. However, they felt that the BSAA course makes scientific principles more meaningful, represents a good approach to learning science, and should receive lab science credit. They agreed that high school agriculture courses should prepare students for college and employment after high school. They also agreed that most high school students should take some course work in agriculture, college-bound students should be encouraged to enroll in agriculture courses, stronger ties should be made between high school science and agriculture curricula, and science applications in agriculture are best taught by agriculture teachers.

Parents agreed ($\underline{M}$ = 3.50 - 4.49) with 9 of the 18 statements regarding high school agriculture programs, with the highest mean score for the item "high school agriculture courses should prepare students for college study in agriculture" ($\underline{M}$ = 3.92). Other statements with which they agreed included: most high school students should take agriculture course work, stronger ties should be made between agriculture and science curricula, science applications are best taught by agriculture teachers, courses like BSAA make scientific principles more meaningful and are appropriate for lab science credit, lab instruction in agriculture should be more science based, and basic study in science, followed by applications of science in agriculture, is a good approach for learning science. Parents were uncertain (M = 2.50 - 3.49) about agriculture teachers' preparation in science, whether agriculture curricula should become more science based, the rigor of agriculture courses and their appropriateness for students with differing achievement levels, whether agriculture courses are too vocationally oriented, if agriculture courses should be primarily offered in rural communities, and whether college-bound students should be encouraged to enroll in high school agriculture courses.

Correlational analysis showed that students' attitudes toward agriculture as a career field ($r = .31$), agricultural technologies ($r = .30$), and their high school agriculture program ($r = .54$) tended to be more positive if they rated the quality of the BSAA course higher ($p < .05$). Analysis of variance results showed that student attitudes toward agriculture as a career field, agricultural technologies, and their agriculture program were significantly greater if they were more familiar with the agricultural industry. In addition, females and upperclassmen were found to have significantly more positive attitudes toward agriculture as a career field than males and underclassmen (see Table 6). No significant differences were found between student year in school, gender, and size of community in which they now live and attitudes toward their agriculture program and agricultural technologies.

Table 6.
Summary Data and Analysis of Variance for Student Attitudes by Antecedent Variable

Variable	n	M	SD	SE
Familiarity with Ag Industry by Ag Program Quality Perceptions				
Very familiar	95	30.86[A]	4.81	.49
Somewhat familiar	143	29.49[B]	4.80	.38
Not familiar	27	25.96[AB]	5.13	99
(F = 11.65, p<.001)				
Familiarity w/ Ag Industry by Career Field Attitudes				
Very familiar	95	42.20[A]	4.90	.50
Somewhat familiar	145	39.44[AB]	4.37	.36
Not familiar	28	36.36[AB]	6.56	1.24
(F = 18.77, p<.001)				
Familiarity w/ Ag Industry by Ag Technologies Attitudes				
Very familiar	94	35.30[A]	4.14	.43
Somewhat familiar	146	34.20	3.98	.33
Not familiar	27	32.41[A]	4.03	.78
(F = 5.77, p<.01)				
Gender by Attitudes Toward Ag as Career Field				
Male	169	39.49[A]	5.22	.40
Female	97	41.22[A]	4.86	.50
(F = 7.08, p<.01)				
Class by Attitudes Toward Ag as a Career Field				
Freshman	36	37.89[AB]	4.67	.78
Sophomore	84	39.46	5.20	.57
Junior	68	41.09[A]	5.00	61
Senior	79	40.97[B]	5.07	.57
(F = 4.14, p<.01)				

Note: Means with the same letter superscript within categories are significantly different.

Parents who lived on a farm, reported having paid work experience in agriculture, were familiar with the agricultural industry, and completed high school agriculture course work reported more positive attitudes toward agriculture as a career field. Furthermore, parents familiar with the BSAA course rated the quality of their agriculture program significantly higher (see Table 7). No significant differences were found between gender or other antecedent variables and parent attitudes and perceptions.

Table 7.
Summary Data and Analysis of Variance by Parent Attitudes by Antecedent Variable

Variable	n	M	SD	SE
Fam. w/ SAA Courses by Ag Program Perceptions				
Very familiar	6	32.67	6.50	2.65
Somewhat familiar	69	31.07[A]	4.87	.59
Not familiar	50	28.80[A]	4.21	.60
(F = 4.17, p<.05)				
Paid Ag Experience by Ag Program Perceptions				
Yes	72	31.48[A]	4.93	.58
No	51	29.02[A]	4.39	.62
(F = 6.26, p<.05)				
Familiarity w/ Ag by Ag Program Perceptions				
Very familiar	47	42.15[A]	3.87	.57
Somewhat familiar	80	38.94[AB]	4.39	.49
Not familiar	27	35.74[AB]	4.34	.84
(F = 20.48, p<.001)				
Familiarity w/ SAA by Ag as Career Field Attitudes				
Very familiar	7	38.71	5.71	2.16
Somewhat familiar	89	40.36[A]	4.57	.49
Not familiar	65	37.83[A]	4.52	.56
(F = 5.74, p<..01)				
H.S. Ag Course Work by Career Field Attitudes				
Yes	47	40.45[A]	4.17	.61
No	107	38.72[A]	4.91	.47
(F = 4.42, p<.05)				
Paid Ag Experience by Ag as Career Field Attitudes				
Yes	82	40.44[A]	4.70	.52
No	74	38.01[A]	4.39	.51
(F = 10.43, p<.01)				
Community Where Now Live by Career Field Attitudes				
Large urban	2	39.00	5.66	4.00
Medium urban	1	27.00	0.00	0.00

Table 7.
Summary Data and Analysis of Variance by Parent Attitudes by Antecedent Variable

Variable	n	M	SD	SE
Small Urban	34	38.50	4.69	.80
Rural town	42	38.07[A]	4.62	.71
Rural area	43	39.26	3.81	.58
On a farm	36	41.92[A]	4.66	.78

Note: Means with the same letter superscript within categories are significantly different.

Conclusions and Recommendations

Students enrolled in the BSAA courses and their parents hold positive attitudes toward agricultural technologies and agriculture as a career field. Both groups believe agriculture is a scientific field with numerous career opportunities. (Note that over one-half of the parents in the data sample were female.) A significant percentage of BSAA students plans to pursue an agricultural career. However, parents are uncertain as to whether they encourage their son/daughter to pursue a career in agriculture. This conclusion parallels one drawn in a previous study with Illinois high school science teachers. These teachers also hold positive attitudes toward the agricultural industry but are unsure if they encourage their students to pursue an agricultural career. Further research is needed to determine the basis for these discrepant attitudes. Agricultural educators should increase their efforts to inform parents and other educators about the many, attractive career opportunities in agriculture.

A significant number of female students who have career interests in agriculture are enrolled in the BSAA course. Further research needs to be conducted to determine if the course is attracting these students or if the course is actually developing these interests in agriculture. Females enrolled in the BSAA course and upperclassmen (juniors and seniors) have more positive attitudes toward agriculture as a career field than do males and freshmen. Further research is needed to clarify the influential factors in these attitudinal differences.

BSAA students and their parents agree that the quality of the current agriculture program is high, even somewhat higher that the science program, although they believe both programs are of high quality. BSAA students and their parents hold very positive views of the BSAA course, in terms of quality and fit (as a lab-based science applications course) within the school's science curriculum. Many parents are familiar with the SAA courses, and those parents regard the current agriculture program to be of higher quality. In addition, students who perceive the BSAA course to be of higher quality have more positive attitudes toward agriculture as a career field and agricultural technologies, as well as more positive views of their agriculture program. Agricultural educators should continue to implement the SAA courses in local agriculture programs to further build on their potential to positively influence career decisions and strengthen local programs.

BSAA students and their parents are uncertain about several key dimensions of high school agriculture programs, in general. These include rigor, vocational emphasis, need for more of a science basis, preparation of the agriculture teacher in science, and other areas. Given the curricular transformations that have taken place in Illinois high school agriculture programs during the past five years, agricultural educators need to clearly and continually communicate these changes and their benefits to local citizens, educators, the business community, and other groups. Some clarification of new directions may also need to be done within the profession. In addition, teacher educators and state staff must continue to provide inservice and preservice courses and programs that boost the expertise and confidence of agriculture teachers in science.

BSAA students and their parents feel that agriculture can help protect the environment and resolve environmental concerns, yet they are uncertain as to whether agriculture has contributed to environmental deterioration. Given their positive attitudes toward agriculture and agricultural technologies, a good opportunity may exist to incorporate more environmental science as it relates to agriculture in the high school agricultural curriculum.

Most BSAA students and their parents feel that they are familiar with the agricultural industry. Most also live in a rural setting. Students who are familiar with the agricultural industry have more positive attitudes toward agriculture as a career field and agricultural technologies. They also believe their agriculture program is of higher quality. Parents of BSAA students are informed about agriculture through personal experiences and their current occupation. Those parents who have paid agricultural work experience, are familiar with the agricultural industry, and completed high school agriculture course work have more positive attitudes toward agriculture as a career field. Parents who live on a farm also hold more positive attitudes toward agriculture as a career field than those who live in a rural town. Agriculture teachers should work with university faculty and the agricultural industry to develop informational programs aimed at further increasing students and parents' familiarity with the agricultural industry.

The people who exert the most influence on BSAA students' career plans include the agriculture teacher, parents, other teachers, siblings, and guidance counselors. Educators and agricultural industry representatives should continually direct informational programs toward these groups in an attempt to strengthen their attitudes toward agriculture. This may enhance efforts to recruit students into the agricultural industry and postsecondary educational programs in agriculture.

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ATTITUDES OF ILLINOIS AGRISCIENCE STUDENTS AND THEIR PARENTS TOWARD AGRICULTURE AND AGRICULTURAL EDUCATION PROGRAMS

Cliff Ricketts, Middle Tennessee State University - Discussant

The authors provided an excellent introduction providing a background for the problem. A theoretical basis for the study suggest that "students and parents' personal experiences, observations, knowledge, and values about agriculture affect their attitudes about agriculture." The purpose of the study was clearly stated. The objectives of the study were stated as four research questions.

A descriptive survey research design was used in the study. The methodology and instrumentation used would provide an excellent example for any research class. Procedures included: sample size consideration, definition of target population, cluster sampling to randomly select, Cronbach's alpha estimates of reliability, two follow - up questionnaires, measures of central tendency and association, analysis of variance, and post hoc group comparisons using the Scheffe test. The only reason for possible concern is the low 43.2% response rating the parent questionnaire.

The findings were clear and concise and answered the research questions. One disturbing finding was that it appeared that parents felt positive about the opportunities in agriculture for other children but not their own children. For examples, parents did not agree with this statement, "I have encouraged my son/daughter to pursue a vocation or professional pursuit in agriculture."

An unwritten conclusion was that education and communication is the key ingredient in affecting the attitudes of Illinois agriscience students and their parents toward agriculture and agricultural education programs. A few excerpts lifted for the conclusions and recommendations substantiate this observation: (1) Agricultural educators should increase their efforts to inform parents and other educators about the many, attractive career opportunities in agriculture. (2) Agricultural educators need to clearly and continually communicate changes and their benefits to local citizens, educators, the business community, and other groups. (3) Agriculture teachers should work with university faculty and the agricultural industry to develop informational programs aimed at further increasing students and parents' familiarity with the agricultural industry. (4) Educators and agricultural industry representatives should continually direct informational programs in an attempt to strengthen attitudes toward agriculture.

If the above things are done, then, according to the research, there will be positive attitudes about agricultural education. In conclusion, to know me (agricultural education programs) is to love me.

FLORIDA AGRICULTURAL ENHANCEMENT CENTERS: MINORITY ENROLLMENT, RECRUITMENT, RETENTION AND STUDENT PERCEPTIONS, ENROLLMENT ISSUES, AND BARRIERS

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Introduction and Theoretical Framework

In 1991, The Florida Department of Education selected 12 secondary and post-secondary sites to be developed as enhancement centers for agricultural education. The secondary sites had existing agricultural education programs in Agribusiness and Natural Resources (ABNR programs). These enhancement centers were intended to serve as model programs for agricultural education in the state of Florida. The enhancement centers were designed to be springboards for agricultural education innovations in curriculum, instruction, and program implementation.

A group of educators representing the Florida Department of Education visited the Enrichment centers in 1994 and reported that minority participation in the ABNR programs was unacceptably low. If their perceptions were accurate, low minority participation in Florida's Centers of Agricultural Emphasis is a concern that needs to be addressed and rectified.

The lack of interest in agricultural professions by minority students is evidenced on a national scale through minority enrollment in post-secondary agriculture pursuits. According to enrollment data furnished in the Fall Enrollment in Agriculture and Natural Resources (FAEIS, 1996) less than 8% of the students enrolled in undergraduate agriculture programs are minorities while overall minority enrollment in US colleges and universities is nearly 17%.

One explanation for this phenomenon centers on the environment for potential minority students. Since the concentration of the minority population in the United States lies within urban boundaries, (Green, 1989) limited exposure to agriculture and a narrow understanding of agricultural professions could contribute to the lack of interest in agriculture among urban minority youth. Geographic location of the Centers of Agricultural Emphasis may offer another explanation for the number of minority students enrolled.

Rudd and Smick-Attisano (1995) reported that urban minority students did not have an accurate definition of agriculture. In fact many continue to associate agriculture with farming and low skill labor. In addition, many minority students identify agriculture with low prestige careers and low income (Whent, 1994).

Wardlow, Graham, and Scott (1995) concluded that the lack of minority role models currently in the field may also contribute to the seemingly low interest of minority youth in agriculturally related careers. Minorities that have made contributions to agriculture and the community need to be utilized in the classroom as role models for minority students (Hossler, 1991). If individuals do not see "themselves" in the contemporary industry, they may not be encouraged to pursue a career in that field.

It is also possible that barriers to enrollment in agricultural education exist for minority students. Hoover and Scanlon (1991) identified image of agriculture, influence of significant others, and perceived future benefit of agricultural education as prominent barriers to enrollment in secondary agricultural education programs. Other barriers identified by Angel and Barrera (1991) may include; inadequate curricula, linguistic difficulties, and a higher instance of family concerns, and differences in cultural values.

Bullivant (1981) cites the absence of sincere efforts toward multicultural education hampering minority student participation in many educational programs. The presumption by many educators that al students come from a monolingual, supportive learning environment is often false. Minority students not from such an environment often feel isolated, as they assume they are vastly different from the teacher imposed norm (Wright, 1987).

Agriculture is already suffering the effect of an agriculturally illiterate public. As our society continues to move away from its agrarian roots, agricultural illiteracy is likely to increase. Given the current and projected growth of minority populations, an increased effort to educate minority students in and about agriculture is warranted.

Purpose, Objectives, and Questions

It is imperative that the state of Florida determine if the extent of minority participation in ABNR programs. Furthermore, if minority student enrollment is a problem, the cause(s) of the problem need to be identified and addressed. Therefore, the purpose of this study was to examine the perceptions of selected school personnel and students about the Agribusiness and Natural Resources (ABNR) programs in the Centers for Agricultural Emphasis in Florida.

The specific objectives for the quantitative portion of this study were to:

1. Identify the extent of minority enrollment in the secondary agricultural education programs in the Centers of Agricultural Emphasis,
2. Identify and describe sociodemographic characteristics of students currently enrolled or not enrolled in secondary agricultural education programs in the Centers of Agricultural Emphasis, and
3. Identify various participation, enrollment, and employment factors that impact on a students' decision to enroll in secondary agricultural education programs in the Centers of Agricultural Emphasis.

The questions that guided the qualitative portion of this study were:

1. How do the principals, guidance counselors, and agriculture teachers at selected Agriculture Enhancement Centers describe the ABNR program?
2. What means are utilized in the recruitment and retention of minority students in the ABNR programs at the Agriculture Enhancement Centers?
3. Are there real or perceived barriers to minority enrollment in ABNR programs at selected Agriculture Enhancement Centers?

Methods and Procedures

Population

The Florida Department of Education selected 12 secondary and post-secondary sites to be developed as enhancement centers for agricultural education in 1991. Four post-secondary and eight secondary sites were selected. Five of the secondary sites were purposefully selected for participation in this study. They were Ponce DeLeon, Palatka, Lake Gibson, Immokalee, and Lecanto High Schools. Students at each of the schools were selected to participate in the study by the agriculture teacher and the principal of the school. These schools were selected to represent unique demographic and geographic populations.

The non-agriculture students surveyed (77) were selected from general courses that all students must take in order to graduate from Florida High Schools (primarily math and language classes). Agriculture students (154) were also surveyed in in-tact groups (in their agriculture classes). Although using in-tact groups does not ensure a random sample, it was determined by the researchers to be the best method available within the school environment. In accordance with University of Florida guidelines for human subjects research, data was only collected from students with signed permission slips from parents or guardians.

Four agriculture teachers, seven guidance counselors, and four principals were interviewed to collect qualitative data. The researchers ensured trustworthiness of the data collected by triangulating the responses of the three interview groups.

Instrumentation

Based on a review of literature the researchers utilized an instrument developed by Hoover and Scanlon (1991) to collect the survey data. The instrument was modified slightly to mirror Florida ABNR programs. The instrument was reviewed for content and face validity by a panel of experts from the University of Florida, ABNR teachers, and representatives from the Florida Department of Education.

The survey instrument was designed to collect socio-demographic data, occupational aspirations, and educational goals for each student. Students also were asked to answer a battery of questions related to their decision to enroll or not enroll in agri-business and natural resources programs, their participation in agricultural education and FFA participation. The key statements differed for students enrolled in ABNR programs and students not enrolled. A Cronbach's alpha levels ranged from .84 to .89 for the enrollment decision scales.

The interview questionnaire was developed by the researchers. The instrument was reviewed by a panel of experts from the University of Florida and the Florida Department of Education for content and face validity. Eight questions were included in the interview to answer the questions posed by the study. The instrument was pilot tested with graduate and undergraduate students in Agricultural Education and Communication at the University of Florida.

Data Collection and Interpretation

A faculty member from Florida A&M University visited each of the schools to collect survey and qualitative data. He administered the surveys to agriculture and non-agriculture students as well as conducted interviews with teachers, principals, and guidance counselors.

The data collected on the survey instruments was analyzed with NCSS (1994).

The interviews were tape recorded, transcribed verbatim and analyzed for recurring themes. Content analysis and the ethnographic method were utilized in data analysis. The interview data was analyzed with the AskSam (1995) software package.

Survey Findings

Minority Enrollment

The minority enrollment in selected Florida Centers for Agricultural Enhancement ranged from 2-87%. The number of minorities in a school may affect the enrollment in ABNR programs. The minority population of the ABNR programs in the selected schools ranged from 0-47%. However, only two schools had minority enrollments in ABNR that reflected the minority population in the total school.

Sociodemographic Data

ABNR students in the selected sites were 37% female and 63% male. The non-agriculture students surveyed were 47% female and 53% male. More than 34% of the ABNR students lived in a rural non-farm home, while 18% of the ABNR students lived in a farm or ranch. In comparison, 22% of the non-ag students lived in rural, non-farm area and 5.5% lived on a farm or ranch.

Over one-half (55%) of the fathers of ABNR students had a high school education or less. Only 21% of the non-ag student's fathers had a high school education or less. Only 5% of the father's of ABNR students completed post-high school vocational training compared to 24% of the non-agriculture student's fathers. The education levels of the mothers of ABNR and non-agriculture students were comparable, only 32% of the mother's of ABNR students had a high school education or less. One-third (30%) of the non-ag student's mothers had a high school education or less. The fathers of ABNR students were more likely to have been raised in a rural community or on a farm or ranch, with the majority of the fathers of ABNR students (55%) being raised in a rural non-farm community or on a farm or ranch. Just over 23% of the fathers of non-agriculture students were raised in similar homes.

The mothers of ABNR and non-agriculture students show similar trends, the majority of mothers (46%) of ABNR students were raised in a rural non-farm community or on a farm or ranch. Just over 24% of the mothers of non-agriculture students were raised in similar homes. Nearly 24% of the students enrolled in the ABNR programs reported that at least one parent or guardian currently lived on a farm or ranch. Slightly over 12% of the students not enrolled in ABNR have at least one parent or guardian living on a farm or ranch.

Enrollment Decisions

Reasons Students Did Not Enroll in ABNR Programs - Over 30% of the non-agriculture students surveyed agreed that conflicts with class scheduling kept them from enrolling in ABNR courses. Over 45% of the same students agreed that the courses offered at their school were too production agriculture oriented to interest them. Over 56% of the non-agriculture students felt that the ABNR courses would not be helpful to them (Table 1).

Table 1.
Reasons Students Did Not Enroll In Agri-Business And Natural Resources Programs

Questions	Mean	SD	% Agree
I do not see how it would be helpful to me.	2.59	1.24	56.8
I did not want to be in the FFA.	2.77	1.34	52.7
I was not encouraged by my counselors to take ABNR.	2.82	1.23	51.3
I didn't like the courses offered, they were too production oriented.	2.82	1.20	45.9
It would be difficult to get the courses required for college while enrolled in ABNR	3.16	1.33	32.4
There were conflicts in scheduling.	3.74	1.02	30.5
ABNR classes are mostly for farm boys.	3.40	1.30	29.7

1 = strongly agree, 2 = agree, 3 = undecided, 4 = disagree, 5 = strongly disagree

Fifty-one percent of the non-agriculture students agreed their guidance counselors did not encourage them to enroll in ABNR courses. Thirty-two percent of these students believed that they cannot take the courses required for college entrance and also be enrolled in ABNR courses. When asked if the ABNR classes were for "farm boys," nearly 30% of the non-agriculture students agreed. More than 52% of these same students indicated that they did not want to be in the FFA.

Reasons Students Enrolled in ABNR Programs - Several key individuals played an important role in students' decisions to enroll in ABNR programs. Parents or guardians, and teachers respectively suggested or encouraged 56%, and 79% of the students enroll. Two-thirds (66%) noted that their satisfaction with middle school ABNR programs or FFA positively influenced their enrollment decision. Nearly 100% of the students felt that ABNR courses were appropriate for both male and female students. Eighty-four percent of the students surveyed agreed that ABNR courses were appropriate for farm and non-farm students (Table 2).

Eight out of 10 students enrolled in ABNR courses agreed that ABNR courses would be of value to them in the future. Over 80% of the students felt that ABNR courses were preparing them for agriculture careers. Eighty percent of the students agreed that they could be enrolled in ABNR courses and still meet college entrance requirements.

The FFA was a strong influence in a student's decision to enroll in ABNR courses. In fact, 92% of the ABNR students agreed that the FFA influenced their enrollment decision. ABNR students felt that the courses helped them develop life skills.

Table 2.
Reasons Students Did Enroll In Agri-Business And Natural Resources Programs

Questions	Mean	SD	% Agree
I believe agriculture classes help both young men and women learn about agriculture.	1.45	0.71	97.2
It includes the FFA organization.	1.64	0.71	92.1
I believe that ABNR classes taken in high school will help prepare me for the future.	1.73	.087	85.0
I believe it will benefit me later in life.	1.62	0.88	85.0
I believe ABNR is for students not from farms as well as from farms.	1.77	0.93	84.3
I liked the classes offered	1.87	0.86	83.0
It helps prepare me for a career in agriculture.	1.78	0.92	81.4
I know I can still meet college entrance requirements and enroll in ABNR.	1.82	0.81	79.9
I like the teacher(s).	1.94	1.05	78.7
I liked the middle school ABNR classes or FFA club.	2.23	1.18	66.9
My parent/guardian suggested I take ABNR.	2.70	1.21	56.4

1=strongly agree, 2=agree, 3=undecided, 4=disagree, 5=strongly disagree

Perceptions of FFA

All students enrolled in ABNR programs in this study recognized that their school had an FFA chapter. Most students (95%) indicated that they studied principles of FFA in their ABNR classes. Ninety-five percent of the students also agreed that the FFA is an important part of agricultural education. FFA membership for the students enrolled in ABNR programs at the schools studies was 76%.

Nearly one-half (47%) of the students not enrolled in ABNR programs indicated that they would be interested in joining an agricultural science or agricultural education club. However, none of these students indicated that they were members of a 4-H club. Only 9% of the students enrolled in ABNR were 4-H members.

Desired Employment - ABNR students identified their interest in being employed in an assortment of agricultural and natural resources careers. Table 3 lists these careers and students' interests in pursuing the careers. Less than half of the students surveyed (42%) indicated they were interested in a career related to the ABNR program. Categories of highly, moderately and slightly interested were combined to create the column "percent interested."

Table 3.
Employment Interests of ABNR Students

Statements	Mean	SD	% Agree
To work in wildlife protection/ conserv.	2.12	1.06	67.4
To raise a few head of livestock/crops in family garden.	2.21	1.11	63.1
To be employed in agricultural mechanics.	2.79	0.98	42.5
To be employed in ABNR.	2.82	1.02	42.0
To be employed in veterinary medicine.	2.72	1.07	41.1
To be employed in agricultural research/emerging technology.	2.94	1.00	35.0
To be employed in agricultural marketing/commodities.	2.86	1.00	39.4
To be employed by an agricultural supplier.	2.87	0.97	34.8
To work in landscape/nursery/turf mngt.	2.94	1.03	33.8
To be employed in agricultural comm.	2.94	0.99	33.3
To work in greenhouse production.	3.15	0.99	28.1
To work in food science/technology.	3.31	0.81	19.3
To work in floriculture/floral management.	3.34	0.81	16.0

4=Highly Interested 3=Moderately Interested 2=Slightly Interested 1=Not Interested

Two-thirds of the students surveyed indicated an interest in raising a few head of livestock or having a family garden. Over one-half of the students indicated they were not interested in food science and technology, greenhouse production, floriculture or floral management.

Sixty-seven percent of the ABNR students indicated a moderate or high interest in being employed in wildlife protection and conservation. Low interest fields (10% or less indicating a high level of interest) included agricultural mechanics, agricultural supplier, landscape/nursery operations, turf management, agricultural communications, agricultural research, agricultural marketing, and ABNR educator.

Educational Aspirations - Both ABNR students and non-agriculture students were asked to identify their education aspirations in terms of the ideal situation and what is likely to be reality for them. Forty percent of the ABNR students indicated that they were interested in pursuing post-secondary vocational training or an Associate's degree. Only 20% of the non-agriculture students indicated the same aspiration.

When asked about their desire to pursue other post-secondary degrees, ABNR students were less likely to aspire to this type of degree than non-agriculture students. Only 11% of the ABNR students aspired to obtain a bachelor's degree while 20% of the non-agriculture students had that goal. The number of students indicating desire for a masters or professional degree were somewhat closer, with 49% of the ABNR students and 57% of the non-agriculture students having this goal.

Educational Reality - When students were asked to realistically predict their highest level of education, 55% of the ABNR students and 45% of the non-agriculture students indicated that they would likely pursue post-secondary training or an Associate's degree. The number of students who indicated they would realistically pursue a Bachelor's degree was approximately 18% for both groups. The number of Master's and Professional degrees that they reported they would most realistically obtain, dropped dramatically for both groups, with the number of ABNR and non-ABNR students indicating they would pursue a Master's or Professional degree, 29% and 32%, respectfully.

Interview Findings

The interview questionnaire was used to interview all guidance counselors, agriculture teachers and principals. Following is a discussion of the predominant themes that surfaced as a result of the interviews.

Question #1

Describe the ABNR program at your school - Principals and guidance counselors tended to describe the ABNR programs as dynamic and changing. Several guidance counselors commented that the program was much difference than the "old" vocational agriculture program. Most guidance counselors and principals emphasized t what the teacher was the key to program success.

The agriculture teachers emphasized programmatic efforts at the schools. The teachers described the curriculum, FFA contests, and program scope. The teachers did discuss program changes that are reflected in the current curriculum. For example, several teachers mentioned that they were de-emphasizing production agriculture in favor of more agri-science based curriculum.

What kinds of students are in ABNR? - Teachers, principals, and guidance counselors were generally in agreement that the agriculture education program at their schools was representative of the school at large. Several commented that students of all abilities were a part of the agriculture education program. One teacher indicated that a high percentage of his students were honor students in the high school.

Question #2

How are students recruited for the ABNR program? - Most of the people interviewed were either not aware of a recruitment program or did not think a programmatic effort to recruit students was necessary. One guidance counselor said "It is based purely on interest, if they are not interested in agriculture I encourage them to sign up for something else."

Those that did discuss coordinated efforts cited middle school programs, educating other faculty members, making announcements on the P.A. system, and student to student contact. Guidance counselors and teachers identified the Florida Gold Seal scholarship program (the Florida Gold Seal Scholarship program is available to all students who complete a vocational program and meet minimum grade point average requirements), and other agricultural scholarships as student recruitment tools.

How are students retained in the ABNR program? - Agriculture teachers, principals, and guidance counselors agreed that an interesting curriculum and the ability of the agricultural education program to meet the students' needs were the best tools for retaining students. All of the groups interviewed said that students who enroll in agricultural education usually stay in the program.

Reasons for staying included FFA, Florida Gold Seal scholarship, teacher interest in the students, and perceived benefits of the program. One teacher commented that, "Students get hooked on ag and don't leave."

There were no coordinated efforts for student retention identified by any of the interview groups. People in each group commented that retention was not a problem.

Do you make a special effort to recruit and retain minority students? - Several of the schools reported that the number of minority students in the school was extremely low. One school guidance counselor said, "We have no black students...none have registered." Schools with minority students did not see a need for special efforts to recruit minority students in agricultural education. One principal stated, "We don't discriminate in any way shape, fashion or form -- they are encouraged to be involved in any program."

Question #3

Are you aware of barriers that may exist for minority students in ABNR programs? - This question was answered with a resounding "NO!" Teachers, guidance counselors, and principals were almost in unanimous agreement on this issue. A few people did discuss minority perceptions of agriculture as a labor intensive, low status vocation as a possible barrier to enrollment.

Are you aware of barriers that may exist for minority students in the FFA? - Again, the consensus answer was no. The individuals interviewed did not perceive any barriers for minority students in the FFA. One teacher said "Personally, if they are good students, I would welcome them."

Do you have any other information you would like to share? - As you would expect, responses to this question varied. The predominant theme that surfaced from this question was the respondent's defense of their school and program concerning minority participation. An agriculture teacher commented, "I think there is a great need in this state and nationwide to involve minority students in agriculture but we do not have a problem at this school." Respondents repeatedly said that everyone was welcome.

Three of the respondents did comment that minority participation in their school needed to be addressed. "I wish more minority students would sign-up for ag," said one principal.

Conclusions

The vast majority of the students in ABNR programs and in the schools surveyed were white, non-Hispanic. The male to female ratio was similar to the state-wide ABNR Enrollments. Only two of the schools had minority populations in the ABNR program that mirrored the total school enrollment (these two schools had very few minorities in the school district).

The mothers and fathers of ABNR students had significantly less formal education than the mothers and fathers of non-agriculture students. ABNR students were more likely to have a parent or guardian that was raised on a farm or ranch than were non-agriculture students

Many non-agriculture students believed that ABNR courses conflicted with their other courses and that they could not be enrolled in ABNR and still meet college entrance requirements. Non-agriculture students felt that ABNR held minimal future benefit for them and that the ABNR courses were too focused on production agriculture. Many of the non-agriculture students indicated that they did not want to be a member of the FFA. Students not enrolled in ABNR courses indicated that their guidance counselor did not encourage them to enroll. These findings add to the growing evidence related to perceptions of agricultural education throughout the country (Farm Foundation, 1989; Hoover & Scanlon, 1991; Hoover & Yoder 1994; Rudd & Smick-Attisano, 1995).

The vast majority of the students enrolled in ABNR indicated that they were pleased with the course offerings. Significant others played a major role in convincing students to enroll in ABNR courses. Students enrolled in ABNR felt that the program was appropriate for all students and that the courses were helping them to develop life and employability skills.

The FFA, and a positive experience in middle school agricultural education programs were credited with influencing students to enroll in high school ABNR programs. Most ABNR students felt that they could be enrolled in ABNR and still meet college entrance requirements. ABNR students agreed that the FFA was an important part of agricultural education. The schools surveyed had a much higher percentage of FFA members than the state average.

Many non-agriculture students indicated a desire to pursue post-secondary vocational training or an Associate's degree. The non-agriculture students indicated a stronger intent to attain a bachelor, masters, or professional degree. Many students from both groups indicated that in reality they would likely pursue post-secondary vocational training or an Associate's degree.

The fact that most ABNR students were not interested in ABNR related careers is a concern for the researchers. Are the programs fulfilling their intended purpose when so few students are interested in Florida's largest agricultural industries (horticulture, nursery operations, and floriculture)?

The principals, agriculture teachers and guidance counselors considered the ABNR programs at their schools as dynamic, and changing to meet the current needs of students and the agriculture industry. All of the interview groups emphasized that the agricultural education program mirrored the overall school enrollment (although only two of the five ABNR programs did indeed mirror the overall minority enrollment at the school).

Most school personnel did not see a need to make a special effort to recruit and or retain minority students in the ABNR program. The beliefs held by school personnel appear to be contrary to the body of knowledge related to recruiting and retaining minority students. Whent, (1994) indicated that many school personnel have embedded biases and behaviors that may keep minority students away from programs. Moore (1994), indicated that many teachers need to work to develop an in-depth knowledge and appreciation for diversity. Teachers, administrators, and counselors need to increase their awareness of stereotypes, exclusive language, cultural histories to support diversity (Bowen, 1994).

The Florida Gold Seal scholarship was identified by teachers, guidance counselors, and principals as a good recruitment tool for all ABNR students.
Overall total student retention in ABNR programs is perceived by the teachers, guidance counselors and principals as strong. Most of the school personnel did not see any barriers to minority enrollment in ABNR programs. No barriers were identified for minority participation in FFA.

Recommendations

1. If the Florida State Department of Education is interested in increasing minority participation in agri-business and natural resources programs more attention needs to be given to placing programs in areas with greater minority populations.

2. More study is warranted to explore the differences between the education levels and general background of parents and guardians of ABNR students and non-agriculture students.
3. Agricultural education in Florida and the enhancement centers need to concentrate on communicating the future benefits of ABNR and dispel the beliefs that there are barriers to college enrollment for students enrolled in ABNR courses.
4. While students enrolled in ABNR had high regards for the FFA, students not enrolled did not hold the FFA in high esteem. School personnel need to identify the source of these negative perceptions and act to inform the non-agriculture students about the benefits of FFA.
5. Since significant others play such a vital role in a student's decision to enroll or not enroll in ABNR, school personnel need to make a special effort to educate these people about the ABNR program.
6 Middle school experiences played a major role in the ABNR student's decision to enroll in high school ABNR programs. A continued effort to offer quality middle school programs is warranted.
7. Students in ABNR programs aspire to have careers in many fields considered as "traditional" for agriculture students (farmers, ranchers, foresters, natural resources). A greater effort is needed to introduce students to agricultural careers that emphasize the science of agriculture. The researchers are also concerned that there is little interest in several career fields that meet the needs of Florida's citizens (food processing, horticulture, and professional agriculture careers).
8. Many agriculture and non-agriculture students believe that the highest education they will obtain is post-secondary vocational training or an Associate's degree. The centers for Agricultural Enhancement need to make an effort to serve these students through the Tech Prep initiative and the School to Work initiative.
9. The state of Florida needs to make a major effort to provide in-service education for ABNR teachers to provide them with the skills and materials necessary to carry out recruitment efforts that will attract and retain all students.
10. The Florida Gold Seal Scholarship program should be continued to encourage student enrollment in Florida vocational programs.

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FLORIDA AGRICULTURAL ENHANCEMENT CENTERS:
MINORITY ENROLLMENT, RECRUITMENT, RETENTION AND STUDENT PERCEPTIONS, ENROLLMENT ISSUES, AND BARRIERS

Discussant Remarks
N. L. McCaslin
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The author of this paper is to be commended for undertaking a study of major importance to agricultural education. If the profession is to move ahead we need participation from all segments of our society. The authors have documented this need by referring to some of the major studies related to the topic under investigation.

The instrument appears to have both the validity and reliability necessary to provide quality data. However, I would like to have known the total number of individuals comprising the panel of experts that reviewed the instruments.

The first section of the paper is entitled "Introduction and Theoretical Framework." Although the authors provide a good rationale for the study, this discussant is not convinced that it included a theoretical framework for the study.

The authors also should be encouraged to edit their paper more carefully. Several typographical errors appeared in the paper.

In the survey findings section of the paper, means and standard deviations were used to report ordinal data. A more appropriate measure of central tendency for ordinal data would be the mode.

The use of both quantitative and qualitative methods in this study enhanced the information that would have been obtained had only one method been used. However, this discussant would encourage writers of papers that use both methods to integrate the reporting of information obtained from these methods.

The conclusions of the study appear to be a restatement of the findings rather than what the authors concluded as a result of their investigation. Finally, the recommendations should all be stated in future tense and suggesting what should be done to alleviate the problem addressed by the study.

ENHANCING THE AGRICULTURAL COMMUNICATIONS CURRICULUM

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Introduction and Theoretical Framework

The discipline of agricultural communications has become an important part of achieving the mission of agricultural education to provide education *in* and *about* agriculture. Agricultural Educators must recognize that mass media and other "non-formal" methods of dissemination used by other communications professionals are valuable sources of information about many subjects, including agriculture. The audience of the popular press, television, and radio far exceeds the scope of influence of formal educational programs on the elementary, secondary, post-secondary and adult levels.

Preparation for professionals to work in this field began in the early 1900s. According to Duley, Jensen and O'Brien (1984), the recognition of agricultural journalism at the university level was initiated when colleges of agriculture developed an extension function in the early decades of the twentieth century. Since that time, programs have evolved as agriculture and communication technologies have developed. They have also increased in number and popularity with undergraduate students. Doerfert and Cepica (1990) reported there are more than 30 academic programs for agricultural communications or agricultural journalism in the United States. The vast majority of those programs are housed in colleges of agriculture and many share an administrative home with agricultural education.

Agricultural communications programs have been designed to fulfill two primary needs of graduates: 1) provide a strong basis of both technical agriculture and sources for agricultural information; and, 2) introduce methods of journalistic writing and other communications skills. According to Evans and Bolick (1982), agricultural communications graduates are taught to disseminate agricultural information to agricultural and non-agricultural audiences through various media. With that idea in mind, it should be recognized that the curriculum for agricultural communications programs is intended to help graduates qualify for a wide range of job opportunities available in the career field (Evans & Bolick, 1982).

Ten years ago, Souka (1985) and Dillman (1985) recognized that changes in both fields of communications and agriculture created a need for agricultural communications faculty to examine their curricula. Although an in-depth assessment of present curricular offerings is a necessary base for curricular revision (Nash, 1928; Kroupa & Evans, 1976; Larson & Hoiberg, 1987; Sledge, 1987), only a few detailed studies of agricultural communications curricula exist (Duncan, 1957; Evans & Bolick, 1982).

Who should provide input as to what should be included in the agricultural communications curriculum? Paulson and Metzger (1990) stated if academic curriculum is to meet the needs of the industry, agricultural communications programs must continually survey professionals to determine the needs and skills required for a career in agricultural communications. Flatt (1991) said those involved in the curriculum review process should also include students in the program, graduates of the program, instructors, college administrators, and employers. However, since 1905, when the first curriculum in agricultural communications was established, there has been no formal assessment conducted in order to determine what disciplines and competencies are needed for graduates of agricultural communications programs based upon the opinions of representatives named above (Bailey-Evans, 1994).

Purposes and Objectives

The purpose of this research was to develop a discipline and competency-based curriculum, using input from leaders of professional groups related to agricultural communications careers. As a means of developing this curriculum, the following objectives were formulated:

1. Determine the discipline areas students should pursue to prepare them for careers in agricultural communications;
2. Identify competencies agricultural communications graduates should possess for each discipline area;
3. Develop specific instructional objectives for each of the competency areas identified;
4. Organize the disciplines, competencies, and objectives into a model curriculum.

Methods and Procedures

Procedures for Objectives 1 and 2

To accomplish the first two objectives, a three-round survey method was used to reach consensus from a panel of experts. The panel of experts was comprised of agricultural communications leaders from the seven major agricultural communications professional organizations in the United States. Representatives from the following organizations were included:

- Agricultural Communicators of Tomorrow (ACT)
- Agricultural Communicators in Education (ACE)
- Agricultural Relations Council (ARC)
- American Agricultural Editors Association (AAEA)
- Cooperative Communicators Association (CCA)
- Livestock Publications Council (LPC)
- National Association of Farm Broadcasters (NAFB)

Using the member directory for each organization, the researchers selected 80 individuals to participate in the study. The individuals were selected from national officers, trustees, or directors for each of the seven organizations. The ACT group included student officers as well as faculty advisors.

All of the individuals listed were contacted by telephone and asked to participate. Two individuals were unable or unwilling to take part in the study, so two people involved in leadership positions in their respective organizations were asked to take their place. The 80 individuals represented agricultural communications employers, employees, educators and students.

Instrumentation for Objectives 1 and 2

The instruments utilized in the study were developed by the researchers. An in-depth review of literature was conducted to develop a list of curriculum disciplines to be included in the Round I instrument. A panel of experts comprised of research graduate assistants, faculty members and communication specialists from agricultural education and agricultural communications programs at two universities assisted in selecting the content and designing the format of the first-round instrument.

The instrument for Round I was pilot tested with upper-level undergraduate students, graduate students, recent graduates, and agricultural communications professionals in two states. A faculty advisory group from the institutions also reviewed the Round I instrument and suggested changes in content and question clarity prior to mailing.

The Round I instrument consisted of two primary sections. The first section was designed to collect demographic data from the participants in the study. The second section was comprised of a list of 38 curriculum discipline areas. A four-point Likert-type scale was used to indicate agreement for items to be included in the list of disciplines. The scale was composed of the following response choices: Strongly Agree; Agree; Disagree; Strongly Disagree. Space was provided on the instrument for respondents to add additional disciplines and to rate the value of these additions. Respondents were also asked to contribute specific competencies for each of the discipline areas.

The instrument for the second round was developed using data collected in Round I. Only those items receiving a rating of "Strongly Agree" or "Agree" by at least 70% of the respondents were included in the Round II instrument. The mean rating for each discipline taken from Round I was printed next to each item. Respondents were asked to rate the disciplines again, using the same scale used in Round I. In addition, a group of curriculum competencies were listed below each of the discipline areas. These items also offered the same Likert-type response choices described in Round I. Space was provided for the respondents to add additional competencies for each of the discipline areas and to rate the value of each.

The Round III instrument was designed to collect the respondents' final opinions regarding the disciplines and competencies needed for agricultural communications graduates. The same discipline areas and competencies rated and identified in Round II were listed. The percent of respondents who marked "Strongly Agree" or "Agree" for each item in Round II was listed in parentheses beside each discipline area and competency. Items to be cut as a result of not making the 70% cut line from Round II were displayed with a strikethru (~~strikethru~~) style. The respondents were asked to indicate if they disagreed with the status of an item (whether it was to be retained or cut). Respondents were asked to explain the rationale for their disagreement.

<u>Collection of Data for Objectives 1 and 2</u>

All 80 panel members were contacted by phone prior to the first mail-out to introduce the objectives of the project and obtain their consent to participate in all three rounds. Each individual was also notified that he or she would be receiving the first-round survey in 2-3 weeks after the phone conversation.

Each round of the instrument was mailed to panel members and reminder cards were mailed two weeks after the original mailing of each instrument. Late respondents were contacted by phone to encourage their participation. An ink pen was sent to each individual along with the Round III instrument as a means of thanking the individuals for their participation. The overall usable response rate for the study was 89%.

<u>Procedures for Objectives 3 and 4</u>

To accomplish the third objective, a group of faculty representing 24 departments and 6 universities was consulted to determine specific objectives for each of the competencies. Faculty who teach and/or research each competency area were asked to contribute a list of instructional objectives necessary to help students become proficient in their area of expertise. The final objective was accomplished through the use of an advisory committee composed of agricultural communications educators, researchers, students, and professionals.

Results

Figure 1 illustrates the levels of the curriculum model. The most basic level of the model was labeled "core areas." The term "discipline" was used to describe the specific areas of study within each core area and formed the second level of the model. The disciplines are broad areas in which graduates of agricultural communications programs should be knowledgeable.

The third level of the model was competencies. These competencies describe proficiencies agricultural communications students should have upon graduation. The fourth level is composed of the instructional objectives for each of the competencies. Instructional objectives specifically describe behaviors, skills, and activities students should be able to perform to develop necessary competencies.

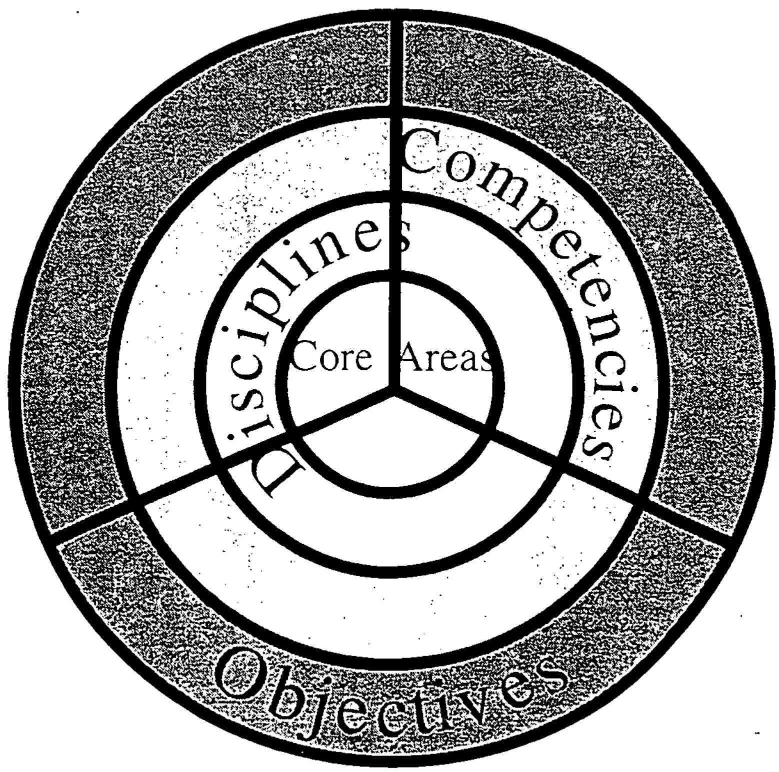

Figure 1. Levels of model curriculum

The disciplines identified in objective 1 fit into three logical categories. Agriculture was composed of those disciplines typically associated with and often offered in academic programs of agricultural sciences and natural resources. All but "Internship Experience" included terms closely associated with agriculture. Internship Experience was placed in this group because most internships for agricultural communications would be supervised by academic advisors who, in most cases, are faculty of colleges of agriculture (Doerfert & Cepica, 1990).

Seven disciplines clustered in the Communications core area. Each of these disciplines involved oral or written communications or technologies and arts used in media productions. The remaining 13 disciplines were placed in the area General Education. Disciplines normally part of university core curriculum were placed in this group along with disciplines that did not logically fit into the other two categories. Table 1 displays the disciplines 1 for each of the core areas.

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Table 1:
Categorization of Disciplines in Core Areas

Core Areas		
Agriculture	**Communications**	**General Education**
Agricultural Communications Agricultural Economics Agricultural Leadership Agronomy Animal Science Environmental Science Food Sciences Technology Internship Experience	Advertising Journalism Mass Communications Law Photography Public Relations Public Speaking Telecommunications	English Government/Political Science History International Relations Mathematics Biological Sciences Psychology Sociology Business Marketing Computer Applications

English was the highest rated discipline area (97.3%) followed closely by Public Relations (96.1%) and Public Speaking (96.0%). More than 90% of the panel members strongly agreed or agreed that agricultural communications graduates should be proficient in Journalism, Agricultural Communications, Computer Applications, Internship Experience, and Photography. The highest rated disciplines from agriculture were Agricultural Economics with 89.5% and Agricultural Leadership with 86.8% of the panelists marking at least "agree." More than three-fourths of the respondents agreed that Agronomy (79.0%) and Animal Science (77.6%) should be included among the discipline areas.

Identification of discipline areas provided input concerning broad areas of proficiency needed by graduates of agricultural communications programs. In the second and third rounds of the research, a series of specific competencies was added to each discipline area to further identify areas in which graduates need to be knowledgeable. The panelists unanimously agreed graduates need to have knowledge about two competency areas: Grammar and Desktop Publishing. More than 95% agreement was reached on seven more items with News Writing (98.6%), Reporting (98.7%), and Editing (97.4%) all being related to the discipline area Journalism. Oral Communications (97.4%), Speech Writing (97.3%), Public Relations Campaign Planning (96.0%), and History of American Agriculture (96.0%) were also rated very high.

For each discipline area, the panel of experts representing the seven agricultural communications organizations identified a set of competencies. In rounds two and three of the instrumentation, a series (one or more) of specific competencies was added to each discipline area to further specify areas in which graduates need to be knowledgeable.

The panelists unanimously agreed graduates need to have knowledge about two competency areas: Grammar and Desktop Publishing. More than 95% agreement was reached on seven more items with News Writing (98.6%), Reporting (98.7%), and Editing (97.4%) all being related to the discipline area Journalism. Oral Communications (97.4%), Speech Writing (97.3%), Public Relations Campaign Planning (96.0%), and History of American Agriculture(96.0%) were also rated very high.
The disciplines with the greatest number of concepts approved were Computer Applications (7), Agricultural Economics (6), Journalism (6), Advertising (5), International Relations (5), and Telecommunications (5). Four concepts were identified within the areas of Photography, Agricultural Communications, and Internship

Experience. In all, 83 concepts were identified as important for agricultural communications graduates to know about.

Thirty-seven concepts were eliminated for lack of agreement among panel members. This group included, but was not limited to Literature (64.4%), History of Western Civilization (57.9%), Trigonometry (28.9%), Physics (43.5%), Leadership Styles and Theories (67.1%), Plant Physiology (63.1%), Animal Anatomy and Physiology (59.2%), Wildlife Management (60.6%), and Food Analysis (48.7%).

The final step of creating the curriculum model was to determine the objectives for each competency area. Faculty members specializing in the competency areas were consulted to help identify instructional objectives for each competency. After these data were gathered, the researchers edited the objectives and placed them into a logical format. Figures 2 - 4 display the disciplines, competencies, and objectives for each of the three core areas.

Figure 2. Disciplines, Competencies, and Objectives for Agriculture Core Area

Agricultural Communications

Communicating Ag to Public (Domestic)

- v describe the impact of agriculture upon all Americans
- v describe the agricultural community in the United States
- v assess the level of agricultural literacy in the United States
- v use a variety of means including writing, radio, and video to inform the public about agricultural information
- v develop public relations campaigns to promote agriculture

Agricultural Publications

- v write feature articles about agricultural topics
- v sell advertisements to agricultural firms
- v take photographs of agricultural subjects
- v design layouts for advertisements
- v use desktop publishing techniques and equipment

Communicating Ag to Public (International)

- v describe the role agriculture plays in international relations
- v discuss the cultural impact of agricultural trade
- v list the barriers that exist when communicating agricultural information in international situations

History and Principles

- v discuss the historical evolution of agricultural communications as a discipline and profession
- v contrast the uniqueness of agricultural communications to other types of communications
- v describe the purposes of agricultural communications
- v apply techniques of agricultural communications

Agricultural Economics

Marketing

- v discuss the definition and types of agribusiness marketing
- v describe marketing theories related to price, grading, elasticity, etc.
- v describe principles of hedging and futures contracts

Ag Policy

- v discuss the impact of government and legislative policy upon agriculture
- v describe the purposes of and rationale for farm programs
- v evaluate the effectiveness of U.S. agricultural policy in foreign markets

Macro Economics

- v describe the impact of monetary and fiscal policy
- v discuss the factors that stimulate and inhibit economic growth

Ag Finance

- v define and compare the sources of credit for agricultural institutions
- v apply basic principles, tools, and techniques of financial analysis
- v complete common forms used in financial analysis and credit institutions
- v describe the concepts used to make financial decisions

Agribusiness Management

- v describe the impacts of business people and agribusinesses upon consumers
- v discuss the unique nature of agriculture and agribusiness in regard to methods of management, risk, diversity, types of firms, and seasonal nature
- v describe the impact of government upon agribusiness

Micro Economics

- v describe and apply concepts of indifference curves, supply/demand, and production function
- v discuss the causes of price movements
- v summarize the impacts of agricultural products and agricultural markets upon agricultural businesses

Agricultural Leadership

Ethics

- v list the stages of moral and ethical development
- v describe the impact of ethics upon personal development and human interaction
- v apply ethical standards to decision-making

Interpersonal Relations

- v describe the characteristics upon which interpersonal relationships are built
- v list the traits of leaders desired by followers
- v work with diverse groups
- v demonstrate creative problem solving
- v describe ways to influence and motivate other people
- v apply leadership theories and styles

Organizational Dynamics

- v describe the stages of group development
- v develop a doctrine, leadership unit, program, and evaluation system for an organization
- v apply methods of conflict resolution and decision making
- v evaluate the performance of co-workers

Personal Development

- v make an honest assessment of personal character
- v develop and use a personal mission statement
- v apply principles of time management and personal planning
- v demonstrate technical and cognitive skills needed by leaders

Agronomy

Crop Production and Management

- v describe major world food and fiber crops including where they are produced and their uses
- v demonstrate an understanding of plant growth and development
- v discuss methods of crop management to maximize profit and minimize inputs
- v describe soil principles including fertility water management
- v list and describe management techniques for major pests of crops such as weeds, insects and disease
- v discuss ways of producing crops in an environmentally conscious way

Animal Science

Livestock Production and Management

- v describe the dynamics of agricultural animal production including nutrition, growth and development, reproduction, and genetics
- v discuss characteristics unique to animal products and their related industries
- v analyze public perception of animal food issues
- v summarize the economic and management roles of producing agricultural animals
- v report on the impact of biotechnology in ag animals

Environmental Sciences

Conservation

- v define conservation
- v discuss the ways in which humans impact the ecosystem and methods of making it stable
- v define sustainability and common methods of sustainable agriculture production
- v discuss environmental/global issues such as global warming and desertification and the relationship of agriculture with those issues
- v describe the effects of agriculture upon erosion and the introduction of chemical compounds in the environment

Ecology

- v define ecology and related terms
- v describe the functions of the ecosystem
- v summarize the ways in which organisms relate to their environment
- v discuss theories of environmentalism including preservationist, animal rights, animal welfare, explotationist, agriculturist, conservationist

Food Science/Technology

Food Safety

- v describe the basics of food classification, modern processing and quality/safety control

Internship Experience

- v demonstrate self discipline and commitment

Application of Ag Communications Concepts

- v demonstrate the use of agricultural communications skills
- v gain experience in the application of agricultural communications theories in the work place
- v master skills to complete given tasks
- v communicate effectively in verbal and written forms
- v model proficiency in time management and organization

Development of Personal Skills

- v demonstrate the characteristics of responsibility and credibility

Development of Interpersonal Skills

- v show ability to work as a team member
- v apply the use of job protocol and the ability to take directions
- v demonstrate loyalty, reliability and trust

Problem Solving Ability

- v apply learned technical skills and personal experience to solve problems in the work-place
- v demonstrate human relations skills in communicating ideas

Employee Responsibilities

- v model professionalism
- v make positive contributions to the firm
- v present personal impressions of the internship experience to an advisory committee

Note: Disciplines are shown in **bold** type, Competencies are shown in *italic* type, and Objectives are denoted with bullets (v).

Figure 3. Disciplines, Competencies, and Objectives for Communications Core Area

Advertising

Creative Strategies

- v display proficiency in copy layout, typography and production
- v apply methods of design in an innovative way

Media Planning

- v list the types of media used in advertising
- v discuss ways to purchase advertisements in various types of media

Campaign Planning

- v design a complete advertising campaign for a product
- v apply a multitude of approaches to promote a product

Graphic Design

- v develop graphic designs for the purpose of advertising products in various media
- v use computer hardware and software to develop graphic designs

Journalism

News Writing

- v use basic news style in writing
- v describe in a clear and concise way, the principles of journalism

Reporting

- v apply reporting and writing skills in a "real world" situation
- v describe the ethical challenges faced by reporters
- v interview a source of information for a news article

Editing

- v edit the work of others
- v use correct editing marks and symbols
- v critique and correct layout and design of publications

Ethics in Journalism

- v describe common dilemmas faced by journalists
- v discuss the ethical standards that exist in the field of journalismv determine ethical solutions to problems

Design and Layout of Publications

- v describe and apply principles of design used in print media
- v develop creative ways to present information in print

Dissemination Systems

- v describe the ways in which news and other information is disseminated to the public
- v compare the effectiveness of various dissemination systems for different messages and different audiences

Mass Communications Law

- v discuss legal problems facing journalists, broadcasters and advertisers
- v discuss and define communications regulations, fairness doctrine, libel, privacy and commercial speech

Photography

Composition

- v define and discuss the relationships of line, shape, texture, pattern, unity, variety, balance, emphasis, rhythm, scale, and symbolism
- v describe color associations
- v determine appropriate light for types of films
- v discuss types of lighting

Camera Functions

- v discuss theory of light and cameras
- v demonstrate proper camera care
- v determine the appropriate camera and film for different purposes
- v demonstrate the proper use of camera equipment including filters, films, flashes, lens, and other accessories.

Ethics in Photography

- v discuss the ethical considerations of taking and using photographs
- v describe the ethical considerations of controlling the scene and manipulating the subject
- v discuss the influence of image seen on television and in magazines
- v establish personal ethics for making and using images

Printing

- v apply basic concepts of black and white as well as color film processing and printing
- v control contrast in black and white and color prints
- v describe concepts of how an image is reproduced in a magazine

Public Relations

Campaign Planning

- v apply effective writing techniques
- v identify needs and traits of the audience
- v identify characteristics of the subject
- v describe basic principles of public relations

Problem Solving

- v determine problems and methods used to solve them
- v solve public relations problems from case studies
- v work individually and in groups to solve public relations problems

Personnel Management

- v apply administrative theories to personnel relations

Public Speaking

Speech Writing

- v select appropriate topics
- v write using effective formats and formulas
- v use creative skills to develop introductions to effectively engage an audience
- v customize a speech for a specific audience

Oral Communications

- v apply effective speaking techniques
- v use the voice to maintain the interest of an audience
- v use a variety of inflection, tone, and volume

Nonverbal Communications

- v use appropriate hand gestures in speaking
- v use appropriate facial gestures in speaking

Telecommunications

Script Writing

- v create media program formats that meet specific training, promotion, marketing, advocacy, fund raising, and orientation objectives

Broadcasting

- v write information to be communicated via broadcast
- v use appropriate verbal and audio techniques to present an effective radio broadcast
- v use appropriate verbal and visual techniques to present an effective video broadcast

Video/Television Production

- v describe budgeting, administration, and supervisory tasks associated with video production
- v develop the ability to interpret concepts and ideas visually
- v demonstrate a working knowledge of the technical aspects of the equipment used in video production
- v perform the roles of camera operator, floor manager, technical director, projectionist, audio engineer, character generator operator, and prompter operator in a video production

Radio Production

- v describe understanding of basic audio theory
- v discuss the equipment used in audio production
- v apply techniques in producing various audio program material
- v demonstrate an understanding of multi-track recording
- v write basic broadcast copy material

Note: Disciplines are shown in **bold** type, Competencies are shown in *italic* type, and Objectives are denoted with bullets (v).

Figure 4. Disciplines, Competencies, and Objectives for General Education Core Area

English

Grammar

- write with proper subject-verb agreement
- use proper punctuation and sentence patterns
- use basic principles of relationships of words
- develop awareness of common errors in grammar

Technical Writing

- prepare written work for professional use such as reports, manuals, business letters, etc.
- apply basic grammar and writing skills

Creative Writing

- apply basic techniques of poetry and fiction writing
- analyze and constructively critique poetry and fiction writing
- apply time saving techniques in writing

Government/Political Science

Government Policy

- describe the American political system
- recognize actors and institutions involved in the American political system such as political parties, levels of government, branches of government
- analyze and critique the American political system

Political Analysis

- use social science and political variables in everyday conversation
- conduct basic research arguing and analyzing how politics work in the American system

Legislation

- describe the legislative process
- describe ways to access legislators

History

American Agriculture

- summarize the development of American agriculture in the twentieth century
- evaluate the development of American agriculture through technological changes
- describe the rise of agri-businesses

American History

- describe the ideas, actions and themes that have impacted American history
- describe political, economical and social factors of Americans in the historical past
- describe an overview of the American heritage

World History

- describe the development of Western civilization
- recognize and appreciate art from various time periods
- compare different cultures and the influence of each upon modern society
- identify cultural characteristics that impact international relations
- describe the influence of religions, agriculture, government, and other factors upon historical development

International Relations

Foreign Cultures

- describe the historical development of international cultures

Trade Relations

- analyze the trade relations that exist between the United States and other nations
- identify barriers and opportunities for international trade of agricultural commodities

Cultural Differences

- differentiate cultures of other nations to that of the US
- determine ways to work with people from other cultures

Communication Systems

- discuss the communications technology and systems that exist in other countries
- identify ways to communicate effectively in other nations

Political Constraints

- identify the governmental systems
- analyze political relationship between the U.S. and other nations

Economics

- evaluate the economic systems of nations
- assess impact of international relationships upon the economic systems of nations

Mathematics

Statistics

- use appropriate methods to analyze data
- apply different statistical concepts
- use formulas and procedures to calculate statistics

Algebra

- manipulate equations
- graph and/or geographically represent functions
- describe properties of exponents and logarithms
- solve matrixes and utilize them in applied functions
- solve sequences and series and apply them to practical use

Biological Sciences

Botany

- describe plant-environment interactions
- identify types of plants
- describe genetic make-up of plants
- identify diseased or distressed plants

Zoology

- describe animal-environment interactions
- describe the functions of animals and animal structures
- identify animals common to the local area

Biochemistry

- obtain molecular description of molecular materials, biological materials, and systems
- apply molecular approach to biochemistry systems

Physical Sciences

Geography

- identify the location of the nations of the world
- locate major land masses and bodies of water
- describe the topography of various regions of the world

Chemistry

- apply basic principles of chemistry
- describe the safety and long term impacts of the use of chemicals
- describe the impact of chemical use on the environment

Psychology

Individual Behavior

- define the field of psychology in a general way
- describe how psychology impacts the general public and how it helps people cope with everyday life

Group Behavior

- describe the interaction between people
- determine the roles of individuals interacting in groups and how those roles are carried outside the group

Sociology

- describe the basic concepts, principles, theories, literature and research methods that constitute the field
- describe linkages between the lives of individuals
- analyze social processes in various contexts

Business

General Concepts and Principles
- v identify the types of business structures and how they operate
- v describe the issues and problems that impact businesses and how they effect the general population

Marketing

Marketing Principles
- v identify marketing structures and agencies
- v describe the basic ideas of consumer choice and preference
- v identify the types of middlemen who operate between the producer of a product and the consumer

Product Promotion
- v determine how to make consumers aware of a product and interested in buying it
- v discuss the relationship between advertising, personal selling, and sales promotion

Buyer Behavior
- v list factors of consumer decision-making
- v describe behavior research techniques used in marketing
- v discuss the process that a buyer goes through when committing to a purchase

Computer Applications

Desktop Publishing
- v apply principles of layout and design
- v demonstrate proficiency in the use of desktop publishing software to produce a publication

Word Processing
- v create and edit documents
- v manipulate and format documents

Presentation Graphics
- v design and produce slides, transparencies and hard copy of information to be used in a presentation
- v transfer information from documents and enhance its visual effectiveness using presentation graphics software

Graphic Design
- v use the computer to design and/or manipulate graphics
- v export computer-designed graphics to a desktop publishing program

Electronic Communications/Networking
- v transfer information via electronic media
- v down-load information through computer networks

Database Management
- v design and enter data into a database
- v use a database to access information and develop reports

Spreadsheet Development
- v enter data and calculate statistics using a spreadsheet
- v develop data graphs and charts with a spreadsheet program

Note: Disciplines are shown in **bold** type, Competencies are shown in *italic* type, and Objectives are denoted with bullets (v).

Conclusions

1. The panel of leaders identified 26 discipline areas and 83 concepts as important for graduates of agricultural communications degree programs. These areas include a wide range of topics at varying depths of knowledge.
2. As indicated by the high level of agreement in the areas of English and journalism, the panelists believe writing skills are extremely important for graduates of agricultural communications programs.
3. Agricultural communications was identified as a unique discipline with its own set of concepts. It is not a sub-group of agriculture or communications.
4. From the results of this research it is concluded that graduates of agricultural communications need to be skilled in operating microcomputers to accomplish a variety of tasks including desktop publishing, word processing, graphical design, networking, and management.
5. Internship experiences are a valuable and important part of the educational training of agricultural communications professionals.

Recommendations

1. The list of disciplines and competencies which received a 70% agreement rating ("Strongly Agree," "Agree") should be used by universities to develop or enhance their agricultural communications curriculum.
2. A large number and variety of disciplines and competencies were identified through this research. While it may be impossible for every student to study each of these areas at the appropriate depth, it is important students be provided an introduction to the various areas of agriculture and communications identified here.

3. Considering the diversity of career opportunities for agricultural communications degree graduates and the fact that 25 competencies related to communications were identified by the panelists, emphasis should placed be upon providing students with information and experiences about a variety of areas in communications.
4. Agricultural communications programs should attempt to provide students with opportunities to pursue studies in the identified disciplines and concept areas and remain as flexible and diverse as possible. Students should be provided opportunities to generalize and specialize in specific areas of communications and agriculture based upon their interests and career aspirations.
5. Opportunities for internships should be provided for students who are pursuing agricultural communications as a career. Such experiences should provide practical application of disciplines and competencies taught in courses.
6. Further research should be conducted to determine the depth at which the disciplines and concepts identified in this research should be studied.
7. Job market analysis for agricultural communications careers should be conducted periodically and compared to the educational opportunities provided for students in curricular and extracurricular activities in the degree program.

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ENHANCING THE AGRICULTURAL COMMUNICATIONS CURRICULUM

Discussant Remarks
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It was good to see a paper accepted in this meeting representing the area of agricultural communication. As the author indicated, ". . . the vast majority of (agricultural communication) programs are housed in colleges of agriculture and many share an administrative home with agricultural education." Information of this type certainly is needed for curriculum development efforts in agricultural communication.

The paper has a strong statement on the need for a discipline and competency-based curriculum. However, the author did not convince this discussant that there was a theoretical framework for the study. If research in agricultural communication and agricultural education is to be recognized by other disciplines, it must present better theoretical and conceptual arguments related to the need for the studies being reported.

In the methods and procedures section a three-round survey was reported as the method used to reach consensus from a panel of experts. No references were given for this method. It appeared to have some of the characteristics of a Delphi study, but it did not seem to match with the requirements of that type of research either.

There was a high rate of response for the study (89%). However, it was not clear to the discussant if everyone responded and 11% were usable or if non-respondents were not contacted.

It appeared that the author also replicated some of the narrative related to the findings related to the competency areas in which graduates needed to have knowledge. This appeared in the second paragraph following Table 1 and again two paragraphs later. A careful editing could have eliminated this duplication.

Finally, the recommendations do not provide any direction for how this information should be transmitted to other agricultural communication programs for their use in curriculum development. Do the findings have utility beyond the institution from which it originated?

FOLLOW-UP STUDY OF GRADUATES FROM THE COLLEGE OF AGRICULTURE AND SCHOOL OF FOREST RESOURCES AND CONSERVATION FROM THE UNIVERSITY OF FLORIDA

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Introduction

Each year, the University of Florida offers some 94 degree programs to approximately 39,500 students and confers roughly 5,500 undergraduate degrees. Consequently, the University spends about $122 million on undergraduate education annually, of that amount, about 35% ($43 million) comes from matriculation and out-of-state fees, and about 65% ($79 million) is appropriated from the Legislature (Office of Institutional Research, 1995). In order to maintain the necessary legislative support, universities, colleges, departments, programs, and educators must account for the education they provide. In 1991 the Florida Legislature enacted a university accountability process which provides for "the systematic ongoing evaluation of quality and effectiveness in the State University System ...(to) monitor performance at the system level in each of the major areas of instruction, research, and public service while recognizing the differing missions of each of the state agencies" (Florida Statutes, 1991). In order to facilitate the accountability process, the Legislature established a set of indicators used to assess university performance. Among these indicators were follow-up surveys of alumni, parents, clients, and employers.

In addition to the State's accountability process, the University of Florida has an internal planning and evaluation process, the Florida Quality Evaluation Project (FQEP), which exceeds the State's requirements. The foundation of FQEP involves a statement of mission and constituencies by the University and by each unit, determination of indicators of quality performance, consideration of resources generated and expended by each unit, and allocation of resources based on quality performance (Lombardi & Capaldi, 1992). Due to the scope and diversity of FQEP within the University, each academic unit was asked to identify measures of quality research and scholarship in the particular field covered by the department. In the 1991-92 academic year, University faculty were surveyed to determine what indicators they believed were useful measures of quality and effectiveness. Of the measures established in the State's accountability process, only one received strong campus-wide support, follow-up surveys of students, alumni, employers, and clients (University of Florida, 1992).

Follow-up studies of graduates can also provide a unique perspective in evaluating the quality of academic programs as a whole rather than on a course by course basis (Wrye & Terry, 1993). Paret (1991), claims that follow-up studies provide information about students needs, expectations, and perceptions of their educational experiences. Information gathered on graduates may also help breakdown the negative perceptions among high school students regarding employment opportunities in agriculture, and act as a public relations tool for college recruiting. Orthel, Sorensen, Lierman, and Riesenberg (1989), Krueger and Riesenberg (1991), the Human Capital Shortages Task Force (1988), and the American College Testing Program (1989), all document that secondary education students have many misconceptions about agriculturally related careers. Most students believe that an agriculturally based education leads to a career in farming or ranching. Follow-up studies of the occupational status of College of Agriculture and School of Forest Resources and Conservation graduates can provide a realistic picture of careers in food, agriculture, and natural resources.

Objectives

The purpose of this study was to determine the occupational status of recent graduates from the College of Agriculture and School of Forest Resources and Conservation at the University of Florida and to evaluate their educational experiences. These educational experiences include teaching qualities of professors, advisement, course work, and extracurricular activities. The specific objectives of the study answer the following questions:

1. What is the occupational status of recent graduates from the College of Agriculture and School of Forest Resources and Conservation at the University of Florida?
2. What are the graduates' perceptions of their educational experiences in the College of Agriculture and School of Forest Resources and Conservation at the University of Florida?
3. What are the graduates' perceptions of their educational experiences at the University of Florida?
4. What are the graduates' perceptions of the value of extracurricular activities and student organizations at the University of Florida?

Methods

The population for this study consisted of all baccalaureate degree recipients from the University of Florida's (UF) College of Agriculture (COA) and School of Forest Resources and Conservation (SFRC) from 1989, 1991, 1992, 1993, and 1994 academic years. Names and last known addresses of the graduates were obtained from both the Office of the Registrar and Development and Alumni Affairs. The survey instrument was sent to the population of 1,388 graduates. A total of 672 graduates, or 48% of the population responded to the survey.

Faculty and administrators in the COA and SFRC are the main stakeholders of the study. Administrators in COA secured the funding for the project, selected the study years, and approved the survey instrument. The survey was compiled by Dr. Tracy Hoover, Assistant Professor in Agricultural Education and Communication, Dr. Jimmy Cheek, Assistant Dean for Academic Programs, and Dr. Larry Connor, Dean for Academic Programs. Survey questions dealing with educational experiences and extracurricular activities were obtained from similar surveys by McGhee and Cheek (1985), Wrye and Terry (1993), and from the Florida Survey Research Center (1993). Content validity of the instrument was established by professors and graduate students in the COA and SFRC.

The instrument consists of four parts: 1. evaluation of the academic program; 2. graduates perception of their overall college experience; 3. evaluation of extracurricular activities; and 4. personal characteristics and occupational information. In part 1, graduates rated course work, academic advisement, and teaching qualities of professors. Teaching qualities of professors were rated for COA and SFRC faculty who taught courses in their major and faculty who taught general education courses. In each situation respondents were asked to use a five-point Likert scale (strongly agree, agree, undecided, disagree, and strongly disagree) to rate their agreement with the following statements: points the professors made in class were clear and easy to understand; professors were enthusiastic about the subject; most of the professors were good teachers; professors lessons were well organized; professors used a variety of teaching methods to explain class and lab material; and professors used a variety of questions to check understanding. A factor analysis was computed to determine the extent to which these statements validly measured teaching quality. A bifactorial structure was exhibited with the two largest Eigenvalues accounting for approximately 70% of the variance.

In each situation, factor 1 (teaching quality) was defined by clarity, enthusiasm, good teachers, and organization and factor 2 (teaching technique) was defined by variety in teaching methods and questions to check understanding. A Cronbach's alpha reliability coefficient of 0.82 was calculated for items measuring teaching quality and 0.68 for items measuring teaching technique.

In part 2, open-ended and partially closed-ended questions were used to gather information on the graduates satisfaction with their overall experience at UF as well as their experience within COA or SFRC. Examples of open-ended questions include: "What three experiences were the most valuable to you while attending the University of Florida?"; and "What three things would you change to make your educational experience at the University of Florida a better one?".

In the evaluation of leadership activities, graduates were asked to identify the extracurricular activities they were affiliated with while attending UF. A Cronbach's alpha of 0.78 was calculated for Likert scale items measuring the value of extracurricular activities in helping students gain a better understanding of food, agriculture, and natural resources, become aware of career possibilities, develop leadership and job skills, and work with people.

Part 4 used open-ended and multiple choice questions to develop a personal profile of the graduates and to determine their current occupational status. The occupational status of graduates was categorized by use of predetermined clusters established by the USDA (Coulter, Goecker, & Stanton, 1990). Respondents from the 1989, 1991, and 1992 academic years placed themselves into one of the following clusters: 1) scientist, engineer, or related specialist; 2) manager or financial specialist; 3) marketing, merchandising, or sales representative; 4) education, communication or information specialist; 5) social service professional; and 6) agriculture production specialist. Respondents that did not fit into an occupational cluster were categorized as 7) graduate or professional student or 8) other. The USDA clusters were found to be insufficient for the variety of occupations held by respondents and the question format was discontinued for the 1993 and 1994 graduates. Efforts are currently being made to expand and restructure the occupational categories.

Data collection from the 1989, 1991, and 1992 graduates began in the fall semester of 1993. Similarly, data collection from the 1993 and 1994 graduates began in the fall semester following the academic year. The survey instrument, a letter of introduction and a self-addressed stamped envelope was mailed to all members in the population. Three weeks after the initial mailing, a follow-up letter and a copy of the survey was mailed to the non-respondents. A final attempt was made to contact the non-respondents three to four weeks after the second mailing.

Data was analyzed using Statistical Analysis System (SAS) for personal computers (SAS Institute, Inc., 1989). Frequencies and percentages were calculated to develop a descriptive profile of the population. Chi-squares were used to compare the characteristics of the respondnets with those of the population, categories with fewer than five observations per cell were combined to facilitate the analysis.

Findings

Characteristics of Respondents

The gender ratio of survey respondents for the five study years was 55% male to 44% female. This ratio ranged from 62% male in 1989 to 53% male in 1994. Data from the Office of Administrative Affairs (1993) showed that the average number of undergraduate male students enrolled during the 1989 to 1993 fall semesters was 58%. Roughly 80% of the respondents from each study year were classified as White (non-Hispanic), while African American, Hispanic, and Asian graduates made up 20% of the respondents. This distribution was similar to known race and characteristics of the student population for the four years. During the time of the study, the COA and SFRC undergraduate population was 77% White (non-Hispanic), 11% African American, 5% Hispanic and 7% were classified as other (Office of Administrative Affairs, 1993). A chi-square test for independence of the variables gender and race by year showed that there were no differences between the characteristics of the respondents and the study year (X^2=2.04, p=0.73 and X^2=8.19, p=0.41 respectively). Table 1 shows the breakdown of the respondents gender and race by year.

Table 1.
Gender and race characteristics of respondents by study year.

	1989-1990		1991-1992		1992-1993		1993-1994		1994-1995	
	n	%	n	%	n	%	n	%	n	%
Gender: (n= 668)										
Female	23	38	26	41	51	46	73	44	124	47
Male	37	62	38	59	60	54	95	56	141	53
Total	60	100	64	100	111	100	168	100	245	100
Race: (n= 659)										
White (non-Hispanic)	50	83	49	77	96	86	138	82	212	81
African American	7	12	5	7	5	5	8	5	15	6
Hispanic	2	3	4	6	10	9	9	5	17	6
Asian	1	2	3	5	0	-	8	5	11	4
Other	0	-	3	5	0	-	5	3	6	3
Total	60	100	64	100	111	100	168	100	261	100

Of the baccalaureate degree programs offered by the COA and SFRC at the time of the study, the largest percent of respondents majored in food and resource economics (24%), animal science (16%), and food science and human nutrition (17%). Less than 10% of the respondents majored in microbiology and cell science (9%), agricultural operations management (7%), and horticultural sciences (7%). Five percent or less majored in agricultural education and communication, agricultural engineering, agronomy, botany, dairy and poultry science, entomology and nematology, plant pathology, plant science, soil and water science, fisheries and aquatic sciences, forest resources and conservation, wildlife ecology and conservation. A comparison of the respondents to data on the known population showed that approximately 30% of the graduates majored in food and resource and economics, 13% in animal science, 11% in food science and human nutrition.

Graduates were asked to think back on their decision to enter COA or SFRC and recall the reasons for selecting a particular major. The majority of the respondents attributed their selection to a genuine interest in the field. Additional responses included, "a good undergraduate major to get into graduate school", and "changed majors after taking elective courses in the program".

Forty-four percent of the respondents entered UF as high school graduates, 8% transferred from four-year universities, and 48% transferred from community colleges. Of the students that transferred from community colleges, 52% indicated they received either excellent or good academic preparation, 21% indicated average preparation and 27% said it was either fair or poor (Figure 1).

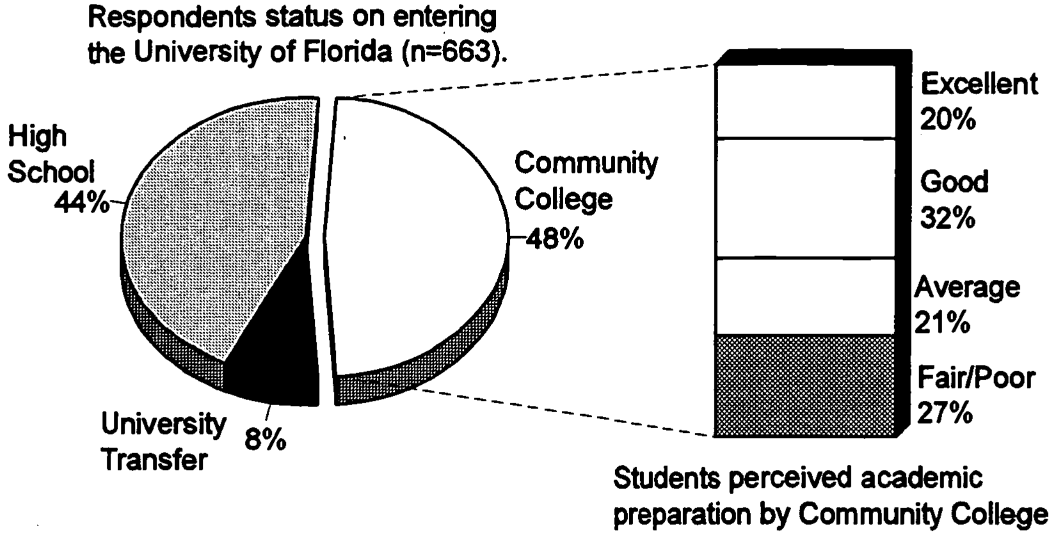

Figure 1. Respondents status and preparation upon entering the University of Florida.

Respondents from the 1989, 1991, and 1992 study years placed themselves into occupation clusters established by the USDA. Twenty-seven percent of the 1989 survey respondents categorized themselves as scientists, engineers or related specialists, 22% as marketing, merchandising or sales representatives, 20% as graduate students, and 15% as managers or financial specialists (Table 2). Over 30% of the 1991 and 1992 respondents indicated that they were graduate students at the time they completed the follow-up survey. Twelve percent of the 1991 respondents categorized themselves as scientists, managers, marketing representatives, and 8% as agricultural production specialists.

Table 2.
Occupational status of respondents from 1989, 1991 and 1992 study years.

	1989-90		1991-92		1992-93	
	n	%	n	%	n	%
Occupation:						
Scientist, Engineer or Related Specialist	16	27	8	12	15	14
Manager or Financial Specialist	9	15	8	12	19	17
Marketing, Merchandising or Sales	13	22	8	12	11	10
Education, Communication or Information Social	4	7	5	8	5	4
Service Professional	2	3	1	2	6	5
Agricultural Production Specialist	4	7	6	9	11	10
Graduate/Professional Student	12	20	21	33	35	32
Other	0	-	7	11	9	8
Total	60	101	64	99	111	100

The 1992 graduates indicated that they were employed as managers (17%), scientists (14%), marketing representatives (10%) and agricultural production specialists (10%). Less than 10% of the respondents from each study year indicated that they were education, communication, information specialists, or social service professionals. Respondents who selected the category 'other' indicated that they were either unemployed or working in a job unrelated to their degree.

The majority of respondents indicated that they received a gross income of between $20,000 and $29,999 per year. Respondents who indicated they were in graduate school at the time of the survey were not included in the analysis. Figure 2 shows that over 30% of the respondents from 1989 indicated that they were earning $30,000 or more, while roughly 10% of the 1991 through 1994 respondents were earning the same amount. This difference can be attributed to the length of time the respondents had been in the work force and the distribution of the survey.

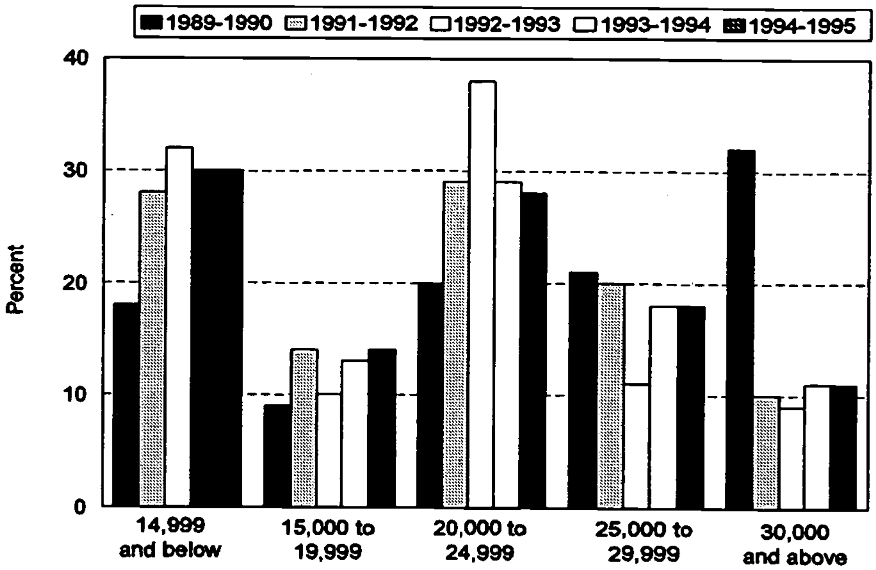

Figure 2. Income of respondents by study year (n=524).

Evaluation of the Academic Program

In an evaluation of the academic program, graduates were asked to rate course work, advising, teaching qualities and techniques of professors. Respondents rated course work and advisement using a five-point Likert scale with the following choices: excellent, good, average, fair and poor. Only 10% of the respondents indicated that the lower division or general education courses they took were excellent, 53% indicated that they were good, and 30% said average (Figure 3). In comparison, a larger percent (41%) of the respondents rated courses in their major as excellent and 48% indicated that they were good. When asked about elective courses in COA and SFRC, 78% of the respondents indicated that they were either excellent or good.

Graduates rated the advisement they received as lower division (pre major) students in contrast with advisement they received in their departments. Only 8% of the respondents indicated that they received excellent advisement as lower division students, 21% felt it was good, 22% average, 20% fair, and 29% poor (Figure 4). In contrast, 42% of the respondents indicated that they received excellent advisement in

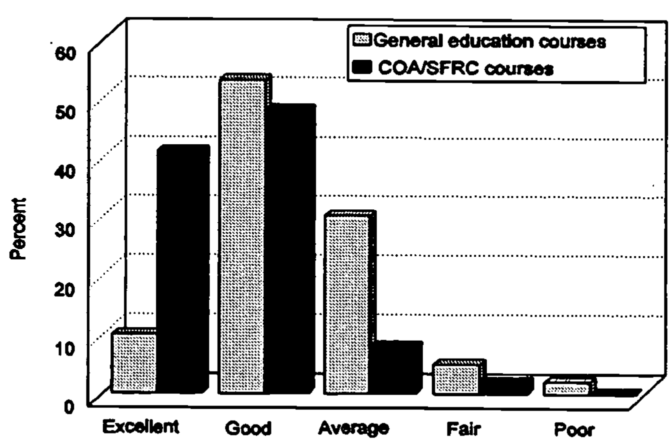

Figure 3. Respondents' ratings of general education or lower division courses and COA/SFRC courses.

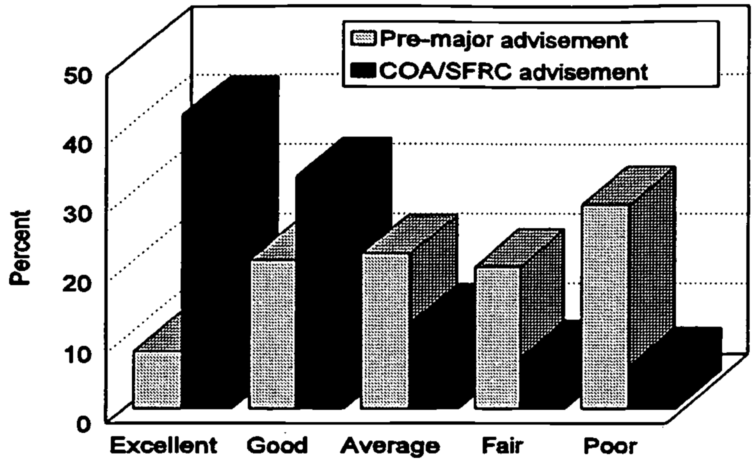

Figure 4. Respondents' ratings of pre-major or lower division advisement compared with ratings of advisement in COA/SFRC.

their departments, 33% felt it was good, 12% average, 7% fair, and 6% poor.

The majority of respondents strongly agreed that COA and SFRC faculty who taught courses in their major were clear and easy to understand (24%), enthusiastic (43%), good teachers (41%), and organized (27%) (Figure 5). Approximately 20% of the respondents strongly agreed that professors used a variety of teaching methods and questions to check understanding. Graduates also rated faculty who taught general education courses. Few respondents strongly agreed that the points professors made in class were clear and easy to understand (4%), good teachers (5%), organized (6%), and enthusiastic (8%). Less than half of the respondents (6%) indicated that general education faculty used a variety in teaching methods and 5% felt professors used a variety of questions to check understanding. For each multiple-item scale, the COA and SFRC faculty who taught courses in the students major rated higher in clarity, enthusiasm, teaching, organization and variety of teaching methods and questions to check understanding than faculty who taught general education courses.

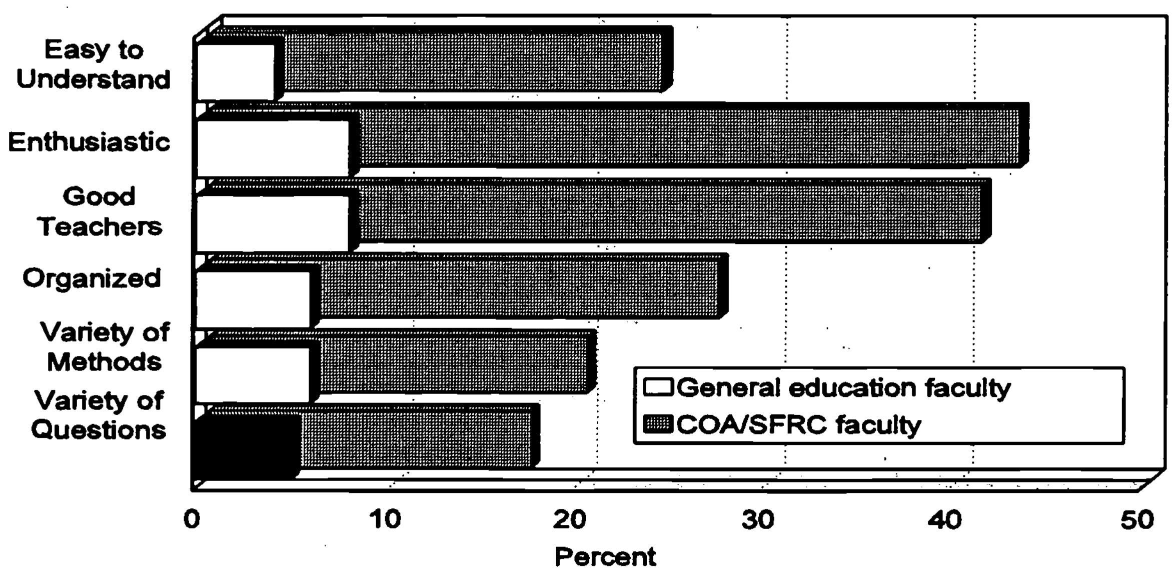

Figure 5. Percent of respondents who strongly agree with statements of teaching quality and technique.

Overall Evaluation

Roughly one-third of the respondents indicated that their overall or cumulative experience at UF was excellent, 53% felt it was good, and 19% felt it was fair or poor. Respondents also rated their overall experience within the COA and SFRC, 57% felt it was excellent, 37% felt it was good, and 6% fair. When asked to reveal their three most valuable experiences while at UF, respondents stated that the professional associations and friendships they developed with professors was their most valuable experience. Involvement in extracurricular activities and meeting new friends were also considered valuable experiences. Other responses included feelings of personal development and classes that allowed students to gain hands-on experience. Graduates were also asked what they would change to make their educational experiences at UF a better one. Respondents revealed that they would have sought better advisement, interacted more with professors, and would have spent more time studying. Other frustrations and comments were directed toward administrative issues such as financial aid, parking and registration.

Evaluation of Leadership Activities

In an evaluation of leadership activities, graduates identify the extracurricular activities and student organizations they were associated with while attending UF. Roughly 80% of the respondents indicated that they were involved in at least one extracurricular activity and 57% indicated that they were involved in more than one activity. The majority of respondents indicated that they were active in departmental clubs, and honor fraternities. Respondents were also active in organizations outside COA and SFRC such as intermural sports and organized community activities.

Respondents rated the overall value of their extracurricular experiences (Table 3). Over three-quarters of the respondents indicated that extracurricular activities helped them (very much or much) develop skills which enabled them to work with people. Over

Table 3.
Respondents ratings of the overall value of extracurricular activities for the combined study years.

Extracurricular activities and student organizations ...	Very Much n	%	Much n	%	Some n	%	Little n	%	None n	%
Helped me understand food, agriculture, and natural resources better (n=575)	120	21	119	21	179	31	80	14	77	13
Helped me develop leadership skills (n=575)	237	41	122	21	140	24	49	8	27	5
Helped me work with people (n=576)	264	46	183	32	89	16	23	4	17	3
Helped me develop skills needed in my current job (n=558)	182	33	108	19	140	25	64	12	64	12
Made me aware of career possibilities (n=577)	172	30	143	25	150	26	65	11	47	8

50% indicated that extracurricular activities helped them develop leadership skills and made them aware of career possibilities while only 42% indicated that extracurricular activities helped them to understand food, agriculture, and natural resources better. Despite the modest ratings, 96% of the respondents recommended students take part in extracurricular activities and student organizations, stating that extracurricular activities helped them "gain leadership experience" and "develop skills not taught in the classroom".

Conclusions

The purpose of this study was to determine the occupational status of baccalaureate degree recipients from COA and SFRC at UF and to assess their perceptions of their educational experiences. The educational experiences included course work, advisement, teaching quality, and extracurricular activities.
The majority of respondents categorized themselves as scientists, managers, marketing representatives, and graduate students. Less than 10% of the respondents indicated that they were education specialists, social service professionals, or agricultural production specialists. Fortunately, the occupational status of COA and SFRC graduates coincides with the employment opportunities outlined by Coulter et al. (1990) in Employment opportunities for college graduates in the food and agricultural sciences. According to the authors, there are roughly 48,000 annual openings for college graduates with expertise in food, agriculture, and natural resources and only 43,500 qualified graduates (Coulter, et al., 1990). The greatest employment opportunities are in the marketing, merchandising, science, and engineering fields while communications, education, and agriculture production fields will experience an excess in the number of graduates for those positions (Coulter, et al., 1990).

Over 90% of the respondents from each study year perceived their overall experiences within their departments and at UF as excellent or good. Forty-one percent of the respondents rated the courses in their departments as excellent while only 10% rated general education courses as excellent. Similarly, 42% of the respondents rated the advisement they received in their departments as excellent and only 8% felt lower division or pre major advisement was excellent. Respondents rated teaching qualities and techniques of COA and SFRC faculty significantly higher than faculty that taught general education courses. However, in both situations, respondents rated teaching qualities of professors higher than teaching techniques. Considering the limited amount of time available to teach a specific amount of material, faculty often have no choice but to use the primary means of instruction in higher education, the lecture. On the other hand, the impediment to instructional variety may be the faculty's lack of academic preparation in educational methodology.

The information obtained in this follow-up study will be used to meet accountability requirements, inform stakeholders, and recruit students. Data gathered on the graduates' occupational status and educational experiences can be used as a recruiting tool to dispel negative perceptions of high school students regarding careers in food, agriculture and natural resources. The administration, faculty, and advisors of the COA and SFRC should be pleased with the feedback from their graduates. The positive feedback from respondents in this study is similar to results from follow-up studies by Wrye and Terry (1993), the Florida Survey Research Center (1993), and Barkley (1995). In each study, participant's satisfaction with their educational experiences was used as evidence of program quality. However, if participant satisfaction is the goal, at what level of satisfaction do administrators and educators assess program quality? Since the majority of respondents indicated that the advisement they received in their departments was either excellent (42%) or good (33%), do administrators set 75% as the standard by which to judge future programs, or do they try to achieve higher levels of respondent satisfaction? Barkley (1993) challenges agricultural educators to aspire to the level of excellence when every graduate can claim to be "very satisfied" with his or her investment in education.

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FOLLOW-UP STUDY OF GRADUATES FROM THE COLLEGE OF AGRICULTURE AND SCHOOL OF FOREST RESOURCES AND CONSERVATION FROM THE UNIVERSITY OF FLORIDA

Discussant Remarks
N. L. McCaslin
The Ohio State University

This paper has been well written and though through. It was a pleasure to read. The author develops a strong case for conducting follow-up studies of university graduates.

The researchers are to be commended for attempting to follow-up the graduates since 1989. However the discussant wondered why the graduates of 1990 were not included. Also, no mention was made of any attempt to contact the non-respondents.

This discussant would like to know more about the panel review. Particularly, how many individuals were involved and their qualifications.

The discussant would have preferred to have most of the lines in the tables eliminated and only use them to set off the heading and to conclude the table. This would make the tables easier to read. The figures communicated their information very effectively. However, it would have been desirable to know how many individuals were reported in each figure. For example, Figures 1 and 2 indicated the number of individuals that responded, but Figures 3, 4, and 5 do not.

Finally, the paper could have been strengthened by having the authors make stronger statements regarding their recommendations. Although they state that the information "will be used to meet accountability requirements, inform stakeholders, and recruit students" more specific recommendations would increase the likelihood that the study will be used.

HISTORY OF GRADUATE PROGRAMS IN AGRICULTURAL/EXTENSION EDUCATION IN THE UNITED STATES

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Introduction/Theoretical Framework

Graduate programs in agricultural/extension education developed rather slowly at the beginning of the twentieth century, partially because before 1900 the belief was generally that two years of college or less was sufficient for an elementary or secondary teacher (Robison and Jenks, 1913). This belief gradually changed giving rise to graduate programs but the change was slow. Programs in agriculture in institutions of higher education began in the mid 1700s (two of the earliest were the chemistry of agriculture at Philadelphia Academy [University of Pennsylvania] in 1751 and husbandry and commerce at King's College [Columbia University] in 1754), they progressed slowly until the passage of the Morrill Acts of 1862 and 1890. These acts led to the founding of agricultural and mechanical colleges (land-grant). One of the few agricultural institutions established before these acts was the Michigan Agricultural College in 1857, generally considered to be the first agricultural college founded. These agricultural colleges became the parent institutions for agricultural education, preparing teachers of agriculture.

According to Jenks (1913), the first graduate program in agriculture was a seminar rotated among interested land-grant colleges about every two years between 1902 and 1912. " In 1902 Thomas F. Hunt, then dean of the school of agriculture of Ohio State University, conceived the idea of a graduate school of agriculture to furnish the opportunity for somewhat extended discussion of topics of interest in agricultural science by the leading teachers or investigators in the field" (p. 264). The University of Illinois, Cornell University, Iowa State College and Michigan Agricultural College hosted sessions. Considerable emphasis was placed on college instruction in agriculture, secondary instruction in agriculture and agricultural extension teaching at the 1912 session.

According to Martin (Cardozier, 1967) teacher education in agriculture really began in the first two decades of the twentieth century (1900-1920). According to Stimson and Lathrop (1942), Massachusetts Agricultural College in 1907, Michigan Agricultural College in 1908, Iowa State College in 1911, and the University of Minnesota in 1912 established the first four departments of agricultural education. Stimulated by the Smith Hughes Act of 1917, other colleges and universities established departments, until in 1921 there were 48 programs in white and 12 programs in negro institutions.

After the rush to provide enough teachers of agriculture somewhat subsided, the need to better prepare those teachers developed. Even in 1912, a professor in agricultural education at Ohio State University was predicting the need for graduate studies in agricultural education (Bricker, 1914). Broyles (1926), agricultural education faculty at the Pennsylvania State College, conducted one of the few studies found that concerned graduate programs in agricultural education. He stated, "In all lines of teaching, the graduate schools of colleges and universities are looked to as agencies of training for better teaching. In search of better preparation, the teachers of vocational agriculture return to college for graduate work" (p. 8). Of the twenty institutions he surveyed, the University of California listed the first masters thesis in agricultural education in 1912. In the 1919-1920 school year, the University of California, University of Minnesota, Cornell University, the Pennsylvania State College, and the University of Wisconsin reported graduate student enrollment in agricultural education. The greatest numbers were at Cornell and Penn State with 10 and 9, respectively. Over the five year period 1919-1924, Cornell had well over twice as many students enrolled as did any of the other 19 institutions. Enrollment in the summer was as many as six times the number enrolled during the regular session. As the study by Broyles was one of the few studies found concerning graduate programs in agricultural/extension education, there appeared to be a great need to identify and document the history of graduate programs information in agricultural/extension education in the United States.

Purpose(s)/ Objective(s)

The purpose of the study was to identify and document the history of graduate programs in agricultural/extension education in the United States. In order to accomplish the purpose of this study, the following objectives were established:

1. To identify 1862 land-grant, 1890 land-grant and non land-grant institutions which offered or offer graduate programs in agricultural/extension education and their founding dates;
2. To determine dates graduate programs started at the institution, started in agricultural education, and when first degrees were awarded;
3. To determine the units administering and the units housing the agricultural education graduate programs; and
4. To determine the dates, types, and numbers of graduate degrees offered.

Methods/Procedures

A questionnaire asking for historical information about graduate programs in agricultural/extension education was sent to all agricultural/extension education departments listed in the American Association of Agricultural Education Directory by e-mail, fax and U. S. mail. It was sent to the graduate coordinator, department head or person most knowledgeable about the graduate program, and, where possible, to the person who filled out a similar questionnaire in 1990. Follow-up was done by phone, e-mail, fax and by U. S. mail for a four month period in an attempt to get the best information possible. The instrument was a modification of an instrument developed by Drs. Bell (North Carolina A&T), Hash (Clemson) and Key (Oklahoma State) and used by Ake (1991) in a similar study on institutional biographical data in agricultural education graduate programs. Information received was cross-checked with published historical sources where possible and published data used and cited if information conflicted.

Results/Findings

As shown in Table 1, 43 (69 percent) of the responding institutions indicated they were 1862 land-grant institutions. Six (9 percent) were 1890 land-grant, whereas 14 (22 percent) were non land-grant. Seventy-nine percent of the institutions involved in this study were land-grant colleges and universities.

A majority of the responding institutions, 36 (57 percent), were established by the latter half of the nineteenth century. Twenty-four (38 percent) were established during the latter part of the nineteenth to earlier part of the twentieth century. Since the mid 1930's only one institution was established, California Polytechnic State University at San Luis Obispo.

The University of Tennessee established the first institutional graduate program recorded by the respondents in 1821. By 1960, a total of 51 (82 percent) graduate programs had already been established in colleges and universities involved in this study.

TABLE 1

STATE, INSTITUTION, YEAR FOUNDED, TYPE, YEAR GRADUATE PROGRAM BEGAN, YEAR AGED GRADUATE PROGRAM BEGAN, ADMINISTRATIVE UNIT, AND DEPT. LOCATION

STATE	INSTITUTION	YEAR FOUNDED	TYPE	INST GRAD PROG BEGAN	AGED GRAD PROG BEGAN	AGED GRAD PROG ADMIN	LOCATION AGED DEPT
AL	AUBURN UNIV	1856	1890	1857	1928	GRAD COL	AG COL
AR	ARKANSAS STATE	1909	NON L-G	1955	1965	GRAD COL	AG COL
AR	UNIV ARKANSAS	1871	1862	1935	1983	GRAD COL	AG COL
AZ	UNIV ARIZONA	1885	1862	1898	1949	GRAD COL	AG COL
CA	CAL POL S.U.-POM.	1901	NON L-G	1948	1948	AG COL	AG COL
CA	CAL POL S.U.-SLO	1938	NON L-G	1976	1976	AG COL	AG COL
CA	UNIV CAL-DAVIS	1905	1862	1945	1945	GRAD COL	AG COL
CO	COLORADO STATE	1870	1862	1857	1928	GRAD COL	APPL H.S
CT	UNIV CONNECTICUT	1881	1862	1941	1941	GRAD COL	COL ED
FL	UNIV FLORIDA	1853	1862	1904[B]	1917	GRAD COL	AG COL
GA	UNIV GEORGIA	1785	1862	1910	1964	GRAD COL	COL ED
IA	IOWA STATE UNIV	1858	1862	1869	1918	GRAD COL	AG COL
ID	UNIV IDAHO	1889	1862	1925	1925	GRAD COL	AG COL
IL	S. ILLINOIS UNIV	1869	NON L-G	1944	1960	GRAD COL	AG COL
IL	UNIV ILLINOIS	1867	1862	1870	1935	GRAD COL	AG COL
IL	W. ILLINOIS UNIV	1899	NON L-G	1967	1967	GRAD COL	BUS & TECH
IN	PURDUE UNIV	1869	1862	1885[B]	1924	GRAD COL	COL ED
KS	KANSAS STATE U.	1863	1862	1869[B]	1911[T]	GRAD COL	AG COL
KY	UNIV KENTUCKY	1865	1862	1874[B]	1926	GRAD COL	AG COL
KY	W. KENTUCKY U.	1906	NON L-G	1931	1968	GRAD COL	SC & TECH
LA	LOUSIANA S. U.	1853[B]	1862	1868[B]	1909[T]	GRAD COL	AG COL
LA	SOUTHERN UNIV	1880	1890	1957	1957	GRAD COL	COL ED
MA	UNIV MASS	1863	1862	1892	1976	GRAD COL	COL ED
MD	UNIV MD-E.SHORE	1886	1890	1978	1978	GRAD COL	AG. SC
MD	UNIV MARYLAND	1856	1862	1917	1928	GRAD COL	AG COL
MI	MICHIGAN S. U.	1855	1862	1864	1946	GRAD/ADM	AG COL
MN	UNIV MINNESOTA	1851	1862	1878[B]	1918	GRAD COL	COL ED
MO	NW MISSOURI S. U.	1905	NON L-G	1958	1967	GRAD COL	AG COL
MO	UNIV MISSOURI	1839	1862	1846	1923	GRAD COL	ED/AG
MS	MISSISSIPPI STATE	1878	1862	1883	1949	GRAD COL	AG COL
MT	MONTANA S. U.	1893	1890	1902	1938	GRAD COL	AG COL
NC	NC A&T STATE U.	1891	1890	1939	1939	GRAD COL	AG COL
NC	NC STATE UNIV	1889	1862	1891	1927	GRAD COL	AG COL
ND	N. DAKOTA S. U.	1862	1862	1895	1924	GRAD COL	AG 25% ED 75%
NE	UNIV NEBRASKA	1869	1862	1886	1928	GRAD COL	AG COL
NH	NEW HAMPSHIRE	1866	1862	1896	1962	GRAD COL	AG COL
NJ	RUTGERS UNIV	1864	1862	1964	1964	GRAD COL	AG COL
NM	UNIV NEW MEXICO	1888	1862	1956	1964	GRAD COL	AG COL
NY	CORNELL UNIV	1865	1862	1870[B]	***	GRAD COL	AG COL
OH	OHIO STATE	1870	1862	1878	1920	GRAD COL	AG COL
OK	OKLAHOMA STATE	1890	1862	1917	1929	GRAD COL	AG COL
OR	OREGON STATE	1869	1862	1882	1948	GRAD COL	AG COL
PA	PENN STATE	1855	1862	1861	1911	GRAD COL	AG COL
RI	UNIV RHODE ISLAND	1892	1862	***	1965	GRAD COL	AG COL
SC	CLEMSON UNIV	1889	1862	1924	1946	GRAD COL	AG COL
SD	S. DAKOTA S. U.	1886	1862	1891	1928	GRAD COL	AG COL
TN	UNIV TENN- MARTIN	1927	1862	1967	1977	GRAD COL	COL ED
TN	TENNESEE S. U.	1912	1890	1941	1944	COL ED	AG COL
TN	UNIV TENN-KNOX	1794	1862	1821	1925AGED;1957EXT	GRAD COL	AG&HEC
TN	TENN TECH UNIV	1915	NON L-G	1958	1985	GRAD COL	AG COL
TX	SAM HOUSTON S. U.	1879	NON L-G	1936	1942	GRAD COL	AG COL
TX	SW TEXAS S. U.	1899	NON L-G	1981	1976	ED & APP. SC	ED & APL. SC
TX	TARLETON S. U.	1899	NON L-G	1971	1986	GRAD COL	APL ARTS&TEC
TX	TEXAS A&M UNIV	1876	1862	1888	1929	GRAD COL	AG COL
TX	TEXAS TECH UNIV	1927	NON L-G	1927	1938	GRAD COL	AG COL
UT	UTAH STATE UNIV	1888	1862	1950	1955	GRAD COL	AG COL
VA	VPI & STATE UNIV	1872	1862	1952	1952	GRAD COL	AG COL
WA	WASHINGTON S. U.	1892	1862	1902	1922	GRAD COL	AG COL
WI	UW - MADISON	1848	1862	1880[B]	1935MSED;'50MSAG	GRAD COL	AG COL
WI	UW-PLATTEVILLE	1866	NON L-G	1965	1965	GRAD COL	AG & F.R & CON. SC
WI	UW-RIVER FALLS	1874	NON L-G	1960	1965	GRAD COL	AG COL
WV	W. VIRGINIA UNIV	1867	1862	1928	1948	GRAD COL	AG COL
WY	UNIV WYOMING	1886	1862	1934	1960	AG & FRTRY	AG COL
						GRAD COL	COL ED

Sources: [B]H.S. Brunner (1962); [T]W.E. Tolliver (1960).

The first graduate program in agricultural/extension education, as revealed by this study, started in 1917 at the University of Florida. Other sources indicated that the first Master of Science degree awarded in Agricultural Education was by the University of California at Berkeley in 1912 (Broyles, 1926). Between 1921 and 1940, the number of agricultural education graduate programs established was 19 (30 percent). Program initiation continued through 1980 as 33 additional programs (52 percent) were established.

A majority of agricultural/extension education graduate programs (57, or 90 percent) was administered through the graduate college. Forty-six institutions (73 percent) indicated they were located in the College of Agriculture.

As shown in Table 2, the Master of Science (M.S.) degree was awarded by 40 (65 percent) of the surveyed institutions for this study. The first M.S. degree in agricultural/ extension education awarded by a responding institution was by Pennsylvania State University in 1914. The least awarded degree in agricultural/extension education by responding institutions was the Master of Agriculture (M.Ag.). The M.Ag. degree was first awarded by the University of Florida in 1918. Currently 8 institutions award the Master of Agriculture degree. Twenty-six institutions awarded the Master of Education (M.Ed). as revealed by the study. The M.Ed. degree was first awarded simultaneously by the University of Arizona, Auburn and Colorado State in 1928.

The Specialist in Education (Ed.S.) degree was not awarded until 1940. The University of Illinois first awarded this degree. Thirteen responding institutions currently offer courses leading to an Ed.S. degree in agricultural/extension education. The Doctor of Education (Ed.D.) degree was not awarded until very late in the 1930's. The University of Missouri first awarded this degree in 1938. Currently, 20 responding institutions offer courses leading to the award of the degree of Doctor of Education as revealed by the study. The Doctor of Philosophy (Ph.D.) degree was first awarded in 1927 by Pennsylvania State University. A total of 16 responding institutions presently award this degree in agricultural/ extension education in the United States.

As shown in Table 3, the University of Missouri awarded the most M.S. degrees in the 1917-1937 period accounting for 34 percent or 49 of 144 of total M.S. degrees awarded. During the 1937-57 and 1957-77 periods Oklahoma State awarded the most M.S. degrees, awarding 128 of 809 (16 percent) and 372 of 2606 (14 percent) respectively for the two periods. During 1977-1990, Ohio State awarded the most degrees in this category, awarding 327 of 3360 (10 percent). For the greatest number of M.S. degrees awarded in the 1990-1995 period, Michigan State University awarded 74 of 1040 M.S. degrees (7 percent).

Sam Houston State University awarded an unusually large number of M.Ed. degrees during the 1937-57 and 1957-77 periods. Sam Houston awarded 446 of 959 or 47 percent of the total M.Ed. degrees awarded in 1937-57 period. In the 1957-77 period, 462 of 1499 or 31 percent of all M.Ed. degrees were awarded by Sam Houston.

The University of Illinois awarded the most Ed.D. degrees during the 1937-57 period. Since then Oklahoma State has awarded the greatest number in each time period, awarding 88 of 293 or 30 percent of the total for the 1957-77 period. In the 1977-90 period, Oklahoma State awarded 69 of 216 or 32 percent and in 1990-95 awarded 24 of 52 or 46 percent of the total.

Ohio State has awarded the greatest number of Ph.D. degrees since the 1937-57 period. For 1937-57, 57-77, 77-90, and 90-95 periods, Ohio State awarded 32/70 or 46 percent, 175/423 or 41 percent, 120/547 or 22 percent, and 66/298 or 22 percent, respectively.

TABLE 2

YEAR GRADUATE DEGREES FIRST AWARDED IN AGRICULTURAL/EXTENSION EDUCATION

STATE	INSTITUTION	M.S.	M.Ag.	M.Ed.	Ed.S.	Ed.D.	Ph.D.	Other
AL	AUBURN UNIV			1928	1963	1972		
AR	ARKANSAS STATE	1966	1975					
AR	UNIV ARKANSAS	1991		1983	1983	1983		
AZ	UNIV ARIZONA	1953		1928				1949 M.AgEd.
CA	CAL POL S.U.-POM.	1963						
CA	CAL POL S.U.-SLO	1977						
CA	UNIV CAL-DAVIS			1945				
CO	COLORADO STATE			1928	1963	1972		
CT	UNIV CONNECTICUT			1947	1955		1953	
FL	UNIV FLORIDA	1918	1918					
GA	UNIV GEORGIA		1964	1968	1973	1968		
IA	IOWA STATE UNIV	1918					1968	
ID	UNIV IDAHO	1925						
IL	S. ILLINOIS UNIV	1960					1975	
IL	UNIV ILLINOIS	1935		1930	1940	1949	1954	
IL	W. ILLINOIS UNIV	1968						
IN	PURDUE UNIV	1925					1928	
KS	KANSAS STATE U.							
KY	UNIV KENTUCKY							
KY	W. KENTUCKY U.			1969				
LA	LOUSIANA S. U.							
LA	SOUTHERN UNIV			1959				
MA	UNIV MASS			1977		1979		1987 Cert. AgSc.
MD	UNIV MD-E.SHORE	1984						
MD	UNIV MARYLAND	1930					1971	
MI	MICHIGAN S. U.	1946	1952	1942	1966	1951	1951	1946 M.A.
MN	UNIV MINNESOTA	1920		1969			1928	
MO	NW MISSOURI S. U.	1968		1970				
MO	UNIV MISSOURI			1937	1957	1938	1931	1923 M.A.
MS	MISSISSIPPI STATE		1950	1949	1973	1981	1989	
MT	MONTANA S. U.	1939						
NC	NC A&T STATE U.	1941						
NC	NC STATE UNIV	1927	1995	1972	1972	1972		
ND	N. DAKOTA S. U.	1926						
NE	UNIV NEBRASKA	1930						
NH	NEW HAMPSHIRE							M.O.E.
NJ	RUTGERS UNIV			1960		1964		
NM	UNIV NEW MEXICO							1964 M.A.
NY	CORNELL UNIV							
OH	OHIO STATE	1927		1993			1936	
OK	OKLAHOMA STATE	1931	1985		1975	1955		
OR	OREGON STATE	1948	1950	1950		1950	1950	
PA	PENN STATE	1914	1981	1941		1942	1927	
RH	UNIV RHODE ISLAND							1966 M.A.
SC	CLEMSON UNIV	1950				1986		1957 M.AgEd.
SD	S. DAKOTA S. U.	1930		1958				
TN	UNIV TENN- MARTIN	1978						
TN	TENNESSEE S. U.	1944						
TN	UNIV TENN-KNOX		1928Ag.Ed					1959Ext. Ed MA.
TN	TENN TECH UNIV							
TX	SAM HOUSTON S. U.			1942				
TX	SW TEXAS S. U.			1981				
TX	TARLETON S. U.	1994						1986 MST.
TX	TEXAS A&M UNIV	1964	1972	1931		1991	1985	
TX	TEXAS TECH UNIV	1937						
UT	UTAH STATE UNIV	1956				1975		
VA	VPI & STATE UNIV	1952			1971	1971		
WA	WASHINGTON S. U.	1922						
WI	UW - MADISON	1935					1950	
WI	UW-PLATTEVILLE							1966 MST.;1969 M.S. Ag. Ind.; 1979 M.S-Ed.
WI	UW-RIVER FALLS	1966						1967 M. Arts in Ag.
WV	W. VIRGINIA UNIV	1944						
WY	UNIV WYOMING	1961			1974	1969	1984	

TABLE 3

NUMBER OF GRADUATE DEGREES AWARDED IN AGRICULTURAL/EXTENSION EDUCATION (BY INSTITUTIONS)

		1917 - 1937			1937 - 1957							1957 - 1977						
STATE	INSTITUTION	M.S.	M.Ed	Ph.D	M.S.	M.Ag	M.Ed	Ed.S.	Ed.D.	Ph.D.	Oth.	M.S.	M.Ag	M.Ed	Ed.S.	Ed.D.	Ph.D.	Oth.
AL	AUBURN UNIV																	
AR	ARKANSAS STATE											72						
AR	UNIV ARKANSAS																	
AZ	UNIV ARIZONA				1							10						
CA	CAL POL S. U.-POM.											147						
CA	CAL POL S. U.-SLO											1						
CA	UNIV CAL-DAVIS						109							180				
CO	COLORADO STATE																	
CT	UNIV CONNECTICUT						11	5		1				11	8		1	
FL	UNIV FLORIDA												20					
GA	UNIV GEORGIA												29	48	11	24		
IA	IOWA STATE UNIV	12			58							161					30	
ID	UNIV IDAHO	7			16							58						
IL	S. ILLINOIS UNIV											16					2	
IL	UNIV ILLINOIS								14	2						16	5	
IL	W. ILLINOIS UNIV																	
IN	PURDUE UNIV																15	
KS	KANSAS STATE U.																	
KY	UNIV KENTUCKY																	
KY	W. KENTUCKY U.																	
LA	LOUISIANA S. U.																	
LA	SOUTHERN UNIV																	
MA	UNIV MASS																	
MD	UNIV MD-E.SHORE																	
MD	UNIV MARYLAND											110					6	
MI	MICHIGAN S. U.				3	8	1		2	13	74		3		3		55	170
MN	UNIV MINNESOTA	18		2	77					10		171		20			54	
MO	NW MISSOURI S. U.											2		4				
MO	UNIV MISSOURI	49	2	1	10		135		10					203		79	35	
MS	MISSISSIPPI STATE				13		74				130	20		71	45			183
MT	MONTANA S. U.				13							85						
NC	NC A&T STATE U.				69							133						
NC	NC STATE UNIV	6			7		68					70		120		2		
ND	N. DAKOTA S. U.																	
NE	UNIV NEBRASKA	9			53							133						
NH	NEW HAMPSHIRE																	
NJ	RUTGERS UNIV																	
NM	UNIV NEW MEXICO											85						
NY	CORNELL UNIV																	
OH	OHIO STATE	33		1	88					33		314					175	
OK	OKLAHOMA STATE	6			128				2			372			1	88		
OR	OREGON STATE				9	3	2		1			17	4	38		10		
PA	PENN STATE				101		20		10	12		36		133		43	16	
RI	UNIV RHODE ISLAND																	114
SC	CLEMSON UNIV				33	1						33	134					
SD	S. DAKOTA S. U.	10			20									30				
TN	UNIV TENN- MARTIN																	
TN	TENNESSEE S. U.																	
TN	UNIV TENN-KNOX.				60							228						
TN	TENN TECH UNIV																	
TX	SAM HOUSTON S. U.						446							462				
TX	SW TEXAS S. U.																	
TX	TARLETON S. U.																	
TX	TEXAS A&M UNIV																37	
TX	TEXAS TECH UNIV				33		91					28		157				
UT	UTAH STATE UNIV											35						
VA	VPI & STATE UNIV											48			5	9		
WA	WASHINGTON S. U.	4			9							109						
WI	UW - MADISON																	
WI	UW-PLATTEVILLE											44						
WI	UW-RIVER FALLS											99						5
WV	W. VIRGINIA UNIV																	
WY	UNIV WYOMING											21			1	2		
	GRAND TOTAL	144	2	4	809	14	959	5	39	70	204	2606	170	1499	74	293	423	491

		1977 - 1990							1990 - 1995						
STATE	INSTITUTION	M.S.	M.Ag	M.Ed	Ed.S.	Ed.D.	Ph.D	Oth.	M.S.	M.Ag	M.Ed	Ed.S.	Ed.D	Ph.D.	Oth.
AL	AUBURN UNIV														
AR	ARKANSAS STATE														
AR	UNIV ARKANSAS	46		38	14	9			18		1	3	3		
AZ	UNIV ARIZONA	40							29						
CA	CAL POL S. U.-POM.	108							39						
CA	CAL POL S. U.-SLO	80							30						
CA	UNIV CAL-DAVIS			134							36				
CO	COLORADO STATE														
CT	UNIV CONNECTICUT			28	10		2				7	2			
FL	UNIV FLORIDA	37	124						35	25					
GA	UNIV GEORGIA		53	46	16	17				34	133	41	5		
IA	IOWA STATE UNIV	114					87		53					44	
ID	UNIV IDAHO	55							31						
IL	S. ILLINOIS UNIV	72					4		33					7	
IL	UNIV ILLINOIS					7	23		50					15	
IL	W. ILLINOIS UNIV	20		10							8				
IN	PURDUE UNIV	75					4		9						
KS	KANSAS STATE U.	180							31						
KY	UNIV KENTUCKY	180							50						
KY	W. KENTUCKY U.														
LA	LOUISIANA S. U.	17				8	8		19					16	
LA	SOUTHERN UNIV														
MA	UNIV MASS			13	2	1					4				
MD	UNIV MD-E.SHORE	20							15						
MD	UNIV MARYLAND	70					45								
MI	MICHIGAN S. U.	56	69				18	67	74					33	
MN	UNIV MINNESOTA	42		61			24		17		40		1	33	
MO	NW MISSOURI S. U.	26		4											
MO	UNIV MISSOURI			263	33	1	48				44	7	3	10	
MS	MISSISSIPPI STATE	38		44	41	33	6	184	16	3	7	5	6	14	33
MT	MONTANA S. U.	28							9						
NC	NC A&T STATE U.	141							54						
NC	NC STATE UNIV	33		37					5	1	20				
ND	N. DAKOTA S. U.								1		33				
NE	UNIV NEBRASKA	67							35						
NH	NEW HAMPSHIRE							45							
NJ	RUTGERS UNIV														
NM	UNIV NEW MEXICO	141							59						
NY	CORNELL UNIV	55					61	112	11					41	47
OH	OHIO STATE	327					120		66		4			66	
OK	OKLAHOMA STATE	162	17			69			61	1			24		
OR	OREGON STATE	2	4	75		2	5		5	17	28		1	1	
PA	PENN STATE	27	5	108		12	23		9		25		1	23	
RI	UNIV RHODE ISLAND														
SC	CLEMSON UNIV		124			13				59			2		
SD	S. DAKOTA S. U.			20							5				
TN	UNIV TENN- MARTIN	30							0						
TN	TENNESSEE S. U.	75							10						
TN	UNIV TENN-KNOX.	179							43						
TN	TENN TECH UNIV							2							
TX	SAM HOUSTON S. U.			16							1				
TX	SW TEXAS S. U.			46							10				
TX	TARLETON S. U.	33													90
TX	TEXAS A&M UNIV	33	110	133		1	34		33	15	43		1	14	
TX	TEXAS TECH UNIV	10		88					55						
UT	UTAH STATE UNIV	60				1									
VA	VPI & STATE UNIV	40			30	29			10			8	7	3	
WA	WASHINGTON S. U.	157							23						
WI	UW - MADISON	33					24		6					2	
WI	UW-PLATTEVILLE	110		12							7				
WI	UW-RIVER FALLS	39						6	14						
WV	W. VIRGINIA UNIV	79							28						
WY	UNIV WYOMING	23					2		2						
	GRAND TOTAL	3160	526	1173	136	216	547	614	1040	144	465	65	52	298	160

STATE	INSTITUTION	Tot 17-37	Tot 37-57	Tot 57-77	Tot 77-90	Tot 90-95	Tot M.S.	Tot M.Ag.	Tot M.Ed.	Tot Ed.S.	Tot Ed.D	Tot Ph.D.	Tot Oth.	GRAND TOTAL
AL	AUBURN UNIV													
AR	ARKANSAS STATE						72	56					56	184
AR	UNIV ARKANSAS				107	23	64		39	16	11			130
AZ	UNIV ARIZONA		1	10	40	29	80							80
CA	CAL POL S. U.-POM.			147	108	39	494							494
CA	CAL POL S. U.-SLO			1	80	30	111							111
CA	UNIV CAL-DAVIS		109	180	134	36			459					459
CO	COLORADO STATE					13								13
CT	UNIV CONNECTICUT		19	44	40	9			81	25		6		112
FL	UNIV FLORIDA			20	153	40	43	169						211
GA	UNIV GEORGIA			112	253	202		106	226	68	66			466
IA	IOWA STATE UNIV	12	116	191	231	97	418	58				161		617
ID	UNIV IDAHO	7	16	58	55	31	167							167
IL	S. ILLINOIS UNIV			18	76	39	110					11		121
IL	UNIV ILLINOIS		16	41	30	65	250		400	43	57	45		794
IL	W. ILLINOIS UNIV				30	8	20		18					38
IN	PURDUE UNIV			15	79	9	84					19		103
KS	KANSAS STATE U.				180	31	211							211
KY	UNIV KENTUCKY				180	50	230							230
KY	W. KENTUCKY U.													
LA	LOUISIANA S. U.				53	25	56				8	24		88
LA	SOUTHERN UNIV						58							58
MA	UNIV MASS				18	4			17	2	1			22
MD	UNIV MD-E.SHORE				20	15	35							35
MD	UNIV MARYLAND			116	135		180					53		231
MI	MICHIGAN S. U.		101	233	210	95	133	80	1	1	2	107	133	637
MN	UNIV MINNESOTA	20	87	245	127	81	325		323		1	133		560
MO	NW MISSOURI S. U.			6	30		28		8					36
MO	UNIV MISSOURI	57	155	257	336	63	59		651	30	44	84		868
MS	MISSISSIPPI STATE		237	338	336	71	107	3	196	91	29	20	519	964
MT	MONTANA S. U.		13	85	28	9	135							135
NC	NC A&T STATE U.		69	133	141	54	377							377
NC	NC STATE UNIV	6	75	192	39	26	104	1	245		2			352
ND	N. DAKOTA S. U.					24	1		23					24
NE	UNIV NEBRASKA	9	53	133	67	15	255							255
NH	NEW HAMPSHIRE				45	1							48	48
NJ	RUTGERS UNIV								50			15		65
NM	UNIV NEW MEXICO			85	141	59	287							287
NY	CORNELL UNIV				228	101	68					102	159	329
OH	OHIO STATE	24	120	489	447	116	818		4			394		1,216
OK	OKLAHOMA STATE	6	130	461	248	86	729	18		1	183			911
OR	OREGON STATE		15	89	88	52	53	28	143		14	6		244
PA	PENN STATE		143	208	184	57	153	5	286		66	82		592
RI	UNIV RHODE ISLAND			114									114	114
SC	CLEMSON UNIV		25	117	136	61	45	100			14			359
SD	S. DAKOTA S. U.	10	30	10	20	5	30		55					85
TN	UNIV TENN- MARTIN				30	0	30							30
TN	TENNESSEE S. U.				75	10	200							200
TN	UNIV TENN-KNOX.		60	228	179	41	510							510
TN	TENN TECH UNIV				2								2	2
TX	SAM HOUSTON S. U.		446	462	16	1			927					927
TX	SW TEXAS S. U.				46	10			76					76
TX	TARLETON S. U.				33	90	123							123
TX	TEXAS A&M UNIV			37	109	106	46	145	174		2	85		453
TX	TEXAS TECH UNIV		133	185	98	55	135		336					461
UT	UTAH STATE UNIV			35	61		95				1			95
VA	VPI & STATE UNIV		94	63	99	27	193			43	45	3		283
WA	WASHINGTON S. U.	4	9	109	157	23	301							301
WI	UW - MADISON				57	8	39					16		65
WI	UW-PLATTEVILLE			44	122	7	154		19					173
WI	UW-RIVER FALLS			104	45	14	153						11	163
WV	W. VIRGINIA UNIV				79	28	107							107
WY	UNIV WYOMING			24	24	2	45			1	2	2		50
	GRAND TOTAL	155	2252	5414	6372	2219	8510	968	4553	323	550	1357	1249	17,509

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In the "Other" degree award category, Mississippi State awarded the greatest number from 1937 to 1990 periods. Their "Other" degree was the Master of Extension Education.

The Top 10 institutions awarded 100 percent of total degrees during 1917-1937. They awarded 1680 different degrees (75 percent) during the 1937-57 period. During 1957-1977, the top 10 institutions had a total of 3090 degrees awarded representing 57 percent of the total degrees awarded. During the 1977-90 period, the top ten institutions awarded 3170 different degrees (50 percent). During 1990-95, the top 10 institutions awarded 1067 (48 percent) of the 2239 total degrees awarded for the period.

Considering the entire time period, Ohio State awarded the greatest number of M.S. degrees, 818 of 8510 (10 percent) and the greatest number of Ph.D. degrees, 394 of 1357 awarded (29 percent). For the M.Ag., M.Ed., and Ed.S. degrees, Clemson, Sam Houston and Mississippi State awarded the most in each category with 300 or 31 percent, 927 or 20 percent and 91 or 28 percent, respectively. Oklahoma State awarded the greatest number of Ed.D. degrees with 183 or 33 percent of the 550 total during the study. In the "Other" degree category, Mississippi State awarded the greatest number, 519 (Ext.Ed.), (42 percent). There were 1238 total other degrees awarded during the study period.

Ohio State also awarded the greatest number of total degrees in agricultural/extension education during the entire period with 1216 or 7 percent. Mississippi State came next with 964 awards representing 6 percent. Oklahoma State, Missouri and Illinois were third, fourth and fifth, respectively. Michigan State and Iowa State tied for sixth with 637 awards or 4 percent. Penn State, Minnesota and Tennessee placed 8th, 9th and 10th, respectively.

The information reported by the responding institutions was the best information available to the individuals reporting at the time of the survey. Any corrections from a documented or more accurate source would be greatly appreciated as it would make the history of the graduate programs in agricultural/extension education in the United States more accurate.

Conclusions/Recommendations/Implications

Objective # 1

To identify 1862 Land-Grant, 1890 Land-Grant and non Land-Grant institutions which offer or offer graduate programs in agricultural/extension education and their founding dates.

The study revealed that 43 of the 63 responding institutions (68.25 percent) were 1862 land-grant institutions. Six institutions (9.52 percent) were 1890 land-grant, while 14 (22.22 percent) were non land-grant institutions. The number of responding institutions conducting or which have conducted agricultural/extension education graduate programs increased by 15 (31.35 percent) over those identified in a similar study by Ake in 1990. Responding institutions were established primarily between 1835 and 1935 (95 percent).

Objective # 2

To determine the dates graduate programs started at the institution, started in agricultural education, and when first degrees were awarded.

Institutional graduate programs were initiated in 1821, however, most programs were established between 1861 and 1980 (58 programs). Program establishment peaked between 1861-1880 (13 programs) and between 1941-1960 (13 programs), respectively.

The graduate programs in agricultural/extension education started about 1917, but most were initiated between 1921-1980 (52 programs). The last program initiated was in 1986, and the number of programs currently operational is declining because of departmental consolidation in insttitutions across the country.

Objective # 3

To determine the units administering and the units housing the agricultural education graduate programs.

The graduate college primarily administered graduate programs in agricultural/extension education in the United States. When institutions were asked where programs were administered, 90.48 percent (57 programs) indicated through the graduate college, 3.17 percent through the college of agriculture, 4.77 percent through colleges other than the graduate college or college of agriculture, and 1.59 percent indicated joint administration of both colleges.

The study revealed that the department was primarily located in the college of agriculture with 73.02 percent of responding institutions indicating so. About 13 percent of the departments were located in the college of education, while 11.11 percent were located in other colleges. Joint location accounted for 3.17 percent.

Objective # 4

To determine when the dates, types, and numbers of graduate degrees offered.

More reporting institutions awarded the M.S. degree in agricultural/extension education than any other agricultural/extension education graduate degrees. The master of science (M.S.) degree was the first graduate degree awarded in agricultural/extension education in the U.S. in 1914 by Penn State. The master of agriculture (M.Ag.) was first awarded by the University of Florida in 1918. The master of education (M.Ed.) was awarded first by Auburn, Arizona and Colorado State in 1928. The specialist in education (Ed.S.) degree was first awarded by the University of Illinois in 1940. The University of Missouri awarded the first doctor of education (Ed.D.) degree in 1938. The first doctor of philosophy (Ph.D.) degree was awarded by Penn State in 1927.

Between 1917-1937, only three types of graduate degrees, the M.S., the M.Ed and the Ph.D, were awarded in agricultural/extension education in the United States. The awarding of the M.Ag., the Ed.S., and the Ed.D. degrees started between 1937 and 1957.

The University of Missouri awarded the most masters degrees (49 M.S. and 2 M.Ed.) between 1917 - 37 and the University of Minnesota the most doctor of philosophy degrees (2). During the next 40 years, Oklahoma State awarded the most master of science degrees, followed by Ohio State and Michigan State in the next two time periods. The most master of agriculture degrees rotated from Michigan State, Clemson, Texas A&M and Clemson in ensuing time periods. The greatest numbers of master of education degrees were awarded by Sam Houston for 40 years, then Missouri and Georgia during the next two time periods. The greatest numbers of specialist in education degrees were awarded by Connecticut, Mississippi State and Georgia. The most doctor of education awards were by Illinois for 20 years, then Oklahoma State for the remaining years. The greatest number of doctor of philosophy degrees were awarded by Ohio State during all time periods after 1937.

The top ten institutions by number of graduate degrees awarded in agricultural/extension education were 1862 land-grant institutions. The 1890 land-grant institutions and the non land-grant institutions did not fall in the top ten institutions in agricultural/extension education graduate programs. Ohio State awarded the most degrees in agricultural/extension education with 1,216, representing 6.9 percent of all reported awards in the study. The second and third places went to Mississippi State and Oklahoma State with 964 (5.51 percent) and 931(5.32 percent) total awards, respectively. Missouri, Illinois, Michigan State, Iowa State, Penn State, and Minnesota were 4th through 9th places, respectively. The University of Tennessee was tenth with 510 (2.91 percent) total awards. The next ten in order of numbers were: Sam Houston (not included in the top 10 because of lack of positive growth, Cal Poly State-Pomona, Georgia, Texas Tech, Uni Cal-Davis, Texas A&M, NC A&T, Clemson, NC State and Cornell.

After due consideration of the data analysis and findings of this study, the following conclusions were drawn:

1. Most of the agricultural/extension education graduate programs in the United States were conducted by the land-grant institutions. This is a landmark fulfilment of the dreams and visions of the founding fathers and originators of the Morrill Acts. Even though visionaries of the Land-Grant Acts emphasized the need for agricultural information dissemination, graduate programs with specialization in agricultural education were slow to be realized.
2. Most institutional graduate programs were initiated around 1861 and thereafter, perhaps jointly in response to the farmers' movement of the early 19th century and the Morrill Acts of 1862 and 1890.
3. The location of agricultural/extension education department s in the college of agriculture perhaps was due primarily to proximity to available agricultural facilities. Strong support from colleges of agriculture has encouraged several departments to move from other colleges to the college of agriculture recently.
4. The M.S. degree was the most awarded degree in agricultural/extension education graduate programs, perhaps because it was the most popular graduate degree for career advancement or as a basis for further graduate study. Also, enrollment in Ed.D. and Ph.D. programs has increased. Therefore, it may be concluded that job demand has a direct effect on graduate programs in agricultural/extension education.

The importance of higher education in the United States cannot be overemphasized. Societal and global demand for food and fiber have placed the onus of agricultural and food production knowledge on agricultural education programs. Subsequently, demands for better and higher qualified personnel have instigated the creation of graduate programs in agricultural/extension education departments in colleges and universities all across the United States. The future is a mirror image of the past. Without the record of what has happened in the past, the development in the future is hindered. Therefore, this study is important in the support of the future of graduate studies in agricultural/extension education in the United States.

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HISTORY OF GRADUATE PROGRAMS IN AGRICULTURAL/EXTENSION EDUCATION IN THE UNITED STATES

Discussant Remarks
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Contribution and Significance of Research

The investigators are commended on conducting historical research that tells us, and reminds us, from whence came programs of graduate agricultural/extension education in the United States. This reviewer agrees with the assessment of the investigators that as the future is influenced by the past, that development in the future is hindered without knowing what has happened in the past. Consequently, the results of this study can help put in context future directions that may be taken by graduate programs in agricultural/extension education.

Procedural Considerations

It was sound procedure to attempt to gather information from all departments of agricultural and/or education extension education listed in the "Directory of Teacher Educators in Agriculture." The investigators are to be commended for apparently using every means possible over a four-month period to get information from the different institutions, short of visiting each institution personally and accosting somebody at gunpoint. However, it was unfortunate that not all institutions with such graduate programs provided information for this study. Consequently, through no fault of the investigators, the study is incomplete and may not be considered a benchmark study.

In reporting the study, it would have been helpful to have included early in the section on "Results / Findings" both the number of departments contacted and the number of departments from which responses were obtained. While, by applying mathematical proportions to some of the numbers given, it is reasonable to project that responses were obtained from 63 institutions, one cannot be certain, and we still do not know how many institutions were contacted originally; it could have been approximately 94.

Questions for Consideration

Reference is made to the "top 10 institutions" in several instances, e.g., "The top 10 institutions awarded 100 percent of total degrees during 1917-1937." The question arises as to the criteria that were used to classify institutions as being among "the top 10." Such clarification would have been helpful.

The conclusion was drawn that "The M.S. degree was the most awarded degree in agricultural/extension education graduate programs, perhaps because it was the most popular graduate degree for career advancement or as a basis for further graduate study." Also, it was stated that "...job demand has a direct effect on graduate programs in agricultural/extension education." Can that conclusion be supported from the data presented? The question is raised as no supporting evidence was presented as to the reasons people had for pursuing graduate study. This question would be worthy of future research.

This was a historical, status quo, descriptive study that depended on recorded events. Building on this study, could another study be undertaken to attempt to uncover some of human stories behind the establishment, nonestablishment, growth, and demise of certain programs? For example, Dr. R. W. Cline at the University of Arizona told me that the reason why the M.Ed. degree, and not the M.S. degree, was approved there for agricultural education in 1921 was that a certain administrator on the program review committee insisted that graduate study in education was not "scientific."

CURRENT STATUS OF COLLEGIATE AGRICULTURAL EDUCATION ORGANIZATIONS

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Introduction

Experiential education has been part of agricultural education for decades. Students studying agricultural education regularly apply what they know through their Supervised Agricultural Experience and as a member of the FFA organization. For those students who embark on a career in agricultural education it is vitally important that they continue to gain valuable experience in a collegiate agricultural education organization. Yet the emphasis placed on collegiate agricultural education organization can vary widely from institution to institution. Many colleges and universities that offer teacher education programs in agriculture do not even have a collegiate organization in which future agriculture teachers can gain experience working with SAE programs, FFA activities or community service projects.

Theoretical Framework

The benefits of college student participation in student organizations have been known for a long time. Over 50 years ago, agricultural education professionals were extolling the virtues of membership in collegiate agricultural education organizations. Responding to the need for preparing future FFA advisors, in 1930 the Future Farmers of America granted permission to all teacher-training departments to establish associate chapters of Future Farmers. Murrell (1935) in an article titled "Better Advisers Through Collegiate Chapters" stated, "The collegiate chapters of F.F.A. are of paramount importance because of their training purposes" (pg. 64). Preparing future FFA advisors continues to be an important function of collegiate agricultural education organizations. Vaughn (as cited in Vaughn, 1978) found that participation in a collegiate agricultural education student organization was positively related to the success of the FFA advisor. Mundt (1991) wrote, "The problems and issues were many and varied but typical for first-year teachers. The most notable problems were: ...managing the FFA component" (pg. 20).

Collegiate FFA chapters are not the only collegiate organizations available for leadership development in agricultural education. Carter (1978) wrote that, "Preservice students enrolled in agricultural education should be served by a collegiate organization or organizations but not necessarily the Collegiate FFA" (pg 3). Numerous teacher education departments offer clubs such as Alpha Tau Alpha, Agricultural Education Society or Club, or Agriscience Clubs.

Membership in a collegiate student organization benefits all college students, not just those majoring in agricultural education. Research conducted by Abrahamowicz (1988) revealed differences between members and nonmembers of student organization with members reporting more positive feelings about college than nonmembers. In a study that examined the development of college students, Cooper (1994) indicated that student change patterns related to membership and leadership in student organizations. Birkenholz and Schumacher (1994) found that "College participation in departmental clubs...were significantly related to the perceived leadership development of the respondents" (pg 4). The researchers concluded that participation in student activities at the college level is positively related to overall leadership development.

A review of the research resulted in the development of a conceptual framework for the utilization of student organizations in the leadership development of college students.

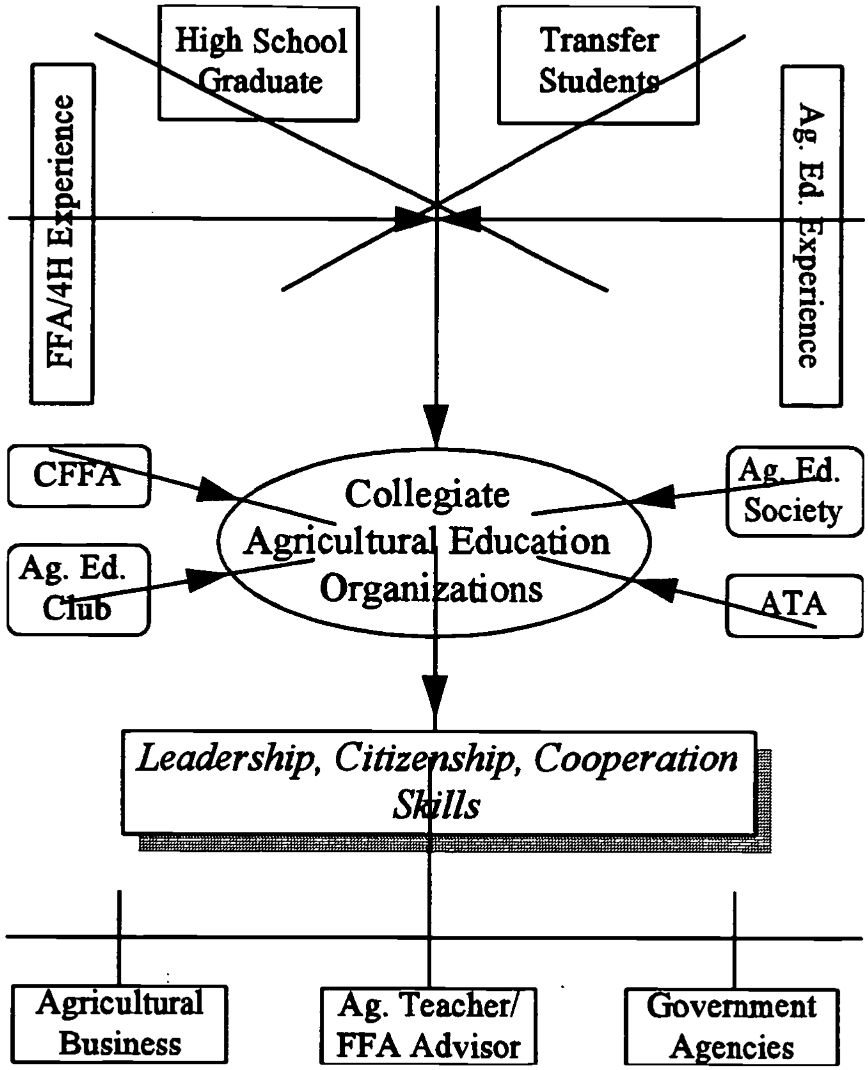

Figure 1. Conceptual framework for collegiate agricultural education student organizations

Purpose

The purpose of this study was to determine the current status of collegiate agricultural education organization located in colleges and institutions that prepare future teachers of agriculture. Specific objectives for the study included:

1. Determine the number of teacher education programs that have an active collegiate agricultural education organization for college students.
2. Determine the demographic information including: eligibility for membership, current membership, and gender of members.
3. Determine if a need exists for establishing better communications with collegiate agricultural education organizations through the collection of a national membership roster and the distribution of the National FFA's *Making a Difference* publication.

Methods

This study was descriptive survey research that followed Campbell and Stanley's (1963) one-shot case study design. The population for the study was all colleges and universities that currently offer degree programs in teacher education in agriculture. A list of the current institutions was obtained from the Directory of Teacher Education Programs in Agriculture (Shelhamer, 1995). To reduce frame error, the list was checked against the 1996 Agricultural Education Directory (Henry, 1995) and a list of institutions developed for the national study of supply and demand for teachers of agriculture conducted by Dr. Bill Camp of Virginia Polytechnic Institute and State University (personal communication, March 1996).

The survey contained 16 closed-ended, open-ended, and partially closed-ended questions about collegiate agricultural education organizations and their membership. The survey was checked for face and content validity by a panel of experts in agricultural education and members of a collegiate agricultural education organization. Survey reliability was not determined because the instrument sought only to elicit current organizational information and contained no summated scales.

The survey was sent to the department heads of 91 institutions that offered teacher education in agriculture. An E-mail survey was sent to those institutions that provided E-mail addresses in the Directory of Teacher Education Programs in Agriculture. For those institutions without E-mail access, a mailed survey instrument was used to obtain the data. The department heads were asked to complete the survey or forward it to the faculty member or individual who advises their collegiate agricultural education organization. Non-response error was reduced by sending four E-mail and two mail follow-up surveys. Telephone calls were placed to those institutions that still had not responded. Late respondents were then compared to early respondents on demographic information about their organization. No significant differences were found. Finding no differences the results were then generalizable to the target population (Miller and Smith, 1983).

Results

A total of 50 E-mail and 20 mailed responses were returned for a response rate of 77%. Objective 1 sought to determine the number of agriculture teacher education departments that have active collegiate agricultural education organizations. Ninety percent of the 70 institutions that responded reported they had at least one collegiate agricultural education organization. The 63 teacher education departments that indicated they had and active organization listed a total of 78 active clubs. Figure 2 shows the percentage of schools with one, two and three organizations.

Institutions that indicated they had an active collegiate agricultural education organization were asked which collegiate organization they offered. Thirty-nine schools (50%) had Collegiate FFA chapters, 17 schools (21.8%) had Alpha Tau Alpha and 9 schools (11.5%) had Agricultural Education Societies.

Responding institutions identified 10 other names for their collegiate agricultural education organizations. Four institutions (5%) had Agricultural Education Clubs. Other clubs identified included Postsecondary Agricultural Student Association (PAS), Agricultural Education and Communications Society and the Society for Agricultural Leadership. A complete list of the various organizations identified is contained in Table 1.

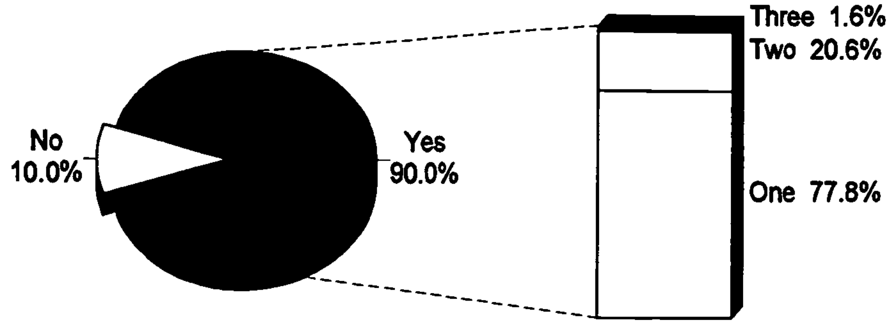

Figure 2. Collegiate agricultural education organizations within agriculture teacher education departments

Table 1.
Type of Collegiate Agricultural Education Organizations

Organization	N	%
Collegiate FFA	39	50.0
Alpha Tau Alpha	17	21.8
Agricultural Education Society	9	11.5
Agricultural Education Club	4	5.0
Agricultural and Extension Education Club	1	1.3
Agricultural Education and Communication Society	1	1.3
Agricultural Science Club	1	1.3
Agriscience Education Club	1	1.3
FFA Alumni	1	1.3
Postsecondary Agriculture Student Association (PAS)	1	1.3
Society for Agricultural Leadership	1	1.3
Vocational Technical Education Association	1	1.3
Young Farmers	1	1.3
Total	78	100.0

Objective 2 of the study was to determine demographic information concerning the members of collegiate agricultural education organizations. Respondents were asked to identify the students who were eligible for membership in their collegiate organizations. Categories of membership included only agricultural education majors, any student majoring in their department, any student enrolled in their college and any university student. The largest percentage of respondents indicated their organization was open to any student enrolled in the university.

Organization membership was then broken down by type of collegiate organization. Over 61% of Collegiate FFA chapters were open to any university student. Conversely, over 56% of Alpha Tau Alpha chapters had memberships comprised of only students majoring in agricultural education. Membership in other organizations such as Agricultural Education Societies and Clubs was more evenly divided throughout all four categories. Figure 3 shows the types of membership within each type of collegiate agricultural education organization.

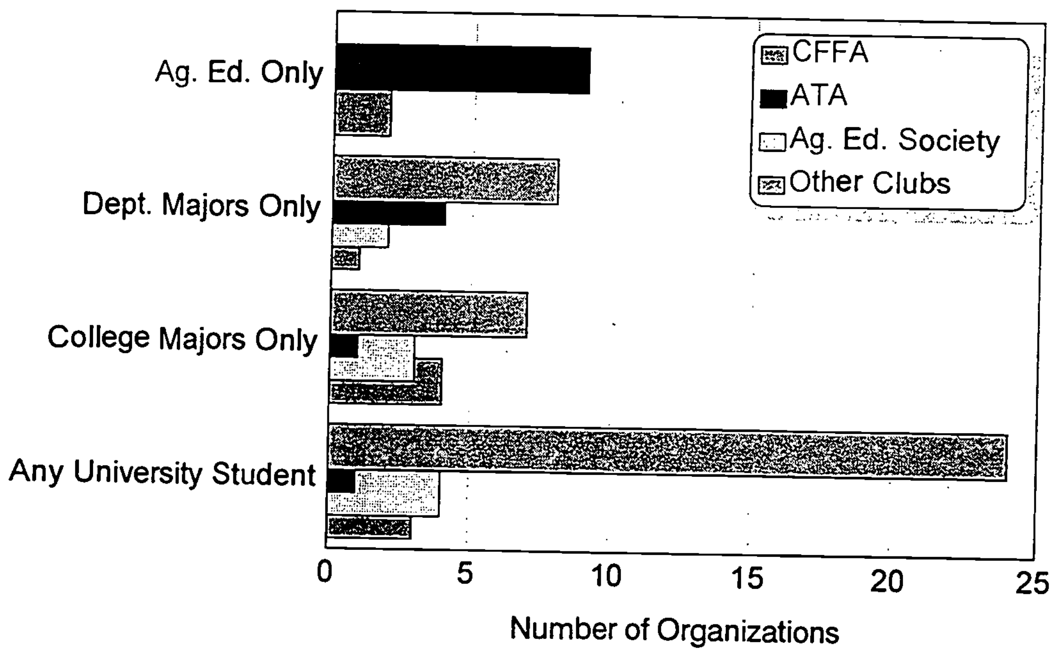

Figure 3. Membership in collegiate agricultural education organizations.

Four different categories of demographic information were collected from the collegiate agricultural education organizations. The average size of the organizations was 35 members. An average of 71% of the organization membership was made up of students majoring in agricultural education. Fifty-four percent of organization membership was male and 46% was female. Table 2 shows the minimum, maximum and mean numbers in each demographic category.

Table 2.
Demographics of Collegiate Agricultural Education Organization Membership

Category	Minimum	Maximum	Mean
Number of members in the organization	5	120	35
Number of members majoring in agricultural education	2	115	25
Number of male members	2	70	19
Number of female members	0	60	16

Organizations were asked if their members paid dues. Almost 88% of the organizations collected dues. The amount of dues collected ranged from a low of $2.00 to a high of $20.00 per year. The average amount of dues collected was $8.50. Data were arranged in a bimodal distribution with 27 organizations collecting $10.00/year and 16 organizations collecting $5.00/year.

Objective 3 was to assess the need for better communication between collegiate agricultural education organizations. Over 90% of organizations stated they would be willing to complete and submit a roster so members could receive information about teaching agricultural education as a career choice. When asked if their membership would like to receive the National FFA's *Making a Difference* publications 93.1% indicated they would like to receive the bimonthly publication.

Almost 56% of respondents thought their members would be willing to pay national dues in order to receive the *Making a Difference* publication. Almost 31% of respondents thought their membership would pay $2.00/year national dues in order to receive the publication. Twenty-six percent responded their membership would support paying $1.00/year national dues. Figure 4 shows amount of dues organizations were willing to pay to receive *Making a Difference*.

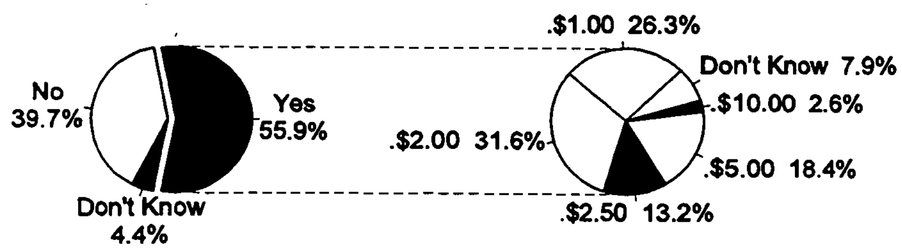

Figure 4. Collection of national dues to receive National FFA's *Making a Difference*.

Respondents were also asked if they had ever participated in the National Collegiate Agricultural Education Conference held each November in Kansas City during the National FFA Convention. Seventy-one percent of the respondents indicated their collegiate organization had participated in the national conference. Twenty-one chapters (29%) had never participated in the national conference.

Space was provided on the questionnaire for respondents to provide written comments concerning the current status of collegiate agricultural education organizations. The following is a sample of the comments provided by advisors to collegiate agricultural education organizations:

> "I wish there were National Contest Activities that would motivate the students to better participate. They have everything in high school, and the college level has hardly anything."

> "I think that Collegiate Organizations are a vital part to inform and teach future agricultural teachers. However, they are not used effectively. If we could receive national newsletters or information, we could become more effective leaders and teachers."

> "It is an excellent laboratory to train future ag ed teachers."

> "I believe, at least in our institution, a club that is somewhat generic within our department (meaning it is open to all of our department majors) would be the most effective."

> "We need <u>more</u> participation at the Collegiate Conference in K.C."

> "It appears that the perception of Collegiate Agricultural Education Organizations is (1) FFA, (2) undergraduate, and (3) a narrowly focused group. These perceptions are not true."

> "I believe that the National Association or governing body lacks uniformity, thereby not providing enough support for local chapters to successfully function at national functions."

> "More emphasis should be placed on PAS or Alpha Tau Alpha and let Collegiate FFA DIE!!!"

Conclusions and Recommendations

Based on the findings of this study the following conclusions have been drawn:

1. Collegiate agricultural education organizations are active and valued in a large percentage of agriculture teacher education departments throughout the country.
2. The two leading organizations represented are the Collegiate FFA and Alpha Tau Alpha. Numerous other agricultural education clubs, using a variety of different names, were also offered available to students in departments, colleges and universities that offer courses of study in agricultural education.
3. Membership is comprised of mostly agricultural education majors, almost evenly divided between male and female students. Collegiate FFA chapters were more likely to be open to any student in the university, while Alpha Tau Alpha chapters were primarily for agricultural education majors only.
4. Collegiate organizations are willing to submit membership rosters, and pay dues in order to receive the National FFA's *Making a Difference* publication. Although several Collegiate FFA chapters responded they already submitted a membership roster and paid National FFA dues.
5. A large majority of the collegiate agricultural education organizations had participated in the National Collegiate Agricultural Education Conference.

This research would indicate that undergraduate students are benefiting from collegiate agricultural education organizations. The question of which organization best meets the needs of undergraduate agricultural education majors is one that cannot be answered, nor one which this research attempted to answer. However there does seems to be a need for better organizational structure on the national level.

Respondents indicated a need for better leadership and organization of collegiate agricultural education organizations on the national level. In this era of instant communications through fax, E-mail, and home pages on the World Wide Web (WWW) collegiate agricultural education organizations should use these resources to improve their channels of communications. A national newsletter, produced either in a hardcopy version or electronically, should be published to share ideas and information on student recruitment and other organizational activities. A collegiate agricultural education listserv similar to that developed for the American Association for Agricultural Education (AAAE) would provide another means of bridging the gap between collegiate organizations. Regional conferences, workshops and even career development events should also be conducted to improve students's knowledge and skills related to agricultural education and the FFA organization.

The results indicated that a majority of collegiate agricultural education organizations were Collegiate FFA chapters. However, it is unclear whether Collegiate FFA chapters are required to submit annual membership rosters and pay dues to the National FFA Organization, even though the National FFA Constitution & Bylaws (National FFA Organization, 1995) state in Article III. Section D. that "Collegiate chapter members shall pay National FFA Organization dues" (p. 66). This research has led to a number of important questions related to Collegiate FFA. Should all Collegiate FFA members pay national dues? Are Collegiate FFA members counted as part of the National FFA membership? What benefits do Collegiate FFA members receive in return for paying national dues?

It seems evident that, at least in the past, the National FFA has overlooked one category of membership that has existed for over 60 years, collegiate membership. Recently however, the National FFA Organization launched two task forces to improve the marketing of agricultural education and the FFA. These task forces, *Local Program Success* and *Leadership for a New Millennium* have developed significant goals for improving agriculture programs including the recruitment of more secondary agriculture teachers. Several of these goals include working closely with collegiate agricultural education organizations.

It is obvious that there is no one organization that meets the needs of college students studying agricultural education. But a definite need exists for improving the national leadership for collegiate agricultural education organizations. An umbrella organization should be established that would coordinate national activities and communications for Collegiate FFA, Alpha Tau Alpha and other collegiate organizations. This umbrella organization could be facilitated by the National FFA, National Vocational Agriculture Teacher's Association (NVATA) or the American Association for Agricultural Education (AAAE).

As the need for more agriculture teachers and better agriculture leaders increases, collegiate agricultural education organizations will become more and more important. Better communication, planning, and coordination among all collegiate agriculture education organizations would help improve these organizations and increase student participation. No matter which organization is utilized on the local level, it is vitally important that teacher educators, administrators, organization officers and advisors work together to provide the best experiences possible for collegiate agricultural education students.

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CURRENT STATUS OF COLLEGIATE AGRICULTURAL EDUCATION ORGANIZATIONS

Discussant Remarks
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Contribution and Significance of Research

This succinctly written, clearly written, and easily read report of research containing realistic and defensible conclusions and recommendations arising from the findings illustrates clearly the use and current status of collegiate level organizations supported by the programs of agricultural education in the United States.

Procedural Considerations

The research, using descriptive surveys, was designed well. Because the total population was surveyed, the investigator did not have to use inferential statistics. A sound procedure was used to reduce non-response error, namely, conducting a total of six e-mail and postal service follow-up contacts with nonrespondents, following up those contacts with phone calls, and then comparing the responses of late respondents with those of early respondents to determine if differences existed.

A question did arise in reading the study. Would it have been possible to define or describe what was meant by the term, "active organization"? If an organization meets once a semester, was it considered to be active? Is it possible that people responded according to differing wazzu perceptions of the term, "active"?

Questions for Consideration

The narrowly defined third objective of the study certainly was appropriate, i.e., to assess the need for establishing better communications among collegiate agricultural education organizations through collection of a national membership roster and the distribution of the Making a Difference publication. However, one might wonder if the study could have been strengthened if information had been sought deliberately about 1) ways in which organizations currently communicate among themselves, if at all, 2) whether or not different organizations perceived that it was necessary to communicate among each other, and 3) the advantages and disadvantages of doing so.

Reading this report of research caused this discussant to wonder about related questions that could be explored in further research undertaken by Dr. Connors or others. For example:

1. What are the kinds of activities in which collegiate level student organizations engage?
2. Do patterns or commonalities emerge among those activities?
3. Would there be a way to assess the prestige and status of collegiate level student organizations associated with programs of agricultural education when compared with other agriculturally related student organizations?

SUBJECT MATTER TOPICS RESEARCHED IN AGRICULTURAL AND EXTENSION EDUCATION: A TEN YEAR ANALYSIS

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Introduction

The agricultural education profession has a long history and tradition of research and development support (Mannebach, McKenna and Pfau, 1984). Rapid growth of research activities have resulted in enormous growth of the agricultural education literature (Radhakrishna, 1995). Articles appearing in the Journal of Agricultural Education (*JAE*) and papers presented at the National Agricultural Education Research Meeting (NAERM) are good indicators of the professions' scientific activity, philosophy and application. According to Knight (1984) "what a profession writes about in its journals and magazines might be considered a fairly good indicator of what is perceived as being important and the topics researched might give insight into the priorities of a profession."

Effective analysis of subject matter topics researched lies in the categories used for grouping the topics under appropriate categories (Knight, 1984). Over the years, numerous researchers have categorized subject matter topics based on central themes or focus of the journal articles, papers presented, summaries of abstracts and by just looking at the titles of the research study (Burke, 1996; Crunkilton, 1988; Moore, 1987; and Moss, 1986). Other researchers have used established practices, replication and use of review panel to determine subject matter topics (Radhakrishna & Mbaga, 1995; Silvia-Guerrero and Sutphin, 1988). For example, Crunkilton (1988) identified eight categories--administration/supervision; curriculum development; pedagogy; special needs; instructional resources; supervised experience programs; leadership; inservice and evaluation. Moore (1987) identified nine categories--professional and general; teacher education; extension, international, FFA, SOEP, curriculum/planning, teaching and agricultural mechanics. Radhakrishna and Mbaga using Kahler's classification identified 18 categories which included adult/post secondary; elementary ag programs; evaluation; experiential learning; extension; inservice education; international; learning theory; philosophy; policy; program development; recruitment; research methodology; secondary ag programs; special needs; teaching methods; youth/youth organizations; and other.

In the last decade, several scholars in the profession have expressed concerns regarding the conduct of research activities in agricultural education. Prominent among these scholars are Warmbrod (1986), Crunkilton (1988), Moss (1985), Moore (1987), Stewart, Shinn and Richardson (1977), Buriak and Shinn (1988), Silvia-Guerrero and Sutphin (1988), Mannebach, et al., (1984), and Radhakrishna (1995). The most striking concern though expressed by Warmbrod a decade ago still remains a concern to the profession today. Warmbrod wrote, "Progress during the past years in the technological and methodological aspects of research in agricultural education has not been accompanied by comparable improvement in another very important aspect of research, namely, the relevance, significance, and importance of problems and issues that we investigate. I propose that our highest priority for continuing progress in research in agricultural education must be that we pay greater attention to the significance and importance of the problems and issues that we research" (Warmbrod, 1986, p. 9).

Stewart, Shinn and Richardson (1977) determined the problems challenging agricultural education found 14 areas of concern. The concerns provided both implications for research and a source of researchable topics.

Silvia-Guerrero and Sutphin (1988) in their study of research priorities in agricultural education in the United States found that 22 topics should be addressed at the national level and 5 topics at the state level.

Based on the examination of summaries of research in agricultural and extension education, Crunkilton (1988) concluded that research in agricultural education is focused, but that focus has come about more by accident rather than through planned activities (p.327). Further, Crunkilton suggested that "If we as a profession want to chart a course for our research, ... , then we need some type of framework that will show us where we have been, where we can or should go, as individual professional researchers, as institutions, and as a total profession. Moss (1985) who analyzed the contents of papers presented at NAERM for the years 1974-1985 found that agricultural educators have examined a variety of topics in agricultural education. Moss concluded that priorities for research in agricultural education are not static (p. 6).

Mannebach et al., (1984) analyzed the summaries of research and development activities in agricultural education for the years 1972-1984. They concluded that there is a dearth of research on agricultural education research. They recommended that agricultural educators should conduct more historical and experimental studies and encourage foreign studies as they become more involved in problems and concerns. Moore (1987) examined over 900 doctoral dissertations to determine the focus of doctoral research in agricultural education conducted during 1900-1986. He found a variety of topics in agricultural education has been researched and concluded that doctoral research in agricultural education lacked focus. However, Moore said that doctoral research in agricultural education has focused more on addressing the problems of the profession.

Shinn and Buriak (1988) identified obstacles that limit systematic research in agricultural education as viewed by three groups of decision makers (deans of agriculture, deans of education, and directors of experiment stations) who play key roles in the approval and support of research. The Delphi technique was used to determine the views of these three groups of decision makers. Shinn and Buriak found consensus among the three groups of decision makers for five obstacles to the conduct of research in agricultural education. These included: 1) lack of focus; 2) inadequate qualifications; 3) teaching and service orientations; 4) insufficient funding; and 5) lack of value for research among agricultural educators. They suggested that agricultural education must identify important researchable problems, which if pursued rigorously, will lead to clear solutions for the profession (p. 146).

McKinney (1987) offered several concerns and challenges to current research paradigms in agricultural and extension education. These included: 1) over reliance on empirical analytical perspectives; 2) expert domination of research framework; 3) insufficient consideration of context; 4) overemphasis on separate and discrete outcomes; 5) managerial orientation of research framework; 6) lack of attention of humanness of human research subject matter; and 7) inadequate conceptualization of what science is.

According to a study conducted by Bowen, Radhakrishna and Jackson (1991), responsibilities of agricultural education faculty are changing. To what extent these changes in responsibilities of faculty reflect the research priorities of the profession? As Mannebach, et al., (1984) indicated, if research and development are to lead the way, we must continually review and evaluate our efforts (p. 15)? Are the subject matter topics hitherto examined by scholars too narrow to describe accurately the research activities of the profession (Mannebach, 1994)? Have we broadened our research focus to other areas such as communications, extension education, agricultural education in higher education and non-vocational areas as suggested by Warmbrod (1987). Are we researching subject - matter topics which address the most critical issues facing the profession (Flowers, 1995)? Have we, as a profession, focused our attention and resources to address problems such as lack of programmatic focus, theoretical base and conceptual framework, broadening the scope of our research activities to address critical issues or problems facing the profession. This investigation was designed to determine subject matter topics researched in agricultural and extension education from 1986 to 1995. This review of research will assist us in examining our priorities and directions for our research efforts as we approach the year 2000.

Purpose and Objectives

The major purpose of this investigation was to examine subject matter topics researched in agricultural education over a ten year period. Specific objectives of the study were to:

1. identify subject matter topics researched in agricultural and extension education in the last decade (1986-1995).
2. categorize subject matter topics published in the Journal of Agricultural Education and proceedings of the National Agricultural Education Research Meeting over a ten year period (1986-1995).
3. compare past studies which examined subject matter topics with this investigation.

Methods and Procedures

Two data sources were used to examine subject matter topics researched in agricultural education. These included, the articles published in the Journal of Agricultural Education *(JAE)* and papers presented at the National Agricultural Education Research Meetings (NAERM) during 1986-1995. Selection of these two data sources resulted in examination of 371 journal articles published in the *JAE* and 415 papers presented at NAERM (Table 1). To address objective 3, studies completed by Moss (1986), Moore (1987), Crunkilton (1988), Radhakrishna and Jackson (1992) and Radhakrishna and Mbaga (1995) were identified as data sources (Figure 1).

Table 1.
Total Number of Journal Articles Published in JAE and Papers in NAERM Proceedings by Year (1986-1995).

	YEAR										
Source	19-86	19-87	19-88	19-89	19-90	19-91	19-92	19-93	19-94	19-95	Total
JAE	35	34	30	35	45	36	31	44	47	34	371
NAERM	39	36	36	36	44	36	44	48	48	48	415
Total	74	70	66	71	89	72	75	92	95	82	786

Each of the 371 journal articles and 415 papers presented were given a code number. Then these articles and papers were reviewed in order to categorize into relevant subject-matter categories. Three criteria were used to categorize the studies into subject- matter topics--title of the study, central theme or focus of the study, and findings and conclusions. Based on this review, a total of 25 subject-matter topics were identified. The list of 25 subject-matter topics was given to a panel of experts for review and validation. The panel of experts was asked to comment on 1) the appropriateness of categories; 2) add or identify categories they thought that were left out or delete categories they thought were not relevant; and 3) suggest whether some categories could be combined. After receiving feedback from the panel, a revised list of categories was developed (Figure 1). This revised list contained 30 subject-matter topics (See Figure 1). The 371 journal articles and 415 papers presented were grouped into the categories. Data were summarized using frequencies and percentages.

Findings

Objectives 1 and 2

The subject matter topics that were published during 1986-95 in *JAE* and NAERM proceedings are shown in Tables 2 and 3. During this ten year analysis, the category with the most subject matter topics reported is that of secondary ag programs (71 studies--27 in *JAE* and 44 in NAERM), followed closely by learning styles/theory and cognition (61 studies--29 in *JAE* and 32 in NAERM), professionalism (41 studies--26 in *JAE* and 15 in NAERM), extension (39 studies--17 in *JAE* and 22 in NAERM), ag mechanics /safety /engineering (38 studies--17 in *JAE* and 21 in NAERM). These were the top five subject matter topics investigated by agricultural and extension educators. The other frequently researched subject-matter topics included: studies related to job satisfaction/morale/burnout (32 studies), followed by undergraduate education (32 studies), FFA (31 studies), SAEP (30 studies) and microcomputers (30 studies). The least researched subject matter topics were evaluation, special needs, and recruitment and retention (See Table 3). But the top category was the "other," a mixture of subject matter topics or studies unrelated to the other categories.

When the subject-matter topics studied over a 10 year period were examined, several trends were evident. First, topics such as secondary ag programs, studies related to learning theory, ag mechanics, and job satisfaction, have been consistently researched by agricultural and extension educators. Second, traditional topics such as FFA, problem solving, and SOEP has been researched consistently but have shown a downward trend in recent years (Tables 1 and 2). Third, several other topics have emerged as subjects of interest to agricultural and extension educators. These include extension, international, agriculture literacy, environmental/sustainability, distance education, undergraduate and graduate education, and diverse audiences (women and minorities). Fourth, a moderate increase is evident in reporting topics such as historical and philosophical studies, research methodology, and leadership. Finally, topics such as evaluation, recruitment and retention, and special needs continue to be subject-matter topics not being studied by agricultural and extension educators.

Objective 3

One of the objectives of the study was to compare past research studies that have examined subject-matter topics researched in agricultural and extension education. Past studies of Moss (1986), Moore (1987), Crunkilton (1988), Radhakrishna and Jackson (1992), and Radhakrishna and Mbaga (1995) suggested that agricultural and extension educators are conducting research in a variety of subject matter areas. As can be seen from Figure 1, the categories of subject matter topics has increased from a low of nine categories (Crunkilton, 1988) to a high of 19 categories (Radhakrishna & Jackson, 1992; and Radhakrishna and Mbaga, 1995). When these studies are compared with the present investigation, there is a clear indication that the scope of subject-matter topics researched by agricultural and extension educators has significantly expanded to other subject-matter topics considered relevant and important to the profession.

Figure 1. Comparison of Past Studies on Subject-matter Topics Researched in Agricultural and Extension Education

Moss (1986)	Moore (1987)	Crunkilton (1988)	Radhakrishna & Jackson (1992) Radhakrishna & Mbaga (1995)	Present Study (1996)
1) Adult education 2) College faculties 3) Curriculum 4) Employment opportunities 5) Future Farmers of America 6) Research methodology/ impact 7) Special needs/ populations 8) Supervised occupational experience 9) Teacher attitudes and problem 10) Teacher training 11) Teaching effectiveness and methods 12) Other	1) International 2) Extension 3) History and philosophy 4) Adult/Young Farmer/Post Sec. 5) Agricultural mechanics 6) FFA 7) SOEP 8) Teacher education 9) Curriculum/ program planning 10) Org., Adm. and supervision 11) Teaching 12) Professional and general	1) Administration/ supervision 2) Curriculum development 3) Pedagogy 4) Special Needs 5) Facilities/ resources 6) SOE 7) Leadership 8) Inservice 9) Evaluation	1) Secondary Ag program 2) Ag instructors 3) Adult/post secondary 4) Extension education 5) Learning theory 6) Teaching methods 7) Inservice education 8) Philosophy/ historical 9) International 10) Program development/ curriculum 11) Recruitment 12) Evaluation 13) Experiential Learning 14) Elementary Ag Program 15) Youth/youth Organization 16) Research methodology 17) Policy 18) Special needs 19) Others	1) Ag. mechanics/engineering 2) SAEP 3) Microcomputers 4) Distance education 5) Leadership 6) International 7) Environmental 8) Extension 9) Evaluation 10) Learning styles/theory/cognition 11) Adult education 12) Inservice/training 13) Job satisfaction/morale/burnout 14) Secondary ag programs 15) Problem solving 16) FFA 17) Research methodology 18) 4-H youth/youth programs 19) Special needs 20) Undergraduate/graduate education 21) Program development/ curriculum 22) Historical /philosophical 23) Instruction /teaching 24) Retention/recruitment 25) Professionalism 26) Young farmers 27) Ag literacy 28) Ag careers 29) Women/minorities 30) Agribusiness 31) Others

Table 2.
Subject Matter Topics Published in the Journal of Agricultural Education (1986-95)

	YEAR										
Subject Matter	19-86	19-87	19-88	19-89	19-90	19-91	19-92	19-93	19-94	19-95	Total
Learning styles/theory cognition	1	-	3	1	5	2	4	4	4	5	29
Secondary ag programs	2	3	-	3	3	-	5	6	2	3	27
Professionalism	3	3	2	2	2	6	2	4	1	1	26
Undergraduate/graduate education	3	-	-	-	5	2	1	3	1	3	18
SAEP	3	2	5	1	1	2	-	2	1	1	18
Extension	-	3	1	3	-	1	2	4	2	1	17
Ag mechanics/engineering	1	4	-	2	4	-	1	3	1	1	17
Job satisfaction/morale burnout	2	2	2	1	3	3	3	-	-	-	16
FFA	3	3	1	2	-	2	1	2	2	-	16
Microcomputers	2	3	-	3	3	2	1	1	1	-	16
Historical /philosophical	3	2	1	1	3	1	2	-	1	2	16
International	-	-	2	2	2	-	-	1	5	1	13
Instruction/teaching	3	-	1	2	2	3	2	-	-	-	13
Leadership	-	-	2	1	-	-	1	3	5	-	12
Environmental	-	-	1	-	-	1	2	2	2	2	10
Program development/ curriculum	3	2	1	1	-	1	-	-	1	1	10
Agribusiness	-	-	1	5	-	2	1	-	-	-	9
4-H youth/youth programs	-	-	1	-	-	-	1	3	3	1	9
Ag careers	-	1	1	-	1	1	1	2	-	1	8
Women/minorities	-	2	-	-	1	-	-	1	-	3	7
Adult education	-	-	-	1	3	2	-	-	-	1	7
Research methodology	-	-	1	-	-	-	1	-	3	1	6
Problem solving	-	-	1	1	1	1	-	-	1	-	5
Distance education	-	-	-	-	-	-	-	-	3	2	5
Ag literacy	1	-	-	-	-	1	-	-	2	1	5
Inservice/training	-	2	-	-	-	-	-	-	2	-	4
Young farmers	-	1	2	-	-	-	-	-	-	-	3
Special needs	-	-	-	-	-	-	-	-	-	-	-
Retention/recruitment	-	-	-	-	1	1	-	-	-	-	2
Evaluation	-	1	-	-	-	-	-	-	-	-	1
Others	5	-	1	3	5	2	-	3	4	3	26
Total	35	34	30	35	45	36	31	44	47	34	371

Table 3.
Subject Matter Topics Presented at NAERM (1986-95)

	YEAR										
Subject Matter	19-86	19-87	19-88	19-89	19-90	19-91	19-92	19-93	19-94	19-95	Total
Secondary ag programs	2	4	5	8	3	2	4	3	7	6	44
Learning styles/theory cognition	1	3	4	3	2	1	3	4	5	6	32
Extension	1	1	4	1	1	2	1	6	3	2	22
Ag mechanics/engineering	2	1	3	-	2	-	4	2	1	6	21
Job satisfaction/morale burnout	2	-	1	-	4	4	3	-	-	2	16
FFA	3	3	1	2	-	2	1	1	2	-	15
Professionalism	2	1	4	2	3	1	-	1	1	-	15
Instruction/teaching	-	1	1	-	1	3	4	3	1	-	14
Women/minorities	-	2	-	-	1	1	-	2	5	3	14
Undergraduate/graduate education	1	2	1	1	1	3	-	3	1	1	14
Microcomputers	2	2	-	2	4	2	1	1	-	-	14
Problem solving	1	3	1	-	2	-	2	1	1	2	14
Ag literacy	-	1	-	1	2	-	-	1	4	2	12
Historical /philosophical	4	1	-	-	1	3	1	-	1	1	12
SAEP	1	3	2	-	1	2	2	-	1	-	12
International	2	1	-	1	1	1	-	1	2	2	11
Program development/ curriculum	-	2	1	2	2	-	1	2	1	-	11
Distance education	-	-	-	-	1	-	-	1	3	5	10
Leadership	1	1	1	1	1	-	1	3	-	1	10
Inservice/training	2	1	1	1	-	-	1	2	1	-	9
Ag careers	1	-	-	2	1	2	-	-	1	2	9
4-H youth/youth programs	1	-	2	1	1	1	1	1	-	-	8
Environmental	-	-	-	-	1	-	2	1	3	1	7
Young farmers	2	-	-	-	-	1	-	1	-	1	5
Adult education	-	-	1	-	1	-	-	-	-	3	5
Research methodology	-	-	-	-	1	-	1	1	1	-	4
Agribusiness	-	1	-	1	-	-	-	-	-	-	2
Evaluation	-	1	-	-	-	-	-	-	-	-	1
Special needs	-	-	-	1	-	-	-	-	-	-	1
Retention/recruitment	-	-	-	-	-	-	-	1	-	-	1
Others	8	1	3	6	6	5	11	6	3	2	51
Total	39	36	36	36	44	36	44	48	48	48	415

Table 4.
Summary of Subject Matter Topics Published in JAE and presented at NAERM (1986-95)

Subject Matter	*JAE* (N=371)	NAERM (N=415)	Total (786)
Secondary ag programs	27	44	71
Learning styles/theory/cognition	29	32	61
Extension	17	22	39
Professionalism	26	15	41
Ag mechanics/engineering	17	21	38
Job satisfaction/morale burnout	16	16	32
Undergraduate/graduate education	18	14	32
FFA	16	15	31
SAEP	18	12	30
Microcomputers	16	14	30
Historical /philosophical	16	12	28
Instruction/teaching	13	14	27
International	13	11	24
Leadership	12	10	22
Women/minorities	7	14	21
Program development/ curriculum	10	11	21
Problem solving	5	14	19
Ag literacy	5	12	17
Ag careers	8	9	17
4-H youth/youth programs	9	8	17
Environmental	10	7	17
Distance education	5	10	15
Inservice/training	4	9	13
Adult education	7	5	12
Agribusiness	9	2	11
Research methodology	6	4	10
Young farmers	3	5	8
Retention/recruitment	2	1	3
Evaluation	1	1	2
Special needs	-	1	1
Others	26	50	76
Total	371	415	786

Conclusions and Recommendations

The findings from this study provide information on subject-matter topics investigated by agricultural and extension educators, which in turn provides perspectives about the research efforts of the agricultural and extension education profession.

Findings indicate that agricultural and extension educators conduct research in a wide variety of subjects. In addition, the topics researched address diverse issues related to the profession. On one hand, it seems that as a profession we are expanding the scope of the subject matter topics researched, while on the other the findings suggest that no systematic research agenda exists for the profession due to lack of focus in our research. The findings also suggest that as a profession, we research only traditional subject-matter topics such as secondary ag programs, FFA, and SAE rather than focus on innovative topics. In addition, our research topics suggest that our focus is more toward dollars rather than the problems of the profession.

In a time of declining resources, the profession should concentrate on topics which are crucial and important to the future of the profession such as research relative to agricultural science and the integration of vocational and academic education, and collaborative research within regions and among institutions. Collaborative approaches to research will become increasingly important since declining resources and downsizing are a certainty in the future. As an example, the recent USDA Challenge Grant Program emphasized collaborative actions at the regional level. Finally, smaller institutions should team up with large institutions to determine research priorities for the profession. All of these efforts can help in focusing our research efforts as we look beyond 2000.

As Mannebach, et al., (1984) suggested, we must continually examine our research and scholarly activities as these tell us what we are doing and where we should be going as a profession. A periodic review of our premier journals and proceedings of the NAERM should be an adequate benchmark. Undertakings like these will help to build a strong foundation to address problems and uniquely position ourselves to face future challenges.

Finally, the findings of this study have provided a basis to remind ourselves where we have been and where we are heading as a profession relative to research in agricultural and extension education. In addition, the findings have helped us to evaluate or examine our past and present research efforts. Findings of this study provide a basis to avoid repetitive studies and focus more on where and on what topics should be emphasized in the future. Hopefully this study will help us to examine our priorities and determine the future direction for our research efforts.

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SUBJECT MATTER TOPICS RESEARCHED IN AGRICULTURAL AND EXTENSION EDUCATION: A TEN-YEAR ANALYSIS

Discussant Remarks

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Contribution and Significance of Research

The question could be asked as to why the investigation was undertaken, what purpose was served by the study reported herein, especially as related studies [Moss (1986), Moore (1897), Crunkilton (1988), Radhakrishna and Jackson (1992), and Radhakrishna and Mbaga (1995)] classified subject-matter topics into different categories. The answer is that the value of this study lies in the further refining of categories in which research has been undertaken. Consequently, a profile of research topics has been developed that reflects the areas in which people in the profession have been active, as reflected by the sources of data analyzed.

It is noteworthy that the investigators concluded that we are not really paying attention to the questions arising about nontraditional or innovative practices and directions that face the profession. For example, compare the number of reports on topics related to educating at a distance (15) with the total number of topics reported (786) in the past 10 years. Another example, it was interesting to note that no mention was made of a research category that addressed alternative methods of providing education in agriculture. As a profession, should we at least be considering such topics?

Procedural Considerations

The parameters examined and the procedures used to conduct the investigation were clearly explained. It was good that a panel of experts was used to review and validate the subject-matter topics originally developed by the investigators. Doing so minimized one possible limitation in the study, i.e., reviewer bias in selecting the categories to which topics were assigned. However, a question might be raised as to why the investigators did not include in their study the database of research in agricultural extension available from different sources, such as the Journal of Extension, especially as this was implied in the title of the study. Incidentally, even though space was limited, it would have been helpful if the authors had shared their perceptions of the limitations that they faced in conducting the study.

Questions for Consideration

The present study does not address (but was not intended to do so, either) whether or not "proper" emphasis has been placed on research in the different categories, or if research in one category has occurred at the expense of research needed in other categories. Research to answer such a question probably needs to be undertaken.

Because so many research studies were classified in the "Other" category, is it possible that additional classifications might be considered in future research and that some of the "other" topics did, in fact, relate to some of the emerging, innovative categories that the investigators concluded needed to be examined by the profession?

A METHOD FOR DETERMINING EQUIVALENCE BETWEEN SCIENCE AND AGRICULTURAL EDUCATION COMPETENCIES

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Introduction and Theoretical Framework

The National Research Council published a report in 1988, "Understanding Agriculture; New Directions for Education", which has served as a catalyst for extraordinary changes in agricultural education programs across the country. One of this committee's principal recommendations was: "Agricultural courses sufficiently upgraded in science content should be credited toward satisfying college entrance and high school graduation requirements for science courses in addition to the core curriculum" (National Research Council, 1988).

"Incorporating science into existing agriculture classes or adopting new agriscience courses is gaining momentum as a major reform of agricultural education programs in secondary schools" (Moss, 1984, p.5). These efforts are being implemented in order to better prepare students for postsecondary education as well as the new, technology-based careers in agriculture.

In 1990, the Arizona Department of Education released its report "Arizona Science Essential Skills"; a framework designed for school districts to use to develop a coordinated, articulated science curriculum. In Part II of the report, scientific and technological literacy is defined in eight specific goals. Experiential education, an integral part of the foundation of agricultural education programs, is addressed in Goal 8: "To acquire skills for learning through concrete and manipulative use of instruments and materials of science" (ADE, 1990). The report states: "Students need many opportunities to learn science by doing science both in and outside the classroom. A wide variety of hands-on interactions should be included at all levels... "(ADE, 1990). The development of the Arizona Essential Skills Frameworks was directed by Arizona Senate Bill 1327, Goals for Arizona's Educational Excellence, which states: "...by 2000, ninety percent of (high school) graduates in this state must master core competencies as detailed in a list of essential skills adopted by the State Board of Education for each of the following student achievement goals......in science, that graduates achieve the science skills and knowledge of scientific principles, reasoning, technology and history"" (Arizona Department of Education, 1990).

The Arizona State Board of Education has developed and is implementing a series of assessment tools known as the Arizona Student Assessment Program (ASAP) based on lists of essential skills in science, mathematics, language arts and free enterprise. These assessment tools are competency-based and students must attain a level of proficiency for each of the essential skills before they can graduate from high school.

The Arizona State Board of Education (1991) determined the minimum course of study and competency requirements effective for the graduating class of 1996 and ruled that local school districts may grant a maximum of three and one-half credits towards requirements for graduation in English, math, free enterprise or science to vocational-technological education program completers. The task of determining the equivalence of the courses was the responsibility of each individual school district. The Board suggested the use of an audit-analysis procedure. Snyder (1989) indicated an audit-analysis involves identifying, coding and comparing academic and vocational source materials for equivalency based upon the skills included in the Arizona Essential Skills Lists. However, there was no universally accepted method among Arizona school districts for determining equivalency between courses. Each district determined course equivalence using their own guidelines.

In 1970, a curriculum titled The Two Year Core Curriculum for Agricultural Education in Arizona was developed to aid agricultural educators, administrators and advisory committees in planning an agricultural education program which would benefit the need at the local level and at the same time meet the demand for "...an articulated, coordinated instructional program in agriculture [in Arizona]" (Department of Agricultural Education, University of Arizona, 1970). This curriculum was used by the educators in this study. Even though much of the curriculum for agricultural education currently being developed in Arizona identifies which of the Arizona Science Essential Skills are being met, no research has been conducted to assess which of these essential skills are included in the Two Year Core Curriculum for Agricultural Education in Arizona. Since Arizona was moving towards competency-based assessment for graduation from high school the need to determine if agricultural education competencies were equivalent to any science competencies was great. This was the justification for the study.

In an investigation of science related competencies taught in the introductory level agricultural courses in Louisiana, Moss (1986) concluded that the science-related objectives included in the program were of substantial numbers, were taught at both levels of the program and overlapped with objectives of science courses approved in the state of Louisiana. Moss reported there were 76 science-related instructional objectives in the curriculum guide for the basic program. "Of the 76 objectives identified, 13 objectives were overlapping with objectives taught in high school biology. Four objectives overlap with objectives taught in general science and three objectives are similar to the competencies taught in physical science" (Moss, 1986, p. 3).

Of the 18 instructional units in the core curriculum, eleven have obvious connections to the traditional academic science subject areas of biology, chemistry and physics. However, agricultural education is built on the total program concept that includes personal growth and development, leadership training and supervised experiences in agricultural enterprises and activities, in addition to regular classroom and laboratory instruction. Those subjects are addressed in the other 7 units of the core curriculum. While these areas may not have obvious connections to science, they help provide "opportunities for the students to apply the knowledge and skills learned at school to real-life situations and to...'develop..leadership, character,..cooperation, citizenship,..to assume civic responsibility,'...develop excellent skills in working with people...and completing cooperative activities" (Phipps & Osborne, 1988). These kinds of student outcomes are also addressed in the Arizona Science Essential Skills.

The conceptual framework for this study (Figure 1) provided a basis for the study. It clearly illustrates the relationship between the Two Year Core Curriculum for Agricultural Education In Arizona, the Arizona Science Essential Skills and requirements for graduation from high school in Arizona. Operationally, this study focused on the relationship between

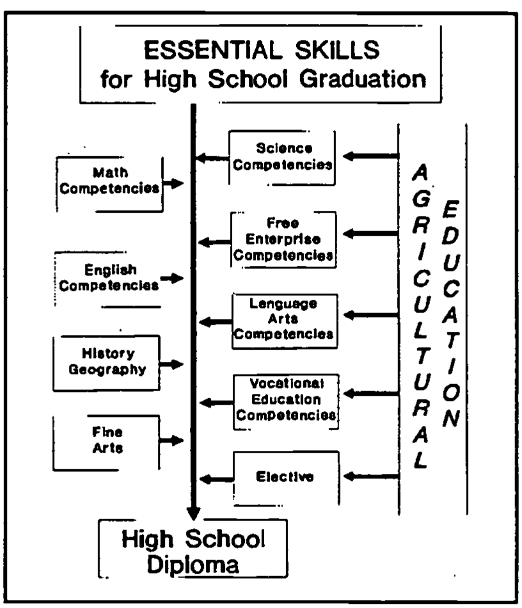

Figure 1. Conceptual Framework

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science competencies (science essential skills) and agricultural education, specifically the Two Year Core Curriculum for Agricultural Education in Arizona. As noted in the literature, the purpose for the essential skills lists was to provide direction for school districts as they develop curricula in science as well as language arts, mathematics and free enterprise. Therefore, it also provides a vehicle for evaluation of existing curricula.

Purpose and Objectives

The purpose of this study was to determine the extent to which the Two Year Core Curriculum for Agricultural Education in Arizona satisfies state science competency requirements for graduation from high school. The following questions were considered to resolve the problem stated above:

1. To what degree are Arizona secondary school agricultural educators teaching the science-related instructional units selected for this study from the Two Year Core Curriculum for Agricultural Education in Arizona?
2. Which science essential skills identified by the Arizona State Board of Education in the Arizona Science Essential Skills list are satisfied in the Two Year Core Curriculum for Agricultural Education in Arizona?

Methods and Procedures

Two surveys were developed. The first survey, referred to as the "objectives survey" was designed to determine the percentage of objectives taught from each of the eleven science-related instructional units of the core curriculum selected for this study. It was mailed to all 73 high school agricultural education teachers in Arizona. Each of the selected instructional units and its objectives were listed. The teachers were asked to indicate approximately what percentage of the objectives from each instructional unit were taught. A five-point Likert-type scale listing various percentages (1 = less than 50%, 5 = 95% or above) was used for the teachers to record their answers. The response rate for the objectives survey was 74.3%.

The second survey, referred to as the "science essential skills survey", was designed as a modified audit-analysis to determine the degree to which the selected science-related instructional units from the core curriculum encompassed the Arizona Science Essential Skills. A purposefully selected evaluation committee, composed of agricultural education and science education teachers, was asked to carefully review each objective from the selected instructional units and compare them to the 35 Arizona Science Essential Skills. Committee members were instructed to indicate all science essential skills met by each educational objective from the science-related instructional units selected for the study. The response rate for the science essential skills survey was 59%.

Results and Findings

The results from the objectives survey showed that science-related instructional units were taught by 98% of the respondents and, on the average, between 80 and 95% of the educational objectives were taught. Figure 2 illustrates the mean, by instructional unit, to the question in the objectives survey that asked the respondents to indicate, using the Likert-type scale, the approximate percentage of objectives taught in each science-related instructional unit.

The Two Year Core Curriculum for Agricultural Education in Arizona was predetermined to have met Arizona graduation requirements in science essential skills if over 50% of the evaluation committee found it satisfied at least 32 of the 35 skills as listed in the Arizona Science Essential Skills. The respondents to the Science Essential Skills Survey rated the core curriculum as having met the established criteria. In fact, all skills received a rating of 67% or higher, as seen in Figure 3. This meant that at least 67% of the evaluation committee believed that the essential skill was included in the core curriculum. Twenty of the 35 science essential skills received a rating over 80% and several received 100%. According to the requirements stated above, the selected science-related instructional units from the Two Year Core Curriculum for Agricultural Education in Arizona met the state high school graduation requirements in science.

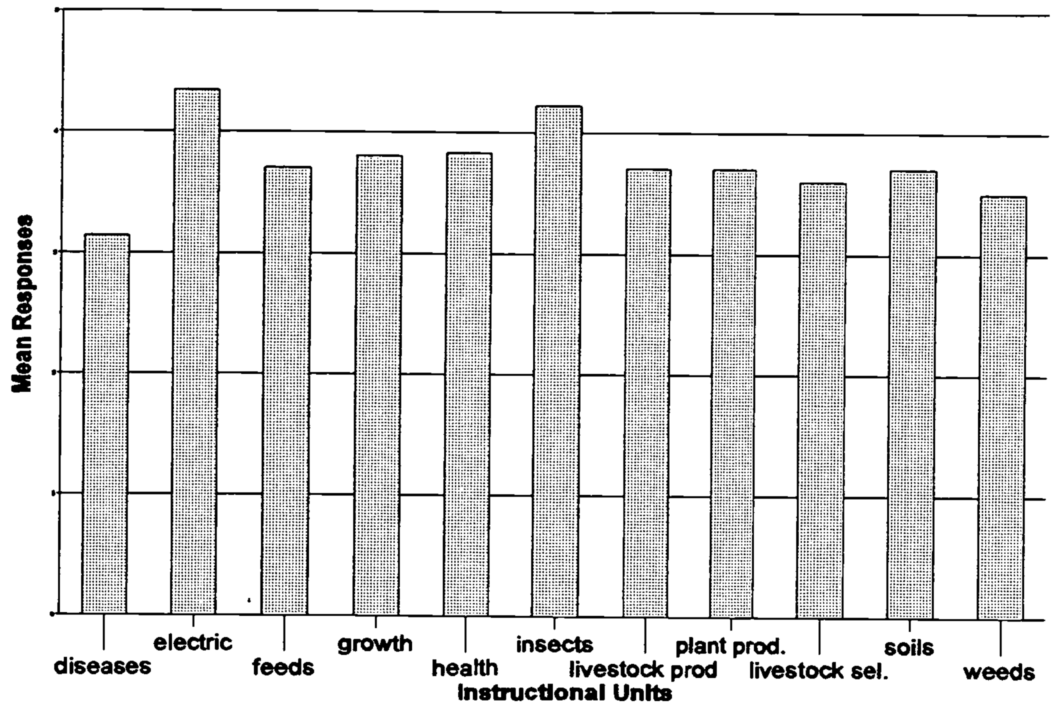

Figure 2. Mean of responses to the percentage of objectives taught in each unit

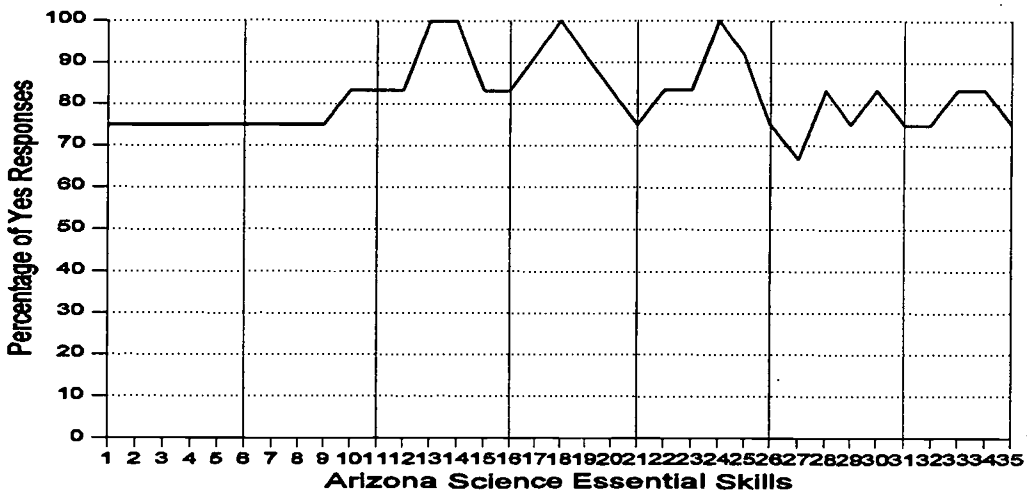

Figure 3 Percentage of affirmative responses to indicate that the science essential skill was met by the Two Year Core Curriculum for Agricultural Education in Arizona.

Conclusions, Recommendations and Implications

Presently, Arizona school districts have no across-the-board, accepted way of determining equivalence of courses. Each district determines their own methods. The modified audit-analysis used in this study could provide an acceptable technique that may align districts' current equivalency evaluation methods and thereby provide a more equal base for students to determine their optimal course of study. The methods used and the results from the science essential skills survey in this study have had an impact on the evaluation of existing curricula. Recently, two agricultural education courses, "Applied Biological Systems" and "Agriscience" and "Agriscience II" were approved as an acceptable laboratory-based biology course and an acceptable laboratory-based integrated science course, respectively, for admission to The University of Arizona. The science-related instructional units used for this study from the Two Year Core Curriculum for Agricultural Education in Arizona are contained within these courses.

High school students today face ever-increasing graduation and university entrance requirements resulting in little or no scheduling room to pursue interest areas. Agricultural education courses can offer students interested in postsecondary education or careers in agriculture as well as those entering the workforce a viable choice for meeting graduation requirements in science. By providing school districts usable methods to evaluate course equivalency, they will be able to offer many more options to their students, allowing a more fulfilling and meaningful educational experience.

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A METHOD FOR DETERMINING EQUIVALENCE BETWEEN SCIENCE AND AGRICULTURAL EDUCATION COMPETENCIES

Discussant Remarks
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The researchers from the University of Arizona are to be commended for their attempt to provide a methodology to their local schools for determining equivalency of a particular state mandate and what a local school program is doing, or attempting to do. The state of Arizona has determined that students graduating from it's high schools should have a particular level of competence in science. Based on previous work, Agricultural Education in Arizona is providing science instruction through it's Two Year Core Curriculum for Agricultural Education in Arizona. Agricultural Education in many states has gone through this process of developing curriculum to meet both programmatic objectives and also broader school objectives. The point in case here is that the researchers at the University of Arizona have attempted to determine the success of that bridging.

While the question was not a part of this research effort, it would be interesting to know whether the Arizona State Department of Education and local schools are accepting and/or adopting the results of this study. Agricultural Educators know that through their program, competencies are developed in the traditional academic science subject areas in addition to the programmatic goals of personal growth and development, leadership training and supervised experience. Agricultural Educators also know and believe that the instruction they provide to the high school student is based in science. This research activity goes one step further and provides a linkage between a specific program's objectives and the overall school and State Department of Education objectives.

Additionally, it would be interesting to review Agricultural Education program completers' responses to research question one (To what degree are Arizona secondary agricultural educators teaching the science related instructional units?). Would Agricultural Education program completers recognize agricultural education instructional units, the components of those instructional units, the objectives and outcomes of those units and would the same students recognize that they have received instruction in science as a part of their Agricultural education program?

Another interesting observation is that for the second research question the researchers used a purposefully selected evaluation committee of teachers in agriculture and science. While percentage of yes responses was seemingly very high, the overall response rate for this survey was considerably lower than the survey sent to the secondary agriculture educators. Is the difference in response rates related to the surveys conducted or the groups of respondents selected? Experience would more than likely say that secondary teachers of agriculture are very responsive when asked to indicate whether they are completing an activity that supposedly is required of them. However, if teachers are asked to evaluate, such as was done in the second survey, experience may say that the responses do not flow as freely.

Again, the researchers from the University of Arizona are to be commended for their research report and the unique conceptualization of a problem that all states are facing. One would hope that the researchers would continue their inquiry and at some point in the future report the acceptance of their methodology outside of the Agricultural Education community.

UTILIZING TWO APPROACHES TO IDENTIFY THE INSERVICE NEEDS OF BEGINNING TEACHERS OF AGRICULTURE

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Introduction/Theoretical Framework

Agriculture teachers have had and continue to have a need for inservice education. Historically, inservice programs have been conducted to assist agriculture teachers, especially beginning teachers, in learning the knowledge and skills necessary to perform their teaching roles (Barrick, Ladewig, & Hedges, 1983; Birkenholz & Harbstreit, 1987; Nesbitt & Mundt, 1993). Many of these inservice programs have been developed based on research (Kahler, 1974; Hillison, 1977; Shippy, 1981; Hachmeister, 1981; Claycomb & Petty, 1983; Veeman, 1984; Birkenholz & Harbstreit, 1987; Valli, 1992; Garton & Chung, 1995) that identified the needs of beginning teachers. What were the needs of beginning teachers as identified by the previous research?

In a study of teachers across subject matter disciplines, Veeman (1984) identified eight problems frequently faced by beginning teachers. The problems included: classroom discipline, motivating students, dealing with individual differences, assessing students' work, relationships with parents, organization of class work, insufficient and/or inadequate teaching materials and supplies, and dealing with problems of individual students (Veeman, 1984).

Researchers (Kahler, 1974; Shippy, 1981; Hachmeister, 1981; Claycomb & Petty, 1983; Birkenholz & Harbstreit, 1987; Mundt, 1991; Talbert, Camp, & Heath-Camp, 1994; Garton & Chung, 1995) have also identified the inservice needs of beginning agriculture teachers. Kahler (1974) concluded that all teachers, regardless of experience, placed a high priority on and expressed much difficulty with the program area entitled "classroom teaching." However, Kahler (1974) also concluded that the needs of the beginning teacher were somewhat different from those of the experienced teacher.

Hillison (1977) found that beginning teachers placed a high need for inservice on such responsibilities as completing state department reports, planning lessons, and ordering materials for the department. Shippy (1981) and Mundt (1991) concluded that beginning teachers perceived their highest need in the areas of program planning, development, and evaluation; planning, execution, and evaluation of instruction; and managing student behavior. Additionally, Birkenholz and Harbstreit (1987) found that the greatest need for inservice appeared in the areas of using computers in the classroom, developing skills in agribusiness management and electricity, training agriculture/FFA contest teams, and assisting students with SAEP records.

Although many studies have provided information with regard to the inservice needs of beginning agriculture teachers, Claycomb and Petty (1983) concluded that the inservice needs of beginning teachers change over time. Furthermore, Birkenholz and Harbstreit (1987) stated that the inservice needs of beginning agriculture teachers should be assessed and prioritized on a continual basis. Therefore, research is needed to assess the inservice needs of today's beginning teachers of agriculture. But which approach to conducting educational needs would best address the problem?

The inservice needs of beginning agriculture teachers have been assessed in a majority of the previous research using similar approaches. Witkin (1984) noted "there is no one model or conceptual framework for needs assessment that has been universally accepted, and there is little empirical evidence of the superiority of one approach over another" (p. 29). In addition, Witkin (1984) concluded that the educational needs of a group could be better identified by using a variety of needs assessment models.

Borich (1980) described an approach to conducting needs assessment based upon a discrepancy model. This approach utilized survey methodology that called for a questionnaire in which respondents provided data that could be weighted and ranked in order of priority. Borich (1980) stated that "... the needs assessment model is essentially a self-evaluative procedure which relies on teachers' judgments about their own performances. The assumption underlying the needs model is that the performer (teacher) can best judge his or her own performance and, when explicitly asked to do so, can make an objective judgement" (p. 42). In addition to Borich, others have defined approaches to assessing educational needs.

Hershkowitz (1973) proposed a criticality function that used a 2x2 matrix to relate perceptions of goal importance to perceptions of goal attainment. Treating each respondent group separately, mean scores of importance and mean scores of attainment to establish criticality levels on the X and Y axes of the graph were calculated. This procedure corrected for the excessive clustering of importance scores toward the top of the scale, which is characteristic of many discrepancy surveys that use category scales (Witkin, 1984). The graphic displays were helpful to needs assessment committees making recommendations regarding priorities.

A quadrant analysis approach based on three dimensions was used by Gable, Pecheone, and Gillung (1981) to establish priorities for training teachers and other school personnel. In their 2x2 matrix, one dimension was the self-desired competencies; the second dimension was generated from ratings by experts on the importance of those competencies. Witkin (1984) stated that this method collapsed two dimensions, present competency and desired competency, into one for the quadrant analysis. Furthermore, Witkin (1984) concluded that the quadrant analysis approach provided a method to use importance as a qualifying factor in deriving priorities and avoided the fallacy of basing priority decisions on simple discrepancies.

Purpose and Research Questions

The purpose of the study was to identify and prioritize the inservice needs of beginning teachers of agriculture in a selected state. The following research questions were developed to guide the study:

1. What were the perceived inservice needs of beginning teachers of agriculture using the Borich needs assessment model?
2. What were the inservice needs of beginning teachers of agriculture as perceived by the teachers and the Joint State Staff using the quadrant analysis model?

Methods/Procedures

The target populations for the study consisted of the beginning (first- and second-year) agriculture teachers in the State of Missouri during the 1994-1995 academic year (N=37) and members of the Joint State Staff in Agricultural Education, which included teacher educators and state supervisor (N=16). Census populations were used; therefore, sampling procedures were not utilized and generalizability of the results was limited to the populations of the study.

To address to the first research question, an instrument using the Borich (1980) needs assessment model was developed to assess the perceived level of importance and perceived level of competence of the beginning teachers regarding 50 professional competencies. The professional competencies were identified through a review of previous research (Kahler, 1974; Shippy, 1981; Hachmeister, 1981; Claycomb & Petty, 1983; Veeman, 1984; Birkenholz & Harbstreit, 1987; Mundt, 1991; Valli, 1992; Talbert, Camp, & Heath-Camp, 1994). Borich (1980) maintained that a major strength of the model was that it attempted to determine the "congruence between what should be and what is, i.e. between what the teacher should be able to do and what the teachers can do" (p. 42).

The beginning agriculture teachers were asked to rate, using a five-point Likert scale, 50 professional competencies on the importance to their success as a beginning teacher. A response of one indicated the competency was not important and a five indicated the competency was very important to their success. The beginning teachers were also requested to rate their perceived competence level with regard to the 50 professional competencies, again using a five-point Likert scale. A response of one indicated they were not competent and a five indicated they were very competent in performing the competency.

A *discrepancy score* for each individual on each professional competency was calculated by taking the importance rating minus the ability (competence) rating. A *weighted discrepancy score* was then calculated for each individual on each of the professional competencies by multiplying the discrepancy score by the mean importance rating.

A *mean weighted discrepancy score* for each of the professional competencies was calculated by taking the sum of the weighted discrepancy scores and dividing by the number of observations. The 50 professional competencies were then ranked using the mean weighted discrepancy scores.

The instrument was assessed for content and face validity by graduate associates, teacher educators, and state supervisors in Agricultural Education. Reliability of the instrument was .95 (Cronbach's alpha coefficient).

To address the second research question, a quadrant analysis based on two dimensions was performed. The quadrant analysis was established using a 2x2 matrix, one dimension was graphically represented by the beginning teachers' discrepancy score for each of the 50 professional competencies. The second dimension was a graphic representation of discrepancy scores for each of the 50 professional competencies as established by the Joint State Staff.

The discrepancy scores, established by the Joint State Staff, were determined by using the instrument developed for the beginning teachers and modifying the directions. Members of the Joint State Staff were asked to rate, using a five-point Likert scale, the 50 professional competencies on the importance to the success of beginning teachers. In addition, they were requested to rate the perceived competence level of beginning teachers on the 50 professional competencies using a five-point Likert scale. The discrepancy score for each competency was calculated by taking the importance rating minus the competence rating.

The four quadrants in the quadrant analysis were (I) high discrepancy as established by teachers and high discrepancy as established by the Joint State Staff, (II) high discrepancy for teachers and low discrepancy for the Joint State Staff, (III) low discrepancy for teachers and high discrepancy for the Joint State Staff, and (IV) low discrepancy for teachers and low discrepancy for the Joint State Staff. Witkin (1984) stated that those competencies falling within quadrant I constituted priorities for inservice programs, but those falling in quadrant II and III should also be discussed and reinforced. Competencies in quadrant IV could be interpreted as successful, with no inservice education needed.

Results/Findings

An analysis of the inservice needs of the beginning teachers of agriculture, using the Borich model, indicated that 12 of the 50 professional competencies were in greater need for inservice (Table 1). The 12 highest rated competencies had mean weighted discrepancy scores greater that 4.0. The 12 competencies included: completing reports for local/state administrators (7.4), motivating students to learn (6.0), preparing FFA degree applications (5.7), developing an effective public relations program (5.5), preparing proficiency award applications (5.4), teaching agriscience - integrating science and agriculture (5.1), utilizing a local advisory committee (5.1), developing SAE opportunities for students (4.9), using computers in classroom teaching (4.5), supervising students' SAE programs (4.3), teaching using experiments (4.1), and conducting local FFA chapter activities (4.0).

Ten of the 50 professional competencies, as perceived by the beginning teachers, received a mean weighted discrepancy score less than 2.0, indicating less of a need for inservice. The 10 lowest rated professional competencies were: teaching knowledge and skills in agricultural construction (1.8), teaching about and agriculture's relationship with the environment (1.8), teaching knowledge and skills in the plant sciences (1.7), conducting parent/teacher conferences (1.7), using multimedia equipment in teaching (1.7), implementing VIMS in the local program (1.4), planning and conducting student field trips (1.1), developing knowledge and skills in the animal sciences (.8), teaching knowledge and skills in soils and soil management (.8), and teaching equine science (.4).

Table 1.
The Inservice Needs of Beginning Agriculture Teachers Using the Borich Needs Assessment Model (N=37)

Ranking	Inservice Needs	Imp. level[a]	Comp. level[b]	MWDS[c]
1	Completing reports for local/state administrators	4.49	2.84	7.40
2	Motivating students to learn	4.84	3.57	6.02
3	Preparing FPA degree applications	4.37	3.08	5.73
4	Developing an effective public relations program	4.73	3.57	5.50
5	Preparing proficiency award applications	4.33	3.08	5.42
6	Teaching agriscience - integrating science and agriculture	4.30	3.11	5.11
7	Utilizing a local advisory committee	4.59	3.49	5.09
8	Developing SAE opportunities for students	4.49	3.41	4.85
9	Using computers in classroom teaching	4.08	2.97	4.52
10	Supervising students' SAE programs	4.42	3.44	4.29
11	Teaching using experiments	4.22	3.21	4.10
12	Conducting local FFA chapter activities	4.58	3.69	4.03
13	Managing student behavior problems	4.51	3.65	3.90
14	Conducting needs assessments and surveys to determine the courses that should be taught	4.16	3.24	3.83
15	Teaching students problem-solving and decision making skills	4.54	3.68	3.78
16	Developing Tech Prep programs	3.65	2.65	3.65
17	Teaching knowledge and skills in electricity	3.84	2.97	3.55
18	Evaluating the local agriculture program	4.38	3.57	3.55
19	Organizing and supervising teaching laboratories	4.19	3.35	3.51

20	Determining the content that should be taught in specific courses	4.32	3.65	3.39
21	Teaching recordkeeping skills	4.51	3.78	3.29
22	Preparing agriculture/FFA contest teams	4.08	3.31	3.29
23	Coordinating activities with local agricultural organizations and agencies	4.19	3.43	3.17
24	Teaching learning disabled students	4.03	3.24	3.16
25	Utilizing a local FFA Alumni affiliate	3.78	2.97	3.04
26	Organizing fund raising activities for the local FFA chapter	4.42	3.75	2.95
27	Assessing and evaluating student performance	4.38	3.73	2.84
28	Organizing a local FBMA program	3.17	2.31	3.73
29	Conducting an adult program	3.61	2.86	2.71
30	Locating and selecting student references and materials	4.28	3.67	2.61
31	Teaching knowledge and skills in marketing agricultural products	4.16	3.54	2.59
32	Repairing and reconditioning agricultural mechanics tools and equipment	3.95	3.32	2.45
33	Teaching knowledge and skills in forestry	3.42	2.72	2.37
34	Teaching about public issues regarding agriculture	4.14	3.57	2.35
35	Developing performance based assessment instruments	3.57	2.92	2.31
36	Developing relations with fellow teachers and administrators	4.59	4.14	2.25
37	Planning banquets	4.14	3.61	2.18
38	Teaching agribusiness knowledge and skills	4.14	3.62	2.12
39	Teaching small gas engines	3.24	2.59	2.10
40	Teaching knowledge and skills in horticulture	3.46	2.86	2.06
41	Teaching knowledge and skills in agricultural construction	4.16	3.68	1.80
42	Teaching about and agriculture's relationship with the environment	4.11	3.68	1.78
43	Teaching knowledge and skills in the plant sciences	4.08	3.68	1.65
44	Conducting parent/teacher conferences	1.25	3.86	1.65
45	Using multimedia equipment in teaching	3.73	3.30	1.61
46	Implementing VIMS in the local program	3.19	2.76	1.38
47	Planning and conducting student field trips	3.76	3.47	1.12
48	Developing knowledge and skills in the animal sciences	4.25	4.06	0.83
49	Teaching knowledge and skills in soils and soil management	3.90	3.49	0.80
50	Teaching equine science	2.75	2.61	0.38

[a] Importance Level: 5 = Very Important, 4 = Important, 3 = Somewhat Important, 2 = Of Little Importance, 1 = Not Important

[b] Competence Level: 5 = Very Competent, 4 = Competent, 3 = Somewhat Competent, 2 = Little Competence, 1 = Not Competent

[c]MWDS: Mean Weighted Discrepancy Score

As a result of utilizing the quadrant analysis model, 16 of the 50 professional competencies were located in quadrant I as a result of receiving high discrepancy scores from both teachers and the Joint State Staff (Table 2, Figure 1). Quadrant II contained nine competencies that received high discrepancy scores from the teachers and low discrepancy scores from the Joint State Staff. Six competencies were located in quadrant III, indicating low discrepancy scores from the teachers and high discrepancy scores from the Joint State Staff. As a result of receiving low discrepancy scores from the teachers and the Joint State Staff, nineteen competencies were located in quadrant IV.

Table 2.
The Inservice Needs of Beginning Agriculture Teachers as Determined by the Quadrant Analysis Model

Quadrant	Item number	Inservice Needs	Discrepancy Scores Bt[a]	JSS[b]
I	2.	Completing reports for local and state administrators	4.95	2.25
	46.	Motivating students to learn	3.81	3.89
	20.	Developing an effective public relations program	3.49	4.00
	26.	Teaching agriscience - integrating science and agriculture	3.57	2.13
	32.	Utilizing a local advisory committee	3.32	3.88
	8.	Developing SAE opportunities for students	3.24	2.50
	11.	Supervising students' SAE programs	2.92	3.00
	15.	Teaching using experiments	2.84	2.50
	23.	Conducting local FFA chapter activities	2.67	2.63
	37	Managing student behavior problems	2.59	4.13
	16.	Teaching students problem-solving and decision making skills	2.51	2.75
	39.	Evaluating the local agriculture program	2.43	3.00
	12.	Organizing and supervising teaching laboratories	2.51	3.13
	17.	Teaching learning disabled students	2.27	2.25
	22.	Coordinating activities with local agricultural organizations and agencies	2.35	2.50
	28.	Organizing a local FBMA program	2.58	2.38
II	49.	Preparing FFA degree applications	3.92	2.00
	50	Preparing proficiency award applications	3.75	1.75
	4.	Using computers in classroom teaching	3.32	1.25
	25.	Conducting needs assessments and surveys to determine the courses that should be taught	2.76	1.63
	47.	Developing Tech Prep programs	3.00	1.13
	44.	Teaching knowledge and skills in electricity	2.76	1.88
	38.	Determining the content that should be taught in specific courses	2.35	1.75
	3.	Preparing agriculture/FFA contest teams	2.33	1.00
	41.	Utilizing a local FFA alumni affiliate	2.42	1.00
III	21.	Teaching recordkeeping skills	2.19	2.75
	35.	Assessing and evaluating student performance	1.95	3.00
	13.	Conducting an adult program	2.25	3.50
	7.	Repairing and reconditioning agricultural mechanics	1.86	3.38

		tools and equipment		
	45.	Developing relations with fellow teachers and administrators	1.38	2.63
	18.	Conducting parent/teacher conferences	1.17	2.63
IV	42.	Organizing fund raising activities for the local FFA chapter	2.00	1.63
	27.	Locating and selecting student references and materials	1.83	2.00
	24.	Teaching knowledge and skills in marketing agricultural products	1.86	1.88
	43.	Teaching knowledge and skills in forestry	2.08	1.38
	40.	Teaching about public issues regarding agriculture	1.70	2.00
	30.	Developing performance based assessment instruments	1.95	1.00
	48.	Planning banquets	1.58	1.75
	9.	Teaching agribusiness knowledge and skills	1.54	1.00
	14.	Teaching small gas engines	1.95	1.00
	10.	Teaching knowledge and skills in horticulture	1.78	1.25
	36.	Teaching knowledge and skills in agricultural construction	1.46	1.38
	34.	Teaching about and agriculture's relationship with the environment	1.30	1.88
	19.	Teaching knowledge and skills in the plant sciences	1.22	1.13
	5.	Using multimedia equipment in teaching	1.30	1.88
	6.	Implementing VIMS in the local program	1.30	1.25
	1.	Planning and conducting student field trips	0.92	0.00
	31.	Developing knowledge and skills in the animal sciences	0.58	1.25
	29.	Teaching knowledge and skills in soils and soil management	0.65	1.88
	33.	Teaching equine science	0.42	0.63

Note: [a]Beginning Teachers
[b]Joint State Staff

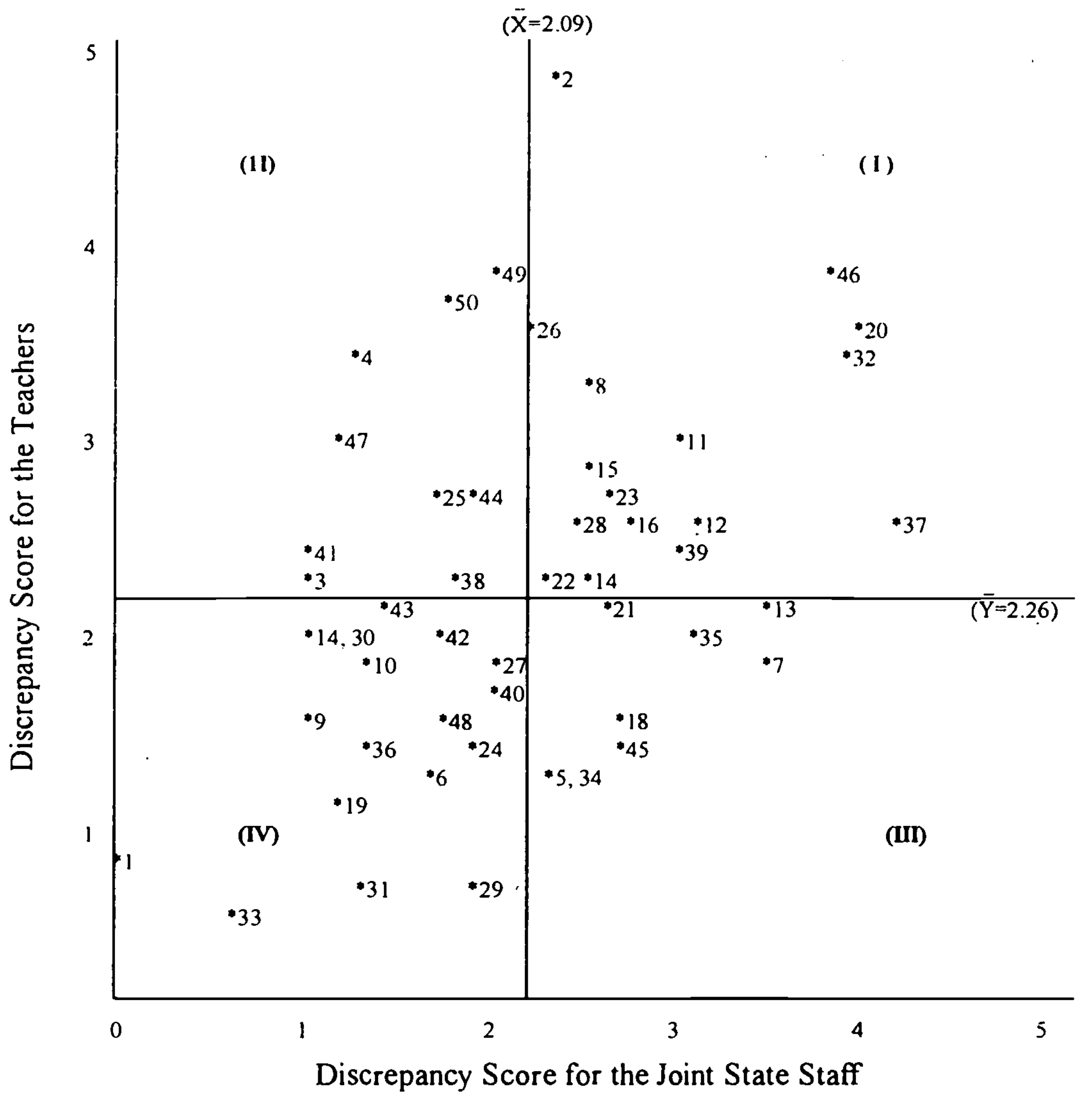

Figure 1. Quadrant Analysis of the Inservice Needs of Beginning Teachers of Agriculture

Conclusions/Recommendations/Implications

From the results of the Borich needs assessment model, 12 of the 50 professional competencies were identified by the beginning teachers as having a greater need for inservice education. Of the 12 professional competencies, five were classified in the category of instruction, five in the category of program planning, development, and evaluation, and two in the category of program administration as defined by Shippy (1981).

As a result of the quadrant analysis model, 16 of the 50 competencies were identified by the beginning teachers and the Joint State Staff as having a greater need for inservice education. Of the 16 professional competencies, eight were classified in the category of instruction, six in the category of program planning, development, and evaluation, and two in the category of program administration.

The ten competencies identified with the greatest need for inservice, as a result of the quadrant analysis model, were included in the 13 highest rated inservice needs as prioritized by the beginning teachers using the Borich needs assessment model. From the quadrant analysis model, the eighteen least needed inservice needs for beginning teachers were included in the 21 lowest rated inservice needs as prioritized by the beginning teachers using the Borich needs assessment model. As in the Borich needs assessment model, the technical agriculture knowledge and skill competencies were ranked lower in priority in the quadrant analysis model when compared to competencies in the areas of instruction, program planning, development and evaluation, and program administration.

The professional competency with the greatest need for inservice education, as perceived by beginning teachers and the Joint State Staff, was in completing reports for local and state administrators which supported the conclusions of previous research (Hillison, 1977; Claycomb & Petty, 1983). Motivating students to learn was identified by the Borich needs assessment model and the quadrant analysis model as the second most needed area of inservice, which supported Veeman's (1984) conclusion of being a frequent problem faced by beginning teachers.

Many teachers of agriculture graduate from teacher preparation programs claiming to lack the necessary technical agriculture knowledge and skills to be successful teachers (Claycomb & Petty, 1983). However, the technical agriculture knowledge and skill competencies were rated lower in priority for inservice when compared to the professional competencies in the areas of instruction, program planning, development, and evaluation, and program administration. Therefore, it can be concluded that the beginning teachers perceived that technical agriculture competence was not as much a factor in the success of beginning teachers as were the other professional competencies. This conclusion is supported by Claycomb and Petty's (1983) finding that the need for assistance in human relations and program administration increased and outweighed technical expertise during the first year of teaching.

In general, the inservice needs identified using the Borich needs assessment model, as perceived by the beginning teachers, corresponded with the inservice needs identified by the quadrant analysis model, as perceived by the beginning teachers and the Joint State Staff. Therefore, it can be concluded that when identifying the inservice needs of beginning teachers of agriculture using either the Borich model or the quadrant analysis model are acceptable approaches that yield similar results.

It is recommended that the findings of this study be taken into account as teacher educators, in the State of Missouri, plan and develop inservice courses for beginning teachers. Inservice should focus on enhancing instruction and program development and administration. The specific inservice needs with the highest ranking should be given priority when planing and developing inservice programs for beginning teachers. In addition, the current study should be replicated in other states to determine if the inservice needs of beginning teachers are consistent across states.

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UTILIZING TWO APPROACHES TO IDENTIFY THE INSERVICE NEEDS OF BEGINNING TEACHERS OF AGRICULTURE

Discussant Remarks

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To begin the discussion of this research report, we must commend the researchers for their concept and clear report of the findings of their research. The concept of using two sources of information and then merging those sources of information into one outcome, or finding, for the answers to the research questions is perhaps a direction that Agricultural Education research should be headed. If that premise is accepted, perhaps the next question would be, "Could the daily supervisors of beginning teachers of agriculture, that is the local school administration, also be included in a study such as this?" If included, would the school administrators' responses converge with the teachers and the teacher educators and state staff, or would the local administrators' responses bring more divergence to the answers?

If one accepts the findings of this study (there is absolutely no reason not to accept the findings), then one must consider the relationship of the in-service needs of beginning teachers, that is year one, two and three and the pre-service needs of those same teachers.

There would seem to be considerable agreement in the profession concerning the fifty competencies upon which this study is based. Some professionals may title or group them somewhat differently. There also would seem to be significant agreement, within the profession, as to the ranking of those competencies in terms of success for the beginning and continuing teachers of agriculture. This agreement and the findings of this study as to the competencies that are listed in quadrant one and identified as in-service needs of beginning teachers should then lead to the question, "What impact do the results of this and other studies have on the determination of the pre-service Agricultural Education curriculum?" As the profession of Agricultural Education develops the in-service need of beginning and continuing agriculture teachers, perhaps it should also be considering those results in light of what is being done in the pre-service component.

Pre-service teacher education programs do pay particular attention to many of the fifty competencies required for successful teaching. At what point do students, as perspective teachers, progressing through the pre-service program and then as actual teachers in the beginning teacher program recognize that most likely there will be a discrepancy between their ranking of the competencies by need and competence? Is it maybe a fact that no matter what the profession does in the pre-service program, teachers will not recognize the importance of those competencies until they are asked to actually perform the competencies in their first few years of teaching? If teacher education and state staff understand this discrepancy, then how might the profession develop it's pre-service program so that the prospective teachers in those programs also have a better understanding of what teaching, after undergraduate, is all about?

While questions have been raised in this discussion, these questions, by no means, take away from the researchers' work. Again, they are to be commended for their conceptualization and approach in answering a research question that the profession continually struggles with, that is "What are the in-service needs of beginning teachers of agriculture?"

BLOCK SCHEDULING'S IMPACT ON INSTRUCTION, FFA AND SAE IN AGRICULTURAL EDUCATION

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Introduction and Theoretical Framework

The publication of a Nation at Risk in 1983 triggered a plethora of educational reforms in the public schools. The reforms included increasing graduation requirements, establishing tech-prep programs, instituting site based management, integrating academic and vocational education, , and developing new approaches to instruction (Paideia and FAST science). One potential area for reform, which has received little attention until recently, is the structure of the school day.

The school day has remained static for the past 80 years. In 1909 the Carnegie Foundation for the Advancement of Teaching proposed the "Standard Unit" as the common measure of time spent on a specific subject in high school. This unit, commonly called the Carnegie Unit, calls for students to attend between five and six classes during the school day with each lasting 50 minutes. Even though there have been minor variations in the school day over the years in local schools, the Carnegie Unit still predominates (Maeroff, 1994). However, starting in the early 1990's, schools started experimenting with different approaches to scheduling the school day (Carroll, 1990). A common alternative is to break the school year into two semesters and schedule four classes of 90 minutes during each semester. Courses are completed in one semester instead of a year. In the literature this approach is commonly called block scheduling, alternative scheduling or the Copernican plan (Carroll, 1994).

Block scheduling is growing rapidly in North Carolina and in many other states. In 1992-93 only 1% of North Carolina public high schools used block scheduling . Block Scheduling is defined as " a scheduling system in schools in which students take four courses each semester, in 90 minute class periods, completing eight courses each year" (Averett, 1994). An agricultural education teacher's block schedule is illustrated in Table 1 and a student's in Table 2. During the 1994-95 school year, about 38% of the public high schools were on block schedules. It is estimated that 60% of the high schools in North Carolina are on block scheduling for the 1995-96 school year (Averett, 1994).

Table 1.
Agricultural Educator's Class Schedule on Block Scheduling

TIME	SEMESTER I	SEMESTER II
7:50 - 9:15 a.m.	Biotechnology	Biotechnology
9:20 - 9:50 a.m.	Home Room	Home Room
9:55 - 11:20 a.m.	Horticulture I	Horticulture II
11:25 - 11:55 a.m.	Prep	Introduction to Agriscience
12:00 - 1:30 p.m.	Lunch I	Lunch I
1:35 - 3:00 p.m.	Introduction to Agriscience	Prep/Visits

Table 2.
Agriculture Student's Class Schedule on Block Scheduling

TIME	SEMESTER I	SEMESTER II
7:50 - 9:15 a.m.	English I	History I
9:20 - 9:50 a.m.	Home Room/Advocacy	Home Room/Advocacy
9:55 - 11:20 a.m.	Horticulture I	Horticulture II
11:25 - 11:55 a.m.	Algebra I	Introduction to Ag
12:00 - 1:30 p.m.	Lunch	Lunch
1:35 - 3:00 p.m.	Elective/Band	Literature

Overall, the initial reaction to block scheduling appears to be positive (Jones, 1995). Carroll (1994) found that block scheduling decreased average class size, reduced teaching load, and substantially increased learning mastery. Hottenstein and Malatesta (1993) report that standardized scores increased greatly in their Pennsylvania school after implementing block scheduling. Guskey and Kifer (1995) found less discipline problems and significant increases in standardized scores of African American students in their Maryland school. They also report that 70% of the students and 95% of the faculty prefer the 4-period day. Schoenstein (1995) found that after block scheduling was implemented in a Colorado high school, student and staff stress was lower, daily attendance was up, and the number of students on the honor roll and attending college increased. Reid (1995) found that English students believe their writing had improved under the block schedule.

Most of the research on block scheduling has been school wide or on the teaching of a specific academic subject. There has been little research on the impact of block scheduling in agricultural education. Since agricultural education involves out-of-school experiential learning and has integral youth organization activities, the impact of block scheduling may be viewed differently. One of the most widely respected agriculture teachers in North Carolina says that block scheduling was the worst thing that had ever happened to him. Yet another teacher from a less prestigious program said block scheduling was the greatest thing that had happened to his program in years. Both views may be accurate or the reality of block scheduling may lie in between.

There is some evidence that block scheduling is having an adverse affect on the operation of agricultural education programs. This research will document the impact of block scheduling on agricultural education and seek solutions for the problems that may be developing. The theoretical foundation for this research is the Hamlin Proposition. Hamlin (1966) asserted that the major reason research is conducted is to find a solution for a problem. This research did not seek to test some hypothetical theory. Instead it sought to document a perceived problem and then to seek solutions to help solve the problem.

Purpose and Objectives

The overall purpose of this research was to conduct an in-depth study of the impact of block scheduling on agricultural education and to determine identify exemplary strategies that could be used by other agriculture teachers in block schedules. This research study had three major objectives:

1. To document the impact that block scheduling is having on the conduct of the complete agricultural education program.
2. To identify the attitudes of agriculture teachers toward block scheduling.
3. To identify "strategies that work" in instruction, FFA and SAE in schools where block scheduling is used.

Methods and Procedures

Instrument

A survey instrument was sent to the senior agricultural teacher in every secondary agricultural department in the state (N=222). The instrument assessed the teachers' attitudes toward block scheduling and identified the impact of block scheduling on the FFA, SAE and instructional programs in their schools. Five questions were used to describe the program before and after block scheduling. The questions revolved around course enrollments, FFA membership, instructional program quality, FFA program quality and SAE program quality.

An attitude score was calculated from responses to a 28 item attitude scale which was completed by the respondents. A Likert-type response scale was used with a 1 being strongly disagree and 5 being strongly agree. The responses were summed and averaged to give a mean attitude score. The scoring of the items on the instrument that were worded negatively were reversed in calculating the mean attitude scores.

In an open ended section of the instrument, teachers were asked to identify what they are doing differently in regards to instruction, FFA and SAE and to assess the effectiveness of these practices. This instrument was developed by the researchers and then field tested in Virginia. Based upon the field test, one modification was made in the instrument. A Cronbach's Alpha was calculated on the attitude portion of the instrument and resulted in a reliability estimate of .92.

Data Collection

The survey was mailed to the teachers in May of 1995. A follow-up administration of the instrument was given during the state agricultural teachers conference. A total of 141 teachers responses were obtained for a response rate of 64%. A comparison of early and late respondents yielded no significant differences. Therefore, since late respondents are similar to non-respondents, no further follow-up procedures were conducted and the researchers assumed that the data were generalizable to the study population (Miller & Smith, 1983).

Data Analysis

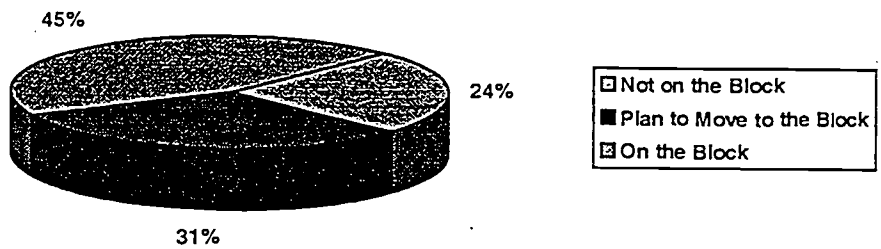
Both quantitative and qualitative techniques were used in analyzing the data. The data amenable to quantitative analysis were placed in an Excel spreadsheet and various statistical functions were employed. The qualitative data were examined and summarized by the researcher.

Results and/or Findings

Current Status of Block Scheduling in North Carolina

The data were collected in the spring and summer of 1995. At that point in time 34 (24%) of the schools were not on block schedules and had immediate plans to do so. Forty-four (33%) schools were not on block schedule but planned to do so in the near future. Sixty-three (45%) of the schools were on block schedules. Counting the schools on block schedules and those planning to do so, about 3/4 of the schools represented in this research are expected to be on block schedules in the 1995-96 school year. This information in graphically presented in Figure 1.

Figure 1 Block Schedule Status of Schools



Of the 63 schools on block schedules, 45 were in their first year of operation. Fifteen schools were in their second year of block scheduling and two schools had been on block schedules three or more years. Of the 63 schools on block schedules, 59 were using the 4 x 4 schedule. The other schools were using the Alternate Day (AB) schedule or some variation of the Alternate Day schedule.

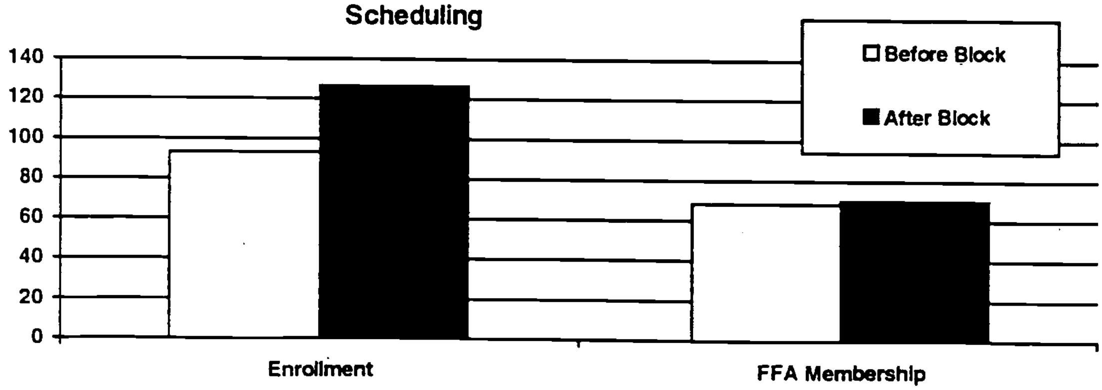
Research Questions

The first research objective was to document the impact that block scheduling was having on the conduct of the complete agricultural education program. Five questions were used to answer this question. These questions revolved around course enrollments, FFA membership, instructional program quality, FFA program quality and SAE program quality.

Enrollment in agricultural courses has increased substantially after the implementation of block scheduling. The mean number of students enrolled in agricultural courses prior to block scheduling was 93.2 students per school. After block scheduling was enacted, the average enrollment rose to 126.6. This is an increase of 33 students per program. For agricultural education programs with low enrollments, block scheduling may be a solution. These data are graphically presented in Figure 2.

While enrollments in agriculture increased as a result of block scheduling, membership in the FFA did not. The average FFA membership per school prior to block scheduling was 68.4. After the implementation of block scheduling, the average membership was 70.4. The increased number of students who are taking agriculture are not showing up on the FFA membership roles. These data are also presented in Figure 2.

Figure 2 Enrollments and FFA Membership Prior to and After Block Scheduling

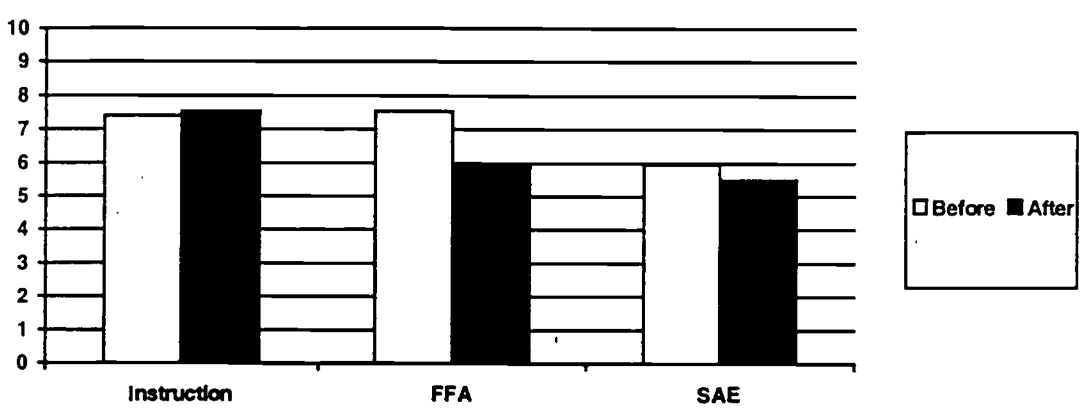


Teachers were asked to rate the overall quality of the instructional program, FFA program and SAE program prior to and after the implementation of block scheduling. A 10 point Likert-type scale was used with 10 being excellent and 1 being poor. The rating of the instructional program was 7.4 prior to block scheduling and 7.53 after block scheduling. The teachers did not believe block scheduling had any much impact on the quality of their instructional program. These data are shown in Figure 3.

The item with the greatest change in relative scores was the FFA program. Prior to block scheduling the teachers rated their FFA program at 7.53. After block scheduling this had dropped to 5.95, a decline of nearly two points on a 10 point scale. Teachers believe block scheduling is having a negative impact on the FFA program. These data are shown in Figure 3.

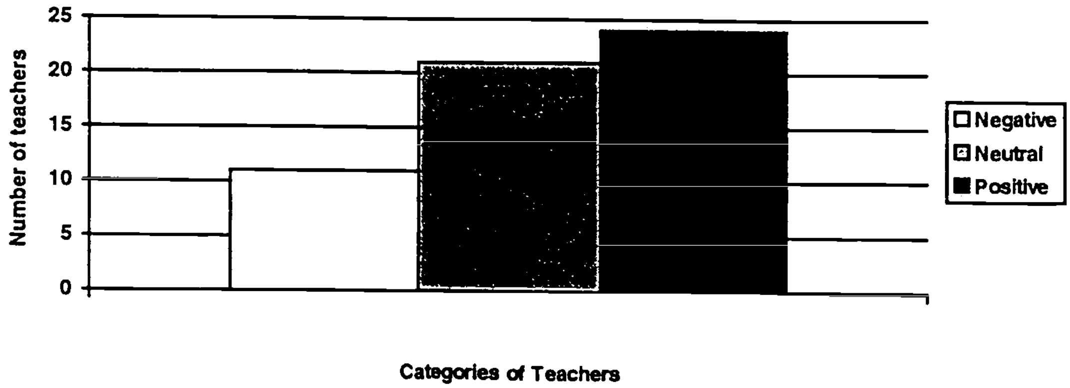
There was a slight decline in scores on the SAE component of the program prior to and after block scheduling. The mean score prior to block scheduling was 5.95. The mean score was 5.49 after block scheduling. Research by Clary over 20 years ago identified SAE as being weak in North Carolina. These data tend to reveal SAE is still a weak component of the program, both before and after block scheduling. These data are shown in Figure 3.

Figure 3 Program Quality Prior To and After Block Scheduling



The second research objective was to identify the attitudes of agriculture teachers toward block scheduling. An attitude score was calculated from responses to a 28 item attitude scale which was completed by the respondents. A Likert-type response scale was used with a 1 being strongly disagree and 5 being strongly agree. The responses were summed and averaged to give a mean attitude score. The scoring of the items on the instrument that were worded negatively were reversed in calculating the mean attitude scores. The overall mean attitude score was 3.22 on a 5 point scale. This score falls in the undecided range. The range of scores was from a mean of 4.1 to 2.25. A 4.1 score is "agree" and a 2.25 is near "disagree". Because the mean attitude score was near the midpoint of the scale, it was decided to divide the teachers into three attitude groups to get a better understanding of the attitudes of the teachers. Mean attitude scores above 3.25 were considered positive and mean attitude scores below 2.75 were classified as being negative. Scores falling in between were considered neutral. Attitude scores were calculated only on teachers who had been in the block schedule. The array of attitude scores is shown in Figure 4.

Figure 4 Overall Attitude of Teachers Toward Block Scheduling



There were more teachers (N=24) with a positive attitude (M>3.25) toward block scheduling than teachers (N=11) with a negative attitude (M<2.75). Twenty-four teachers were classified as having a neutral or undecided attitude (M=2.76-3.24) (see Table 3).

Table 3.
Attitudes of teachers toward block scheduling

Attitude Statements	All Teachers[1]	Positive Teachers	Negative Teachers
Labs can be utilized more effectively under block scheduling.	4.44	4.76	3.90
It is more difficult to operate the FFA program since we implemented block scheduling.	4.13	3.30	4.36
Enrollment in Ag Ed classes has increased since we implemented block scheduling.	4.02	4.21	3.91
I have had to change my ways of teaching since we implemented block scheduling.	4.02	4.04	4.09
I personally like block scheduling.	4.00	4.66	2.73
I have more planning time.	4.00	4.24	3.18
Block scheduling has been successful in my school.	3.83	4.29	3.00
Coordinating SAE visits are difficult when students are not in class.	3.75	3.50	4.18
It is more difficult to prepare contest teams since we implemented block scheduling.	3.70	3.28	4.36
Most of my students like block scheduling.	3.70	4.18	2.82

Table 3.
Attitudes of teachers toward block scheduling

Attitude Statements	All Teachers[1]	Positive Teachers	Negative Teachers
I believe block scheduling is a better way to organize school time.	3.63	4.17	2.36
Students can focus better under block scheduling because they have fewer courses.	3.47	4.07	2.18
Higher quality students are now joining the FFA.	3.23	3.64	2.72
My students are learning more since we implemented block scheduling.	3.22	3.68	2.27
It is easier to teach SAE record keeping with the longer class periods.	3.21	3.59	2.55
Student achievement has improved with block scheduling.	3.20	3.55	2.10
The quality of the students in the program has improved since we implemented block scheduling.	3.16	3.62	2.45
Students have difficulty sitting through the longer periods of block scheduling.	3.12	2.32	3.82
It is more difficult for students to have a SAE program with block scheduling.	3.02	2.48	3.55
Block scheduling allows students to have different types of SAE Programs.	2.85	3.11	2.45
I worry that students don't learn as much as they did under a traditional schedule.	2.80	2.32	3.82
More students are showing interest in the SAE program under block scheduling.	2.57	2.93	2.09
I have difficulty maintaining student interest for the entire period since we implemented block scheduling.	2.48	1.93	3.18
It is easier to cover all of the competencies outlined in the course description under block scheduling.	2.47	3.11	1.45
It is easier to develop a FFA Program of Activities under block scheduling.	2.33	2.82	1.64
I have had more discipline problems in my class since we implemented block scheduling.	2.30	1.73	2.82
Attendance for FFA chapter meetings has increased since block scheduling.	2.25	2.62	1.91
I would prefer to return to a more traditional schedule.	2.18	1.55	3.55

[1] The rating scale was 1 Strongly Disagree, 2 Disagree, 3 Undecided, 4 Agree and 5 Strongly Agree

Responses to specific items on the attitude scale were examined to see which items might merit special attention. Six attitude statements had mean ratings of 4.0 or higher. These statements were: Labs can be utilized more effectively under block scheduling (M=4.44), It is more difficult to operate the FFA program since we implemented block scheduling (M=4.13), Enrollment in Ag Ed classes has increased since we implemented block scheduling (M= 4.02), I have had to change my ways of teaching since we implemented block scheduling (M=4.02), I personally like block scheduling (M=4.00), and I have more planning time (M=4.00).

There were six attitude items that had mean scores below 2.5 Teachers were in disagreement with the following statements: I have difficulty maintaining student interest for the entire period since we implemented block scheduling (M=2.48), It is easier to cover all of the competencies outlined in the course description under block scheduling (M=2.47), It is easier to develop a FFA Program of Activities under block scheduling (M=2.33), I have had more discipline problems in my class since we implemented block scheduling (M=2.30), Attendance for FFA chapter meetings has increased since block scheduling (M=2.25) and I would prefer to return to a more traditional schedule (M=2.18). The teachers' responses to all attitude statements are found in Table 1.

The third research objective was to identify "strategies that work" in instruction, FFA and SAE in schools where block scheduling is in operation. An open ended question was used to elicit the responses to this question. Most people made the same points repeatedly. The major points made by the respondents are summarized as follows:

> Break up each period with different activities. Spend part of the time doing class work followed by a practical activity or laboratory work. Some teachers recommend 1/2 of the time on class work and 1/2 the time on practical work while other teachers suggest dividing the class into three 30 minute segments with a different type of activity in each segment. Increase "hands on" activities.
>
> Use a wide variety of teaching methods. Methods mentioned included lecture, board work, seat work, small groups, teams, peer teaching, cooperative learning, video, field trips, visiting speakers, team teaching, and use of labs.
>
> Provide a brief break half way through the period.
>
> Publish a FFA newsletter or use bulletin boards to keep members informed of FFA activities. Some type of communication device will be needed to keep the FFA functioning.
>
> Teach the introductory or first level courses in the fall.
>
> Have plenty of officer meetings.
>
> Be ready to try different things.
>
> Prepare thoroughly for class. Use the VOCATS (state list of competencies to be taught in each course) blueprints to plan lessons.

A number of points (not suggestions) were made by the teachers and some questions were raised. These comments are as follows:

How do you get students enrolled in agricultural education class for the second semester to pay FFA dues during the first semester? How do you maintain contact with students who were in agricultural education the first semester but not the second? Students may not want to pay dues during the second semester because they think they will get only half the benefits.

The VOCATS system needs to be revised to reflect 135 hours of instruction instead of 180.

Field trips (including club activities) are harder to get approved. Students are missing more information if they are gone for a day.

There is not enough time for FFA activities. It is difficult to prepare for contest and events. The FFA will need to be altered.

Budgets for supplies and materials need to be increased. You are teaching two years of courses in one year. There is an increase number of students.

Some biotechnology laboratories need to meet every day.

Students may meet all graduation requirements by the junior year and not put much effort into classes the remainder of the time.

Conclusions and/or Recommendations

Agriculture teachers in North Carolina generally have a positive attitude toward block scheduling. The majority of the teachers who are on block schedules prefer to remain on block schedules. However, block scheduling is having an impact on the operation of the agricultural education program, particularly the delivery of traditional FFA activities. Block scheduling is resulting in increased number of students enrolling in agricultural education. Teachers are having to plan more carefully and use a variety of teaching methods. This is not creating a major problem for teachers. It is recommended that teachers:

Use a variety of teaching methods in each class period. Divide each class period into halves or thirds and use different teaching methods in each segment.

Prepare thoroughly for each class.

Provide a brief break half way through the period.

Teacher education programs may need to conduct in-service refresher courses on teaching methodologies for the teachers.

This research found that SAE is a weak component of the agricultural education program. It was weak before block scheduling and continues to be weak. If agricultural educators believe SAE is important, this problem needs to be addressed.

Block scheduling is causing problems in the operation of the FFA program. The increased number of students taking agricultural education are not joining the FFA. It is harder to maintain FFA membership, communicate with FFA members, prepare career development teams, work with the FFA officers, and operate the other components of the FFA program. Changes will need to be made in the FFA program. Based upon the written responses and interviews, it is recommended that teachers:

Work hard at communicating the FFA program. Publish a FFA newsletter or use bulletin boards to keep members informed of FFA activities.

Consider establishing and operating satellite FFA chapters. The umbrella FFA chapter concept may need to be revisited.

The state leadership for agricultural education and FFA may need to take the lead in instituting state wide changes in the operation of the FFA program. Some of the problems encountered in operating local FFA chapters are a result of state deadlines and procedures. The organization and operation of the FFA at the state level needs to be completely rethought. Some possible changes might include:

Collect and submit FFA dues twice per year, once in the fall and once in the spring.

For years the FFA has operated on a school or calendar year paradigm. It is time to critically challenge that paradigm. Some career development events may have to be held twice during the year, once in the fall and once during the spring. If the purpose of the career development events is to provide motivation for students and reinforce what is being taught, then it would be logical to hold career development events to coincide with how the instructional program operates in schools. The instructional program should drive the career development events, and not the other way around.

FFA chapters may want to consider having a fall set of officers and a spring set of officers. If one of the goals of the FFA is to develop leadership, then having two sets of officers during the year instead of one set of officers would further contribute to that goal. FFA chapters may want to consider having a fall set of officers and a spring set of officers. If one of the goals of the FFA is to develop leadership, then having two sets of officers during the year instead of one set of officers would further contribute to that goal.

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BLOCK SCHEDULING'S IMPACT ON INSTRUCTION, FFA AND SAE IN AGRICULTURAL EDUCATION

Discussant Remarks
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Since this report of research has already gone through the process of evaluation for acceptance, there does not seem to be any further need to critique the research methodology and reporting procedures. The researchers are to be commended for their study and the conceptualization of the problem and the reporting of their findings of the problem of block scheduling's impact on Agricultural Education programs.

Some interesting aspects of the report of research should be noted. The researchers indicate that the major reason for completing this activity was not to test a hypothetical theory but instead to document a perceived problem and then seek solutions to help solve the problem. A unique way of stating the purpose of a research activity.

In the researchers' conclusions and recommendations, they stated that this research found that SAE is a weak component and that is was weak before block scheduling and continues to be weak.

The researchers also stated in their conclusions and recommendations that block scheduling is causing problems in the operation of the FFA program. They state that changes will need to be made in the FFA program. Increased numbers of students taking Agricultural Education are not joining the FFA.

At first, the term block scheduling was a new term with which this discussant was not overly familiar. However after reading the whole report, block scheduling or restructuring of the school day, whether it be called semesterized programming, eight period roll-over programming, block scheduling, etc., the concept became very clear. It also became very clear that block scheduling, as a solution to the structure to the school day, is a phenomenon that is happening throughout public education. In terms of this research report, the restructuring of the school day was never intended (to the best of our knowledge) to assist in the delivery of the components in Agricultural Education that deal with youth organizations such as the FFA, and the application of SAE programs. Again, a phenomenon identified by the researchers of increased enrollment in agriculture classes without the corresponding increase in FFA membership and/or conduct of SAE programs could be considered a universal problem. The conduct or utilization of an FFA chapter and the use of SAE programs as experiential components of the Agricultural Education program were designed for the long-gone, traditional structure of the school day, with year long programs and the long-gone Agricultural Education programs of Agriculture 1, 2, 3 and 4.

While the profession has spent significant effort in restructuring curriculum, including science components, for the restructured school day and partly in response to declining enrollments, very little evidence exists that the approach to utilizing an FFA chapter and SAE programs as an integral component of secondary Agricultural Education has ever been visited.

As was stated before, the rationales and purposes of restructuring of the school day were perhaps never intended to strengthen the Agricultural Education components of the FFA chapter and the SAE program. However, perhaps the only reaction or possible follow-up by the profession to this restructuring has been in the area of redesigning curriculum to support the restructured school day. The conduct of the FFA and the SAE components has not changed, not only in North Carolina, but nationally as well.

COUNTY DIRECTORS' PERCEPTIONS OF PROFESSIONAL DEVELOPMENT NEEDS OF EXTENSION STATE SPECIALISTS IN THE FLORIDA COOPERATIVE EXTENSION SERVICE

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Introduction and Theoretical Framework

The effectiveness of research to contribute to development depends upon linkages between research, farmers and technology-transfer agencies. Extension education serves to bridge the gap between researchers' knowledge of farmers' priority needs and farmers' access to new technical innovations (Bourgeois, 1990). Basic requirements of horizontal cooperation include the identification of objectives, understanding of tasks to be carried out, awareness of one's role and that of the other participants, and adoption by consensus of compatible approaches (Eponou, 1993).

Effective internal communication is critical to the success of any organization, public or private. For organizations, such as extension, where offices are often separated by great distances, the flow of information can be particularly troublesome (Weigel, 1994). Distance, time demands, program autonomy, and limited face-to-face interaction in an extension system can create communication failure and lead to inefficiency, conflict and dissatisfaction among personnel (Weigel, 1994; Boltes, Lippke, & Gregory, 1995).

County extension faculty depend upon specialists for information and publications. Specialists have expertise in locating and interpreting information (Kawasaki, 1994). As a result, specialists are key individuals in providing the technical information that drives county programming (Warner & Christenson, 1984; McDermott, 1984; Prawl, Medlin & Gross, 1984).

Studies point out that specialists are among the major information sources consulted by county faculty (Radhakrishna & Thomson, 1996; Shih & Evans, 1991). Specialists represent the most highly specialized segment of thc professional staff. About 44% of the total personnel in extension are specialists typically located in academic departments along with teaching and research faculty (Vines & Anderson, 1976). To be effective, specialists must understand the extension education process, including supportive areas such as human development, teaching and learning, and social interaction processes (Gibson & Hillison, 1994).

Specialists have the responsibility to synthesize, evaluate, integrate and apply research information and expertise from within the land-grant university system in support of county programming activities (Taylor & Summerhill, 1994). Woeste (1995) lists the following duties in regard to specialists: (1) remaining current with the latest research and technologies, (2) understanding concerns of clientele, (3) providing leadership for development, implementation and evaluation of new initiatives, (4) synthesizing and integrating research information and expertise into educational materials to assist county faculty, (5) identifying funding sources to further extension programs, (6) providing feedback to departmental faculty and program leaders on program needs, and (7) encouraging the involvement of other university faculty, community and industry experts in the development and implementation of educational programs (Woeste, 1995).

Extension strives to meet the needs of a broad, very diverse population. In recent years, many state extension services have been hard hit by personnel turnover and reduced budgets which have inhibited the replacement of personnel (Bartholomew, 1993). As a result, extension professionals have been faced with increasing workloads as they strive to effectively meet the rapidly changing expectations of a more diverse clientele (Djire, & Newman, 1995). Experts contend that budget reductions have negatively impacted the manner in which specialists perform their roles (Bartholomew, 1993; Gibson & Hillison, 1994). Such change can result in ambiguous responsibilities and roles, and cause disagreement as to the specific jobs of staff members. This creates the need for a continuous redefinition of Extension staff roles (Carroll, 1989).

The specialist's position is complicated and multifaceted. It often varies on an institutional basis and between program areas. Specialists often have dual appointments in research or teaching. This process of change has increased the uncertainty surrounding the roles of specialists (Wallace, 1982; Feller, 1984). While an important function of a land-grant system is to generate relevant technologies for farmers, the employee reward system may favor refereed research publications more than extension programming support (Eponou, 1993). Even county agents who hold faculty rank, but have no research appointment, are expected to publish articles in peer-reviewed journals to advance in rank in some state extension services (Bartholomew, 1993).

The process of personnel development includes both informal and formal approaches to the improvement of personnel effectiveness. Development involves all activities aimed at improvement and growth in an individual's ability to perform assignments effectively. The need for personnel development programs is continuous for all personnel and is closely related to institutional changes. Faculty must have a clear perception of the operational standards they are expected to achieve in an organization as dynamic as extension. As a result, needs must be continuously assessed in order to provide meaningful staff development programs (Castetter, 1981).

Purpose and Objectives

The purpose of this study was to determine professional development needs of state specialists in the Florida Cooperative Extension Service (FCES). This research is part of a broader study in the process of assessing specialists' needs based upon the perceptions of specialists, county directors, and county faculty. The specific objectives of this study were to:

1. describe county directors in terms of selected demographic characteristics, and
2. identify critical professional development needs of state specialists as perceived by county directors.

Methodology

The population for this descriptive study was all county directors in the FCES (N=67). A census of the population was utilized for data collection. The instrument consisted of 28 Likert-type statements measuring the following constructs: (1) Research Generation and Synthesis, (2) Program Development and Evaluation, and (3) Communication and Presentation. Participants were asked to respond to both the importance of ability and the degree to which current state specialists possessed the ability. In addition, several questions regarding demographic characteristics were included.

After the initial development of the instrument, a panel of experts consisting of state specialists, administrators, and district directors was used to establish face and content validity. The instrument was then field tested for internal consistency. Thirty-one county faculty participated in this process. Cronbach's alpha reliability coefficients for the constructs ranged from $r = 0.80$ to $r = 0.82$. A packet consisting of the instrument, a cover letter, and self-addressed stamped envelop was initially mailed to the 67 county directors on March 29, 1996. A total of 44 instruments were returned (65.7%). On April 17, 1996 a second complete packet was mailed. A total of 15 instruments were returned after the second mailing, resulting in a total response rate of 88%. No additional follow-up was made. As a result, the findings reported in this study are limited to the 59 responding county directors.

Descriptive statistics consisting of means, standard deviations, percentages, and frequencies were used to describe the population. Critical needs were determined based upon the use of a matrix analysis as recommended by Hershkowitz (1973) and Witkin (1984). Grand means of importance and current abilities were calculated for each of the three constructs. A two-dimensional graph was then developed for each of the three constructs. Grand means were then plotted on a "X" and "Y" axis of a graph, resulting in the creation of four quadrants. Mean importance and current abilities for each ability within a construct were then plotted on the graph. Each individual ability was subsequently assigned into one of the four quadrants. The four quadrants were labeled: (1) High-Level Successful Abilities (high levels of importance and obtainment), (2) Low-Level Successful Abilities (low levels of importance and high levels of obtainment), (3) Low-Level Needs (low levels of importance and obtainment), and (4) Critical Needs (high levels of importance and low levels of obtainment). The data were analyzed using the SPSS/PC+ statistical program.

Results

The initial research objective was to describe county directors in terms of demographic characteristics. Table 1 reveals that county directors had been employed in extension for approximately 16 years (M=16.02, SD=8.34), and had served as a county director for about 10 of those years (M=9.59, SD=7.10). Although the county directors represented five academic program areas, about 70% had academic backgrounds in Agriculture, 14% in Family and Consumer Science, and 9% in 4-H/Youth Development (Table 2).

When asked to rank the program areas in which the county directors and their faculty had the greatest interaction with state specialists, Agriculture was ranked first, followed by Family and Consumer science, and 4-H/Youth Development (Table 3). A great deal of variability was found between counties in terms of the number of state specialists who were involved in delivering county programs in the previous one-year time period (M=13.48, SD=15.26). Over 10% reported that state specialists were involved in 30 or more programs per year, while 59% revealed that state specialists were used in only 10 programs or less (Table 4).

The final research objective was to identify critical professional development needs of state specialists as perceived by county directors. The matrix analysis used to assess needs resulted in categorizing the specific abilities (Likert-type statements) into four areas: (1) Critical Needs, (2) Low-Level Needs, (3) High-Level Successful Abilities, and (4) Low-Level Successful Abilities. Table 5 reveals that in terms of research generation and synthesis, the ability to collaborate with county faculty in conducting demonstrations was identified as a critical need. In addition, the following low-level needs surfaced: (1) the ability to communicate client problems to researchers, and (2) the ability to view problems from different perspectives.

According to Table 6, the following four critical needs emerged for the construct of program development and evaluation: (1) the ability to understand the needs of clients, (2) the ability to produce appropriate educational programming materials, (3) the ability to deliver appropriate inservice training to county faculty, and (4) the ability to evaluate state major programs. In addition, the following low-level needs were identified: (1) the ability to assist county faculty in planning programs, (2) the ability to identify funding sources for program development, and (3) the ability to assist county faculty in obtaining funding.

Table 1.
Description of Years Employed in Extension and as a County Director

	Years in Extension		Years as County Director	
Range	n	Percent	n	Percent
1 - 10	17	28.8	35	59.3
11 - 20	24	40.7	19	32.2
21 - 30	15	25.4	5	8.5
Greater than 30	3	5.1	0	0.0
Totals	59	100.0	59	100.0
	M = 46, SD = 8.34		M = 9.59, SD = 7.10	

Table 2.
Academic Backgrounds of County Directors

Academic Background	n	Percent
Agriculture or Natural Resources	41	69.5
4-H/Youth Development	5	8.5
Family and Consumer Sciences	8	13.6
Sea Grant	2	3.4
Community Leadership & Development	1	1.6
Missing	2	3.4
Totals	59	100.0

Table 3.
Program Areas of Greatest Interaction with Specialists

	First		Second		Third	
	n	Rank	n	Rank	n	Rank
Agriculture or Natural Resources	43	1	13	2	9	3
4-H/Youth Development	4	3	13	2	27	1
Family and Consumer Sciences	8	2	28	1	12	2
Sea Grant	1	5	2	3	2	4
Community Leadership & Development	2	4	0	4	2	4
Missing	1		3		7	
Totals	59		59		59	

Table 4.
Number of Times in Which County Faculty Used a State Specialist to Conduct County Programs Within Previous Year

Range	n	Percent
0 - 10	35	59.3
11 - 20	9	15.2
21 - 30	6	10.1
31 or Greater	6	10.1
Missing	3	5.3
Totals	59	100.0

M = 13.48, SD = 15.26

Table 5.
Levels of Importance and Current Abilities of the Construct: Research Generation and Synthesis* (N=59)

		Importance		Current Ability		Class**
		M	SD	M	SD	
1.	Conduct Applied Research	4.45	0.37	3.78	0.82	LLSA
2.	Knowledge of Current Research Findings	4.81	0.58	4.02	0.69	HLSA
3.	Communicate Client Problems to Researchers	4.57	0.84	3.38	0.70	LLN
4.	**Collaborate with County Faculty in Conducting Demonstrations**	**4.66**	**0.61**	**3.02**	**0.75**	**CN**
5.	View Problems from Different Perspectives	4.61	0.56	3.24	0.90	LLN

Grand Mean for Importance=4.612, (SD=0.42), Grand Mean for Current Abilities=3.48, (SD=0.52)
Critical Needs Identified in Bold Italics
* Based upon a five-point Likert Scale, where 1=Low, 2=Below Average, 3=Average, 4=Above Average, and 5=High
** CN=Critical Need, LLN=Low-Level Need, HLSA=High-Level Successful Ability, and LLSA=Low-Level Successful Ability

The final construct consisted of statements related to communication and presentation. Table 7 indicates that only one critical need surfaced as a result of the needs analysis. The critical need was the ability to travel to counties at state expense. The following low-level needs were also discovered: (1) the ability to incorporate innovative teaching techniques into programs, (2) the ability to provide research summaries suitable for county newsletters, and (3) the ability to develop products on electronic data bases for county faculty.

Conclusions and Recommendations

Participating county directors in this study could be described as having extensive county-level extension experience. They were seasoned administrators primarily with an agricultural background. They reported that state specialists in agriculture are involved in county programming decisions.

Table 6.
Levels of Importance and Current Abilities of the Construct: Program Development and Evaluation* (N=59)

		Importance		Current Ability		Class**
		M	SD	M	SD	
1.	Assist County Faculty in Planning Programs.	4.29	0.70	2.90	1.00	LLN
2.	**Understand Needs of Clients**	**4.61**	**0.77**	**3.12**	**0.95**	**CN**
3.	Deliver Programs	4.49	0.73	3.36	0.98	HLSA
4.	Develop Initiatives to Solve Problems	4.66	0.51	3.36	0.92	HLSA
5.	**Produce Appropriate Ed. Programming Materials**	**4.73**	**0.55**	**3.12**	**1.01**	**CN**
6.	Identify Funding Sources for Program Development	4.31	0.77	3.10	1.02	LLN
7.	Assist County Faculty in Obtaining Funding	3.95	0.84	2.59	0.97	LLN
8.	Interact with State-Wide Industry Groups	4.50	0.79	3.78	0.80	HLSA
9.	Interact with National Industry Groups	3.47	1.00	3.47	0.80	LLSA
10.	Interact with International Industry Groups	3.47	1.00	3.47	0.80	HLSA
11.	**Deliver Appropriate Inservice Training to County Faculty**	**4.76**	**0.50**	**3.05**	**0.88**	**CN**
12.	**Evaluate State Major Programs**	**4.39**	**0.81**	**3.07**	**0.81**	**CN**

Grand Mean for Importance=4.35, (SD=0.46), Grand Mean for Current Abilities=3.22, (SD=0.52)
Critical Needs Identified in Bold Italics

* Based upon a five-point Likert Scale, where 1=Low, 2=Below Average, 3=Average, 4=Above Average, and 5=High

** CN=Critical Need, LLN=Low-Level Need, HLSA=High-Level Successful Ability, and LLSA=Low-Level Successful Ability

Table 7.
Levels of Importance and Current Abilities of the Construct: Communication and Presentation* (N=59)

		Importance		Current Ability		Class**
		M	SD	M	SD	
1.	Communicate in Writing	4.56	0.62	3.86	0.71	HLSA
2.	Orally Communicate	4.66	0.51	3.73	0.81	HLSA
3.	Listening Skills	4.76	0.47	3.29	0.81	HLSA
4.	Respond to Technical Subject Matter Questions in a Timely Manner	4.83	0.42	3.29	0.87	HLSA
5.	Incorporate Prior Experiences when Delivering Programs	4.46	0.57	3.59	0.83	LLSA
6.	Assist County Faculty to Incorporate Innovative Teaching Techniques into Programs	4.41	0.70	2.78	0.85	LLN
7.	Exhibit Enthusiasm when Delivering Programs	4.41	0.67	3.45	0.80	LLSA
8.	**Travel to County at State Expense**	**4.71**	**0.56**	**2.49**	**1.14**	**CN**
9.	Provide Research Summaries Suitable for County Newsletters	4.46	0.23	2.83	1.13	LLN
10.	Communicate with County Faculty via E-Mail	4.36	0.78	3.39	1.14	LLSA
11.	Develop Products on Electronic Data Bases for County Faculty	4.31	0.65	2.88	0.93	LLN

Grand Mean for Importance=4.54, (SD=0.38), Grand Mean for Current Abilities=3.20, (SD=0.58)
Critical Needs Identified in Bold Italics

* Based upon a five-point Likert Scale, where 1=Low, 2=Below Average, 3=Average, 4=Above Average, and 5=High

** CN=Critical Need, LLN=Low-Level Need, HLSA=High-Level Successful Ability, and LLSA=Low-Level Successful Ability

It must be pointed out that specialists in agriculture make up the majority of specialists in the system. The average county used 13 state specialists in delivering programs during the previous year. It must also be pointed out that the role of county program delivery is at the discretion of county faculty. State specialists are to contribute to programming in a variety of ways, but are not necessarily charged with delivering county programs.

Six critical professional development needs of state specialists were identified as a result of this study. Four of the six related to program development and evaluation. It is clear that county directors perceive that state specialists need assistance in understanding client needs. There appears to be a communication breakdown between client needs expressed at the county level and the ability of specialists to provide leadership in addressing those needs. It is also apparent that county directors perceive that state specialists need assistance in understanding their role in the programming process, especially as it relates to materials development, delivering inservice training, and evaluating state major programs.

In addition, county directors identified critical needs related to the specialist's ability to collaborate with county faculty in conducting demonstrations and to travel to counties at state expense. It appears that the county-level administrators who were surveyed would like to see more of a local presence of the specialists. This may be reflective of a budgetary problem in that specialist activities are budgeted at the departmental level. However, state-level programming is approached from an interdisciplinary design team perspective, where specialists with a broad range of backgrounds typically work together with representatives from counties to plan state major programs. Specialists have voiced a concern that effective programming happens as a result of design team planning, implementation, and evaluation, and that design teams should be provided a budget, rather than department chairs controlling the extension budget.

County directors perceived that state specialists were very successful in nine areas. Broadly speaking, the successful areas involved the ability to utilize the research base in solving problems, interfacing with industry groups, and communication skills.

In conclusion, it is clear that these findings should be factored into the equation when developing professional development programs for state specialists. It is not known how the perceptions of county directors will differ from county faculty and state specialists. Currently, research is being conducted to address this issue.

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COUNTY DIRECTORS' PERCEPTIONS OF PROFESSIONAL DEVELOPMENT NEEDS OF EXTENSION STATE SPECIALISTS IN THE FLORIDA COOPERATIVE EXTENSION SERVICE

Discussant Remarks

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The authors of this paper have conducted an interesting study. They developed a good theoretical foundation from which to conduct the needs assessment (with the possible exception of telling us "why the 'county director' may be best suited for determining professional development needs of 'state specialists'"). Further, their methodology is clean, based upon a logical process and substantiated in the literature as valid. Although the paper, as presented, offers some interesting insight into the "perceptions of county directors", the most interesting findings will perhaps be revealed when the findings are contrasted with those from the studies related to the perceptions of the county faculty and the specialists themselves. These findings alone may be somewhat misleading to those planning inservice for state specialists.

The only methodological issue I would raise for the authors consideration is minor but none-the-less worth mentioning. Although the use of the Cronbach's Alpha is "by *textbook* definition" correct as a measure of internal consistency, it is in my opinion, not indicating that the instrument is reliable in the real sense. In essence, a grand mean for each of the three reported constructs was calculated primarily for identifying the "X" and "Y" intercept points on the graph to clearly label the four quadrants. The grand means were not used as an indicator of relative importance of each construct. There was no presupposition that each construct was a "continuous scale". Literally interpreted, a high level of internal consistency (ex. .80 to .82) would simply indicate that the individual item means on the graph would likely not move far from the intercept lines (the higher the Alpha, the closer the group of scores to the point where the two intercepts cross). In my opinion, the only valid indicator of "reliability" for this instrument would be a coefficient of stability (test-retest).

The researchers identified that there was need for inservice related to "**collaborating with county faculty in conducting demonstrations", "understanding needs of clients", producing appropriate educational programming materials", delivering appropriate inservice training to county faculty", "evaluating state major programs"**, and "**traveling to county at state expense**". Although these are indeed county leaders' perceptions of the "roles" which state specialists should perform, I'm not sure that they are "professional development" needs. As indicated earlier, it will be interesting to study differences in perceptions among the three groups "county directors", "county faculty" and "specialists". Do these findings reflect a need for inservice or simply a re-prioritization of how specialists spend their time. Does one really need professional development regarding "traveling to county at state expense"?

LIFE-SKILLS AND SUBJECT-MATTER CONTENT OF THE 4-H BEEF PROGRAM: A DELPHI NEEDS ASSESSMENT

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Introduction

Four-H is a dynamic organization interested in the development of educational programs designed to meet the current and future needs of young people. The main goal of 4-H programs is to help youth acquire the technological knowledge and life-skills necessary to grow and succeed in a rapidly changing society (Rasmussen, 1989).

The Iowa 4-H beef program is an important educational program that provides future leaders for the beef industry (Iowa Business Council, 1990). The subject-matter content of 4-H livestock manuals includes selection, nutrition, health care, performance records, marketing, showmanship, and quality grades (ISU Extension, 1991; ISU Extension, 1992). The life skills emphasized in Iowa 4-H are positive self-esteem, communication skills, decision-making skills, learning how to learn, ability to cope with change, citizenship skills, and leadership skills (ISU Extension, 1989). While young people are learning the skills of livestock production, they are also learning life-skills that go beyond their projects. Several studies confirm this. In a survey of 5,000 4-H'ers who had animal-science projects, Oregon Extension found that most respondents identified life-skills as the most important skills they learned from their projects (Rasmussen, 1989). In three southwestern states, 4-H'ers identified fairs and livestock shows as activities that developed the life-skill of leadership (Seevers & Dormody, 1994). In a study of self-perceived, youth leadership-life-skills development, Morris (1996) reported that Iowa 4-H club members recorded a moderately high gain in leadership life-skills development from their participation in 4-H. Gamon and Dehegedus-Hetzel (1994) found that 4-H'ers with swine projects learned life-skills and subject-matter content, but males rated content skills higher than life-skills; female ratings were the reverse.

To help 4-H'ers acquire knowledge about beef production and the life-skills necessary to grow and succeed in this rapidly changing society, up-to-date information must be identified regarding what 4-H'ers need to learn in 4-H beef projects. A needs assessment is a systematic way to identify the needs of a target group (McKillip, 1987). Needs are perceived gaps between "what is" and "what should be." A needs assessment allows educators to prioritize these gaps and to select those that are most important for resolution (Kaufman & English, 1979). The process of conducting a needs assessment consists of six sets of activities, with ten steps, as follows (Stufflebeam, McCormick, Brinkerhoff & Nelson, 1985; Caffarella, 1982):

1. Identifying the clientele (or target group)
2. Setting purpose of the needs assessment
3. Preparing to do a needs assessment
   - Step 1: Communicating a decision to complete a needs assessment with a commitment to planning
   - Step 2: Identifying persons who will be involved in the planning and overseeing of the needs assessment
   - Step 3: Developing specific objectives for the needs assessment
   - Step 4: Determining budget and time frame

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4. Gathering desired information
   Step 5: Selecting survey methods and designing data collection techniques
   Step 6: Collecting data
5. Analyzing the information
   Step 7: Analyzing data and determining points of agreement and disagreement
6. Setting priorities and planning action
   Step 8: Ranking the needs from most critical to least critical
   Step 9: Selecting those needs for immediate attention
   Step 10: Developing specific objectives, plans of action, and evaluation procedures for the selected problems

These steps or sets do not necessarily occur in sequence. Sometimes many of them can be done at once. At other times, recycling will inevitably occur (Stufflebeam et al., 1985).

Kaufman and English (1979) suggested that the Delphi technique is an effective way of identifying needs. Youth are sometimes limited in their ability to express their needs. Therefore, instead of asking young people directly, it may be better to pool judgements from experts about what young people need to learn from beef projects. Possible experts knowledgeable about beef production and young people with beef projects include (1) parents of outstanding beef project members, (2) extension beef specialists, (3) youth specialists, and (4) beef industry representatives.

The Delphi technique is an accepted method of obtaining group consensus among purposively selected experts (Buriak & Shinn, 1989; Murphy & Terry, 1995; Stufflebeam et al., 1985). Typically, the Delphi technique involves the use of a series of mailed questionnaires (Moore, 1987). The first round uses open-ended questions to allow the generation of a wide range of opinions. These opinions are then organized by researchers to yield items for the second-round questionnaire. On the second round, the experts are asked to rank the items or use a Likert-type scale to rate the items (Buriak & Shinn, 1989). Subsequent rounds contain feedback from the previous questionnaires and ask for a defense of extreme ratings or rankings from the experts (Brooks, 1979). The process stops when consensus is obtained. Most Delphi studies reach consensus among experts and stop at the third round (McCampbell & Stewart, 1992).

Purpose and Objectives

The purpose of this study was to identify the subject-matter content and life-skills that 4-H'ers should learn through their beef projects, as perceived by four groups of experts: parents, extension beef specialists, youth specialists, and beef-industry representatives. Specific objectives of the study were to:

1. identify the beef subject-matter content important for 4-H'ers to learn and that content not as important,
2. identify the life-skills important for 4-H'ers to learn through their beef projects and those life-skills not as important, and
3. identify any differences among the ratings of the subject-matter content and life-skills by the four groups of adults.

Methodology

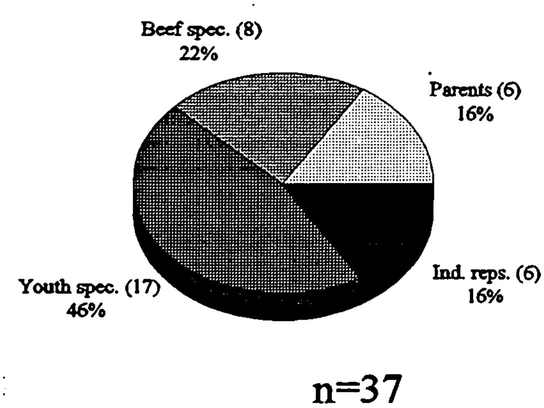
A Delphi technique involving the following four groups of experts was used to collect data: (1) the parents of the 32 outstanding 4-H'ers involved in the beef program at the 1992 State 4-H Round-up, (2) the 16 Iowa Extension beef state and field specialists, (3) 21 youth/4-H field specialists, and (4) 25 industry representatives recommended by the Director of Consumer Information at the Iowa Beef Council. All 94 members of the population were sent the first-round questionnaire. The sample was defined as all members who agreed to participate in the study. The process resulted in a sample size of 42. Attrition in the second round reduced the number to 39, and in the third round the withdrawal of two other persons resulted in a final number of 37. Dalkey (1969) stated that when the group size was greater than 13, the reliability was greater than .80. Thus, the sample size of 37 was deemed to be sufficient to maintain reliability.

The first-round questionnaire consisted of two open-ended questions that solicited opinions about subject-matter content and life-skills related to the beef project. A summary of responses from the first-round questionnaire resulted in 65 subject-matter topics and 36 life-skill topics for the second-round questionnaire. In the second round, a five-point Likert-type scale was included to allow respondents to rate each item as "extremely important," "very important," "important," "slightly important," and "not important." These descriptors were used because it was felt that most responses would be positive and few would disagree strongly with inclusion of items in the beef project curriculum. This questionnaire was validated with Agricultural Education and Animal Science faculty members and graduate students at Iowa State University. In the third round, the experts were asked to rate the same topics as in the second round, in light of a summary of the ratings on the second round. The process was stopped at this point because it was evident that responses were nearly at consensus.

Responses of the final round questionnaire were analyzed by using frequencies, mean scores, standard deviations and analysis of variance. Any topic rated as very important (VI) or extremely important (EI) by 50% or more of the experts on the final round questionnaire was considered a necessary one for youth to learn. The alpha level was established beforehand at .05.

Findings

Demographic data were based on those who responded to the third round questionnaire. Respondents were geographically dispersed across Iowa. Moreover, as noted in Figure 1, the largest percentage of final-round respondents was of youth specialists (46%). The next largest group consisted of extension beef specialists (22%). The percentage for both parents and industry representatives was 16%.



1 Figure. Percentage of Respondents for Each Group

The respondents identified 31 subject-matter topics to be included in the beef curriculum. Included in Table 1 are the frequencies and percentage of topics rated by more than 50% of the respondents as very important (VI) or extremely important (EI) on the final-round questionnaire. Nearly 95% of the respondents rated record analysis and budgeting as very or extremely important topics for 4-H'ers to learn through their beef projects. Four other topics were rated as very or extremely important by more than 83% of the respondents: carcass data, rate of gain, feed costs, and consumer preferences. Although more than 83% of the respondents rated consumer preferences as very important or extremely important, the topic is rarely included in 4-H livestock manuals (ISU Extension, 1991c; ISU Extension, 1992). Some other topics rated by more than 50% of the respondents as very important or extremely important were related to the concerns of consumers, such as drug withdrawal, quality assurance practices, hormone and drug effects, growth stimulants, environmental compliance, and animal rights issues.

Table 1.
Subject-Matter Topics Rated by More Than 50% of Experts as Very Important (VI) or Extremely Important (EI) (n=37)

Subject matter topics	f	% rated VI or EI
Record analysis	35	95
Budgeting	35	95
Carcass data	31	84
Rate of gain	31	84
Feed costs	31	84
Consumer preferences	31	84
Drug withdrawal	29	78
Quality assurance practices	29	78
Beef as support of farm	29	78
Project financing	29	76
Genetic evaluation	27	73
Breeding for desirable traits	26	70
Use of veterinarian	26	70
Nutrient requirements	26	70
Sustainable agriculture	26	70
Environmental compliance	25	68
Market-based values	24	65
Beef in Iowa's economy	23	62
Hormone and drug effects	23	62
Balancing rations	23	62
Buying skills	22	59
Growth stimulants	22	59
Computerized records	20	54
Research information availability	20	54
Benefits of computers	20	54
Marketing alternatives	19	51
Animal rights issues	19	51
"Real" vs. auctions at county/state fairs	19	51
Accounting skills	19	51
Stages of growth	19	51
Feed efficiency	19	51

Note: Scale 1= not important (NI), 2=slightly important (SI), 3=important (I), 4=very important (VI), 5=extremely important (EI)

Table 2 shows 34 topics rated VI or EI by less than 50 percent of the respondents. In Table 2, thirteen traditional topics related to state or county fairs and emphasized in 4-H livestock member manuals were rated by less than 50 percent of the respondents as very important or extremely important. These topics were safe handling; frame score; body conformation; beef careers; size and age of animals; level of feeding; feed intake; multiple animal care; care and grooming; cattle breeds; equipment; showmanship; and feeding systems.

Table 2.
Subject-Matter Topics Rated by Less Than 50% of Experts as Very Important (VI) or Extremely Important (EI) (n=37)

Subject-matter topics	f	%rated VI or EI
Safe handling	18	49
Housing and shelter	18	49
Scientifically-based procedures	18	49
Beef processing	17	46
Waste management	16	43
Frame score	15	42
Body conformation	15	41
Injections and implanting	15	41
Feedbunk management	15	41
Cooking and product promotion	15	41
Animal rights organizations	14	38
Farm to table concepts	13	36
Beef careers	13	36
Size and age of animals	13	35
Hobby vs. real farming	13	35
Level of feeding	13	35
Feed intake	13	35
Marketing systems	13	35
Multiple animal care	12	33
Feed preparation and storage	12	32
Industry structure	10	27
Artificial insemination	10	27
Care and grooming	9	24
Livestock tasks	9	24
Analysis of feedstuffs	8	22
Industry vs. vegetarians	8	22
Cattle breeds	7	19
Digestive systems	7	19
Pen vs. individuals	6	16
Alternative feedstuffs	6	16
Equipment	6	16
Familiarity with animals	5	14
Showmanship	3	8
Feeding systems	1	3

Note: Scale 1= not important (NI), 2=slightly important (SI), 3=important (I), 4=very important (VI), 5=extremely important (EI)

Life-skill topics identified by the respondents

Table 3 displays the 30 life-skill topics rated by more than 50% of respondents as very important or extremely important. Half of these topics were rated by more than 90% of the experts as very or extremely important. Honesty and money management were the topics identified by the highest percentage of respondents as most important (97%). Ninty-five percent of the respondents rated the following topics as very or extremely important topics: pride in a job well done, self-confidence, evaluation skills, goal setting, and problem solving.

Table 3.
Subject-Matter Topics Rated by More Than 50% of Experts as Very Important (VI) or Extremely Important (EI) (n=37)

Life-skill topics	f	% rated VI or EI
Honesty	36	97
Money management	36	97
Pride in a job well done	35	95
Self-confidence	35	95
Evaluation skills	35	95
Goal setting	35	95
Problem-solving	35	95
Sifting fact from fiction	34	92
Pride in finishing	34	92
Listening carefully	34	92
Follow-through skills	34	92
Life-long learning	34	92
Responsibility	34	92
Thinking and questioning	34	92
Time management	34	92
Cooperation	33	90
Sportsmanship	33	90
Work ethic	32	87
Daily discipline	32	87
Concern for others	31	84
Speaking skills	31	84
Personal accomplishment	29	78
Concern for environment	29	78
Tolerance	28	76
Continued learning	26	70
Consumer service attitude	26	70
Meeting deadlines	26	70
Team work	26	70
Striving for excellence	25	68
Writing skills	22	60

Note: Scale 1= not important (NI), 2=slightly important (SI), 3=important (I), 4=very important(VI), 5=extremely important (VI)

Information in Table 4 shows the six topics rated by less than 50 % of the respondents as very important or extremely important. The six topics were industry issues, fair rules and policies, promoting beef, compassion, salesmanship, and competition.

Table 4.
Life-Skill Topics Rated by Less Than 50% of Experts as Very Important (VI) or Extremely Important (EI) ($\underline{n}$=37)

Life-skill topics	f	% rated VI or EI
Industry issues	18	49
Promoting beef	18	49
Fair rules and policies	18	49
Compassion	18	49
Salesmanship	10	27
Competition	6	16

Note: Scale 1= not important (NI), 2=slightly important (SI), 3=important (I), 4=very important(VI), 5=extremely important (EI)

Subject-matter and life-skill topics rated by the respondents as not important

Table 5 displays the topics rated as not important. The respondents rated showmanship (22%) and care and grooming (14%) as not important for 4-H'ers to learn in their beef projects. Both showmanship and grooming have traditionally been emphasized in 4-H livestock projects. Ten percent of the experts rated competition as an unimportant topic for the youth to learn in the beef projects. In their study of the effects of competition and rewards in 4-H, Weber and McCullers (1986) questioned whether competition and reward would enhance performance and motivation in 4-H programs. The 4-H professionals ranked the competitive rewards as the item needing the least emphasis in 4-H programs.

Relationships of four groups of experts to the most important subject-matter topics and life-skill topics

Table 6 presents the means and standard deviations of the four groups of experts for the composite scores of the most important 31 subject-matter topics and 30 life-skill topics. Each group of respondents had higher mean scores for life-skill topics than for subject-matter topics. With the exception of the youth specialists, however, the standard deviations for each group tended to be greater for the life-skill topics than for the subject-matter topics. This demonstrates diversity of opinion on the importance of the life-skill topics. The youth specialists had greater consensus in their opinions on the life-skill topics than the other three groups. Analysis of variance tests uncovered a tendency toward significant differences among the groups of respondents in the subject-matter topics. The F-value for the composite subject-matter topics was larger than the F-value for the composite life-skill topics, an indication that the four groups of experts had a stronger consensus on the life-skill topics than on the subject-matter topics.

Table 5.
Subject-Matter and Life-Skill Topics Rated by Experts as Not Important (NI) (n=37)

Topics	f	% rated NI
Subject-matter topics		
Consumer preferences	1	3
Animal rights issues	1	3
Real vs. fair auctions	1	3
Industry structure	1	3
Artificial insemination	1	3
Livestock tasks	1	3
Equipment	1	3
Cattle breeds	1	3
Pen vs. individuals	1	3
Frame score	1	3
Familiarity with animals	2	5
Industry vs. vegetarians	3	8
Hobby vs. real farming	3	8
Care and grooming	5	14
Showmanship	8	22
Life-skill topics		
Sportsmanship	1	3
Personal accomplishment	1	3
Fair rules and policy	1	3
Competition	4	10

Note: Scale: 1= not important (NI), 2=slightly important (SI), 3=important (I), 4=very important (VI), 5=extremely important (VI)

Table 6.
Group Means, Standard Deviations, F-Values and F-Probabilities for Highest Rated Subject-Matter Topics and Life-Skill Topics (n=37)

Groups		Subject Matter				Life-skills			
	n	Means	SD	F-value	F-prob.	Means	SD	F-value	F-prob.
Parents	6	4.23	0.35	2.53	0.0745	4.29	0.49	0.59	0.6281
Beef specialists	8	3.85	0.30			4.15	0.35		
Youth specialists	17	3.74	0.43			4.22	0.42		
Industry reps.	6	4.08	0.53			4.45	0.57		

Note: Scale 1= not important (NI), 2=slightly important (SI), 3=important (I), 4=very important(VI), 5=extremely important (VI)

Conclusions

Based on the results of this Delphi study with four groups of people knowledgeable about 4-H beef projects, the following conclusions were made.

1. Some of the traditional topics emphasized in 4-H livestock member manuals were rated the most important for 4-H'ers to learn. These topics were record analysis, budgeting, carcass data, rate of

gain, feed costs, market-based values, buying skills, marketing alternatives, and accounting skills, all topics related to profitability. This result is consistent with one of the highest rated life-skill topics, money management.

2. The other top rated life-skill was honesty.
3. Subject-matter topics related to consumer concerns and environmental concerns were emerging issues.
4. The traditional topics, showmanship, care and grooming, and competition were deemed less important.
5. Life-skills were more important than subject-matter content for 4-H beef members to learn.
6. There was a greater consensus of opinion on the life-skill topics than on the subject-matter topics.

Recommendations

Agricultural educators should consider replicating this Delphi study nationally with FFA parents and advisors, state supervisors, and beef industry leaders.

On the basis of conclusions of this study drawn from results, youth/4-H staff and extension beef-specialists should consider the following recommendations for 4-H beef projects:

1. Iowa 4-H beef educational materials should concentrate on the most important 31 subject-matter topics and 30 life-skill topics identified in this study.
2. Topics related to the concerns of consumers and the environment should be added when developing manuals and conducting programs.
3. The value of traditional topics, showmanship, care and grooming, and competition, which were rated not as important in this study, should be examined.
4. Honesty and money management should be emphasized in the 4-H beef educational program.
5. Life-skill development should be considered as the most important goal while 4-H'ers are in the process of learning the subject-matter topics.
6. A future study should identify important activities for 4-H beef project members and the relationship between activities and subject-matter and life-skill topics.
7. Subject-matter, life-skill, and activity topics should be examined in a study that uses randomly selected 4-H beef project members.

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LIFE-SKILLS AND SUBJECT-MATTER CONTENT OF THE 4-H BEEF PROGRAM: A DELPHI NEEDS ASSESSMENT

Discussant Remarks
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As traditional programs are studied to determine if they continue to meet the needs of "less traditional" 4-H members, it is necessary to determine whether those programs should change in order to remain viable. As such, the authors are to be commended for studying the content of the 4-H Beef Program in Iowa.

The choice of the Delphi Technique as a needs assessment tool seems logical and is well supported in the literature. Although the selected panel was a little large (by most standards), there was a logical means of identifying "experts" to participate in the study. However, in my opinion, there is still considerable question regarding whether conclusions are indeed valid due to "expert mortality". Although the researchers quote Dalkey regarding the needed sample size of only "13", to suggest that this constitutes ".80 reliability" is misleading. The reason is not so much related to panel "size" as it is to "who dropped out of the study between questionnaire rounds, and why". It is important to note that more than 50 percent of the panel chose to not participate by not returning the first round questionnaire. An additional 12 percent dropped out during either the second or third round. Does the remaining group adequately represent an "expert panel"?

Dalkey and other users of the Delphi discuss the importance of the "mean" and the "standard deviation" when determining importance and consensus. It would have been more informative if the authors would have simply listed subject-content items and life-skills items by <u>mean ranking</u> of <u>all</u> respondents and reported the corresponding <u>standard deviation</u> in order to explain results. To conclude that subject-matter and life-skills in Table 5 were "not important" based upon responses from only one respondent who may have rated it as such is very misleading without knowing how many rated it as "very important". I'm unsure of the logic regarding the process used to identify items as being "important" and "not important".

Although the authors indicate that "consensus was reached" at the end of round three, did the third-round questionnaire provide respondents with their original ratings, or were they simply provided with a group mean and told to reconsider the items? Were opportunities for "minority opinion" given to the panel members? How was it determined that "consensus" was reached?

What are the implications to the profession regarding the conclusions that "showmanship" and "competition" are deemed less important? Can this educational program teach such important life-skills as "honesty", "pride in a job well done", and "self-confidence" without a corresponding competitive event based upon "showmanship" and "animal quality"?

SELF-PERCEIVED MOTIVATION OF MISSISSIPPI COUNTY EXTENSION AGENTS AS COMPARED TO THEIR PERFORMANCE

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Introduction and Theoretical Framework

Professional county Extension agents respond to many stimuli in the work situation. Some agents respond more to higher salary and rewards, while others respond to job satisfaction. The relationship between motivation and job performance has long been recognized. Therefore, many government Extension programs in the world, particularly in the United States, have been established to promote positive job performance. Brundage and Mackeracker (1980) indicated that motivation is connected to levels of success in achieving desired goals and to levels of satisfaction gained from achievement. To many employers, a well motivated work force means higher productivity, performance beyond basic requirements (often without extra compensation), and reduced absenteeism in the work place.

The United States Cooperative Extension Service is an educational agency designed to work mutually among the three levels of government: local, state, and federal, to achieve its mission effectively. According to the Joint United States Department of Agriculture and National Association of State Universities and Land-Grand Colleges (USDA-NASULGC) committee on the Future of the Cooperative Extension Service (1983), the mission of the Cooperative Extension Service is to create better agriculture, homes, and communities by disseminating and encouraging the implementation of research-based knowledge to individuals, families, and communities.

Fetsch, Flashman, and Jeffiers (1984) also noted that there has been an increasing workload on professional county Extension agents due to budget constraints and hiring freezes. These burdensome situations often require Extension agents to have busy schedules to deal effectively with high expectations of clientele, administrative details, family commitments, and professional goals. In addition, the society has changed, as well as values, trends, and policies regarding the financial resources of the agricultural Extension programs. At the same time, inflation has changed the way people spend and save money, and the population as a whole is older (Rouse, 1990). As a result, people take fewer risks.

These conditions may explain why many Extension agents are responsible for two counties or discipline areas. These societal changes may influence the motivation of the agent and possibly influence his or her performance.

Statement of the Problem

Professional county Extension agents are exposed to a wide variety of problems and responsibilities, including assessing the appropriate needs of the clientele, seeking appropriate technologies to solve individual clients ' problems, and overcoming a lack of modern instructional materials. Considerable variation exists within and between agents, reflecting particular agro-ecological conditions, socioeconomic environments, and an administration's supervisory system. To be successful with a heterogenous clientele, county Extension agents need an appropriate working environment--well-trained subordinates, modern equipment, up-to-date publications, salary commensurate with the work performed, recognition, and promotion incentives. However, the problem facing the Extension services in many countries is the inability to create an environment within which the Extension agent is motivated to perform at a level commensurate with his or her efforts and salary (Benor & Baxter, 1984).

Purpose and Objectives

The purpose of this study was to determine the correlation between self-perceived motivation scores and job performance scores of professional county Extension agents of the Mississippi Cooperative Extension Service. Specific objectives were as follows:

1. Determine county agents' self-perceived motivation scores.
2. Determine county agents' performance appraisal scores.
3. Determine the relationship between county agents self-perceived motivation scores and scores received on their annual performance appraisals.

In addition, possible extraneous variables were compared to the motivation and performance scores. These possible extraneous variables were gender, race, age, level of education, length of service, area of work, job classification, length of time in the present position, salary, marital status, and number of counties worked.

Significance of the Study

The results of this study should be useful to Mississippi Cooperative Extension Service directors for improving productivity among their agents. Motivation is a significant factor contributing to the performance of individual workers (Quick, 1982). Quick (1982) also indicated that "...people don't work effectively because they don't feel motivated to do so. The cause of most on-the-job problems and failures is lack of motivation" (p. 3). Incorporation of the results of this study should contribute to more efficient personnel development.

The knowledge gained from this study could clear the way for future research to consider those variables related to motivation and performance and exclude those that are not. Current knowledge about the relationship between perceived motivation scores and performance appraisal scores of professional county Extension agents in Mississippi has been very limited.

Methods and Procedures

The design of the study was descriptive-correlational. Agents' performance scores were compared to their scores on an instrument designed to determine their level of motivation.

Population and Sampling

The population for the study included 185 professional county Extension personnel employed by the Mississippi Cooperative Extension Service (MCES). A list of agents was obtained from the staff development office of the MCES. Only agents who had been employed for at least one full year were included in the study because of the need of obtaining performance scores. A sample size of 115 was calculated using Krejcie and Morgan's (1970) table for determining sample size of a given population. A simple random sample of 115 agents was drawn for the study.

A request was made for agents' participation and their performance appraisal scores to the MCES director. Permission was given to use the professional Extension agents as the population of study, and the performance scores were received from the staff development department.

Instrumentation

The instrument used for the study was based on the expectancy theory of Hackman, Lawler, and Porter (1977). The developer of the instrument was contacted and granted permission to use the instrument.

The expectancy theory consists of three major components: the expectancy of effort's leading to performance (E-P); the expectancy that performance's leading to certain outcomes (P-O); and the valence (V), the value or weight that an individual attaches to an outcome, which can motivate behavior and influence decisions (Hellriegel & Slocum, 1992).

The instrument contained four parts. The first part requested demographic information. The second part contained questions pertaining to performance and outcomes (P-O). The third part contained questions related to the valence (V) or importance placed on outcomes. The fourth part contained questions related to effort and performance (E-P).

To use the instrument to determine level of motivation, the following process was used (Hackman, Lawler, & Porter, 1977):

Step 1. The score obtained for question 1 of part 2 of the questionnaire was multiplied by the score of question 1 of part 3. The score obtained for question 2 of part 2 was multiplied by the score of question 2 of part 3, and so on for all the questions in parts 2 and 3.

Step 2. All of the products from Step1 were added together to get a sum of all expectancies times valences. This sum was divided by the number of pairs of questions in parts 2 and 3 to get an average performance times valence expectancy.

Step 3. The three E-P questions were added together and divided by three (number of questions) to get an average performance to effort expectancy.

Step 4. The average performance times valency expectancy was multiplied by the average performance to effort expectancy to provide a total motivation score for each person. The mathematical formula is as follows:

$$M = AVG ([P\text{-}O] \times [V]) \times AVG [E\text{-}P]$$

The instrument was pilot tested on a randomly-selected group of 20 agents not included in the sample for the study. The internal consistency for the instrument was calculated using Cronbach's alpha on the three scales of the instrument. The reliability coefficients were .83 for the performance-outcomes expectancy scale, .87 for the valence scale, and .74 for the effort-performance scale. These reliability coefficients were determined to be acceptable based on recommendations by Pedhazur (1982) for non-experimental studies. Content validity was established by a panel of experts consisting of Extension educators, agricultural teacher educators, and motivation researchers.

Data Collection

An electronic mail message was sent by the Director of the MCES to request agents' participation. The data were collected using a mailed questionnaire, which had been validated and pilot tested. Ten days later a follow-up procedure initiated following the mailout of the original questionnaire. An additional questionnaire was sent to non-respondents. Ninety-two agents responded to the survey for a return rate of 81%. Because of time constraints, no further action was taken.

The primary researcher in the study submitted the names of the respondents and obtained performance scores from the MCES staff development office. Code numbers were used so the names of the agents in the study could be kept confidential.

Data Analysis

Descriptive statistics were used to analyze objectives one and two. Pearson's r correlation was used to determine the relationship between agents' self-perceived motivation scores and their 1993 performance appraisal scores (Objective 3). Analysis of variance and simple linear correlation were used to determine differences between the 11 independent variables and the 2 dependent variables: self-perceived motivation and performance scores. However, prior to performing the ANOVA, the tests of homogeneity and normality were performed. Because the homogeneity assumption was violated using the performance scores, the data were transformed using a natural logarithm or rank transformation method.

Findings and Discussion

Demographic information about the participants is provided below. Following, the findings are reported based on the objectives of the study. An analysis of possible extraneous variables is also reported.

Demographic Characteristics of Respondents

Forty-two males and 50 females responded to the study. The average work experience of the agents in Mississippi was 15 years, and they had been in the same position for an average of 9.5 years. The racial composition was 73% white and 27% African-American. Most respondents were married (78.3%).

The agents were from various occupational classifications, with 25% serving in positions with multiple responsibilities, either home economics or agriculture combined with 4-H. Table 1 contains a summary of respondents by job classification.

Table 1.
Distribution of Respondents by Job Classification (N = 92)

Job Classification	Frequency	Percent
Agriculture	27	29.3
Home Economics	24	26.1
4-H/Youth	16	17.4
Agriculture & 4-H	14	15.2
Home Economics & 4-H	11	12.0
Total	92	100.0

Table 2 shows the distribution of respondents by education level. The majority of the respondents hold masters degrees.

Table 2.
Distribution of Respondents by Level of Education (N = 92)

Level of Education	Frequency	Percent
B.S./B.A.	15	16.3
M.S./M.A.	73	79.3
Ph.D/Ed.D	2	2.2
No Response	2	2.2
Total	92	100.0

While most of the agents had responsibilities in one county, a significant number (28.4%) had multiple-county assignments. The distribution of county assignments is summarized in Table 3.

Table 3.
Distribution of Respondents by Number of Counties Worked (N = 92)

Number of Counties	Frequency	Percent
One	66	71.6
Two	18	19.6
Three	2	2.2
Four	3	3.3
Five	3	3.3
Total	92	100.0

Respondents were asked to indicate a salary range. Almost 84% earned between $25,000 and $45,000 per year. Table 4 contains a summary of salary ranges indicated by agents.

Table 4.
Distribution of Respondents by Salary Range (N = 92)

Salary Range	Frequency	Percent
$20,001 to $25,000	9	9.8
$25,001 to $30,000	17	18.5
$30,001 to $35,000	25	27.2
$35,001 to $40,000	20	21.7
$40,001 to $45,000	15	16.3
$45,001 to $50,000	1	1.1
No Response	5	5.4
Total	92	100.0

Objective One

The first objective was to determine county agents' self-perceived motivation scores. The average score recorded from the respondents was 26.3 with a standard deviation of 10.8. The median was 25.0 with the upper quartile 33.0 and lower quartile 18.0. It can be concluded that 25% of the respondents had a low motivation score, 26.1% had a low average score, 25% had a high average score and 23.9% had a high motivation score.

Objective Two

The second objective was to determine county agents' performance appraisal scores. The professional county Extension agents' 1993 performance appraisal scores were excellent. All the county Extension agents had a score above the expectation (90 out of a possible 140). Also, the largest percentage (42.4%) of the respondents had a performance score between 121 and 130. Six percent of the respondents had scores above 135. These results indicate either one of two occurences. One possibility is that the majority of the professional county Extension agents in Mississippi implemented their programs and activities satisfactorily, according to their supervisors. The second, more likely possibility is that the instrument and/or process used is too lenient in its judgement of agents' performance.

Objective Three

The third objective was to determine the relationship between county agents' self-perceived motivation scores and scores received on their annual performance appraisals. The correlation between agents' self-perceived motivation scores and scores received on their 1993 performance appraisals was low ($r = .16$) and not statistically significant. It can be concluded that the agents' actual performances are not related to their motivation level in 1993. Another explanation could be that 1993 was a year in which agents had such consistently good performance scores that the differences in self-perceived motivation levels were not enough to indicate a relationship.

Relationships Between Possible Extraneous Variables and Motivation

The results of a t-tests revealed that agents of different gender and marital status have different self-perceived motivation levels. Agents in this study who are single ($M = 31.95$) showed a significantly higher self-perceived motivation score than married agents ($M = 24.50$). Female agents ($M = 29.24$) had significantly higher self-perceived motivation than male agents ($M = 22.74$).

The results of an Analysis of Variance (ANOVA) procedure indicated that a significant difference was found between agents' self-perceived motivation scores and job classification. A post-hoc Scheffe test identified significant differences between home-economics/4-H agents and the 4-H agents and between agriculture and agriculture/4-H agents at the .05 level. However, no statistically significant difference was found between other groups. Table 5 contains a summary of the ANOVA procedure.

No differences were found by race for self-perceived motivation scores. White and African-American agents in this study appear to have similar self-perceived levels of motivation. When agents' age, level of education, length of service, and salary were compared to their self-perceived motivation scores, no differences were found.

Relationships Between Possible Extraneous Variables and Performance

The analysis of the classical assumptions of independence, normality, and homogeneity for using a priori tests on the agents' 1993 performance appraisal scores show that two assumptions (normality and homogeneity) were violated. Therefore, the data were transformed using a natural logarithm transformation system. This transformation allowed the data to meet the normality and homogeneity assumptions.

Table 5.
Analysis of Variance for Overall Mean of Agents' Self-Perceived Motivation by Job Classification (N = 91)

Source of Variation	Degrees of Freedom	Sum of Squares	Mean Squares	F Ratio	F Prob.
Between Groups	4	1183.72	295.93	2.77	.031*
Within Groups	87	9281.97	106.69		

* p < .05

Job Classification	Freq.	Mean	SD	Group
Home Ec. & 4-H	11	34.73	12.26	1
Home Economics	24	27.17	10.77	1
4-H/Youth	16	25.00	8.41	2
Agri. & 4-H	14	23.86	12.56	2
Agriculture	27	23.52	8.77	2

According to Mefferd and Sadler (1985), a period of 3 to 4 years is required for an agent to become fully effective in his or her position. Therefore, the agents were divided into two groups, those who had been employed for four years or less and those who had been employed for more than four years. A t-test revealed that agents with five or more years experience had higher performance ratings (M = 49.09) than those agents with four years experience or less (M = 24.95) (means from transformed data). This finding indicated that, in this particular group, the amount of experience that an agent accumulates will influence his or her work performance level. Agents with higher experience are likely to be better prepared to perform at higher levels than those with less experience in Extension work. The difference could be due to a greater degree of understanding the Extension system or a better understanding of the performance appraisal system within the MCES. This finding is supported by previous research (Patterson, 1984; Williams, 1991).

Other researchers have reported differences in performance appraisal scores by race (Wolfork, 1986); level of education (Mefferd & Sadler, 1985); age and job classification (Patterson, 1984); and marital status, number of children, time in present position, and number of counties worked (Williams, 1991). None of these variables were found to be statistically significantly related to job performance in this study. Also, job performance was not found to be related to salary or gender.

Recommendations

The following recommendations are based on the findings and conclusions of the study.

1. A longitudinal study should be conducted to examine changes in agents' motivation level related to their performance appraisal.
2. In developing programs to maintain and enhance the motivation level of professional county Extension agents, marital status, gender and job classification should be given higher priorities. In addition, more incentives should be given to agricultural Extension agents and agricultural Extension and 4-H agents who appear to be the least motivated groups in the Mississippi Cooperative Extension Service. However, more research needs to be conducted in order to determine appropriate incentives.
3. A future study is needed to identify if the Performance Evaluation Instrument (PEI), which was designed specifically for MCES, has a correlation with the same instrument used to measure the motivation of professional county agents in this study.

4 A significant correlation found between experience and performance should lead the MCES to consider length of work (experience) when evaluating county Extension agents.

5 A similar study should be replicated at the regional or national levels in the United States to determine if the same results are obtained using large sample sizes.

6 Furthermore, it is important to note that variables such as supervisors' confidence in their employees' talents and capacities to implement programs, interrelationship between supervisor and agents, management style of supervisor, availability of up-date technology, modern equipment, responsibility, and location which may be related to motivation and performance were excluded in this study, therefore, they should be explored in future studies.

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SELF-PERCEIVED MOTIVATION OF MISSISSIPPI COUNTY EXTENSION AGENTS AS COMPARED TO THEIR PERFORMANCE

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This study is particularly interesting in that it attempts to revisit motivation theory and determine if motivation and performance are indeed related for a group of Mississippi Extension agents. Although the theoretical proposition based upon the literature infers that "motivation" may cause "performance", I'm still somewhat perplexed regarding which of these variables is actually antecedent to the other. Does increased motivation cause higher performance, or does a high performance score "increase motivation"? Unfortunately, additional light was unable to be shed upon this question due the limited variation in performance scores for the agents in this study.

The design and methodology of this study is sound. The literature in support of the theoretical proposition being studied has been adequately included in the introduction to the paper and, even though the proposition was not supported by the resulting research findings, the researchers have studied alternative propositions and discussed probable reasons for their findings. They are to be commended for conducting a "clean" study.

In essence, the authors have used what appears to be a valid instrument to assess motivation and what they have "suggested" <u>may</u> be an "invalid measure" of performance (because of it's inability to correlate with motivation). I suspect their "suggestion" is correct. The fact that, of all extraneous variables studied, the single variable which significantly related to performance rating was "length of employment" (4 years or less and more than 4 years) further substantiates the fact that the performance appraisal "score" may be measuring something other than "performance".... for example "longevity"? Although the authors gave a rational reason for breaking the years of experience into a dichotomous variable, I would suspect that the Pearsonnian Correlation Coefficient between years of experience and performance would have been equally revealing.

In my opinion, this research and other studies I've read which produce similar findings raise some interesting questions regarding performance measures in Extension and similar educational agencies. Are such instruments really being used to measure job-related "performance", or are they being used by evaluators to simply distribute what ends up being "longevity pay"? Is an inability to differentiate between "performance scores" indicative of "an invalid instrument" or an inability of the evaluator to use the instrument effectively? Further, aside from the obvious need to release really ineffective employees, is it good for an organization such as Extension to try and differentiate between performance scores beyond the concepts of "acceptable" and "unacceptable"? What impact would continuous annual performance ratings of "average" have upon the highly motivated young agent?

A NEW METHODOLOGY TO ASSESS SAFETY CONDITIONS IN AGRISCIENCE LABORATORIES

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Introduction and Theoretical Framework

Previous research has documented that agriculture teachers are not using recommended safety practices or providing student safety and emergency equipment to the extent warranted by the hazards present in the laboratory (Johnson & Fletcher, 1990; Lawver, 1992; et al.). Burke's (1989) study of accident frequency in Virginia agricultural mechanics programs concluded that, at five student accidents per teacher per year, the accident rate was excessive. Burke recommended that safety instruction should be enhanced, and that "further study should be made of the methodology currently used by teachers of agriculture to teach safety."

Lawver (1992) found that Texas secondary agricultural science teachers were using recommended safety practices and were providing student safety and emergency equipment but not in relation to the hazards present in the agricultural mechanics laboratory. The findings of Johnson and Fletcher, and Lawver were both consistent with the results of similar studies in Missouri (Lamb, 1984), Nebraska (Rudolph and Dillon, 1984), Ohio (Gliem & Hard, 1988), and Iowa (Hoerner &Kessler, 1989). Both Johnson and Fletcher (1990), and Lawver (1992), concluded that it was apparent that unsafe conditions existed in many secondary agricultural mechanics laboratories, and that safety program improvement must become a top priority for agricultural educators in their respective states. Workers must be educated to do their job safely and this education must start at the high school level (Godbey (1979)

According to Kigin (1983), the place where a student engages in shop activity must be conducive to modern learning and the responsibility for providing a suitable place is shared by the school district and the teacher. The school district is required to provide adequate facilities and the teacher is expected to utilize them in a safe and proper manner. The safe operation component is what this research is designed to ascertain.

This study is unique because it utilizes a new concept in assessing the safety conditions of agriscience laboratories-- relative safety importance. Relative safety importance is defined as the potential of any safety related item or practice to cause or contribute to accidents. Agricultural education, human factors, safety management, and industrial engineering researchers worked as a team to conduct this study.

Purpose and Objectives

The purpose was to develop a methodology to assess the safety of agriscience laboratories based on agricultural education, human factors, safety engineering, and safety management perspectives. The specific objectives were:

1.. To develop a methodology to assess the safety status of the facilities, materials, equipment and instructional methods used in agriscience laboratories.
2. To validate and improve the above methodology by interviewing teachers and evaluating data collected from agriscience laboratories through the use of this tool.

3. To identify the most common safety problems in agriscience laboratories as the above methodology was developed and validated and suggest appropriate solutions or means for improvement.
4. To make recommendations about the best use of a validated and improved methodology for future research and safety assessments.

Methods and Procedures

The procedures used in this study are depicted in the model shown in Table 1. The instrumentation was developed in Phases I-III, the agriscience laboratory safety data was collected in Phase IV, and final instrument revisions were made in Phase V.

Table 1.
Research Procedures

Phase I	Initial Instrument Design: Developed a hypothesized survey model (HSM) based on the review of the literature and the field study. Field Study: Conducted a field study in four selected agriscience laboratories located in a region different from the research area using the HSM.
Phase II	Research Instrument Design: Used results from Phase I to design and face validate the research survey model (RSM).
Phase III	Field Validation: Used the face validated RSM to conduct on-site research and field validation of the RSM. Data reported in this study collected during this phase. Relative Safety Importance Factor (RSIF): Six safety experts assessed the relative safety importance of each safety item in the instrument from the standpoint of its potential for causing or contributing to accidents.
Phase IV	Data Analysis: Identified safety conditions and examined RSM for improvement. Develop conclusions and recommendations based on data collected using RSM.
Phase V	Finalize RSM: Make final modifications to RSM.

Instrument Development

As a result of the field validation visits, assessments and discussions with agriscience teachers in Phase I, a Research Survey Model (RSM), was developed. Part one had 103 data items that were designed to assess the physical environment. Part two had 107 data items that assessed the institutional and community environment. Besides the 210 safety data items collected at each site, additional information was collected including pertinent demographic data. The items in the instrument were selected after reviewing the research related to agriscience laboratory safety. Most of the items were either verbatim or modified versions of items utilized by Burke (1989), Johnson and Fletcher (1990), or Lawver, et. al. (1992). The remaining items were developed by the research team. Every safety data item was assigned a safety rating or a score of one to ten with ten representing the safest condition. The RSM was face validated by the faculties of Biological and Agricultural Engineering, Industrial Engineering and Agricultural Education at Louisiana State University. Part one was divided in seven sections: Building; environment; machines and equipment; safety conditions; housekeeping; fire protection; and ergonomics and safety engineering. Part two was divided into four sections: School safety policies and procedures; general safety practices; personal protective equipment; and fire protection.

Data Collection

The research area included all high school agriscience laboratories in 44 schools in 14 parishes in Southeastern Louisiana. Forty-one of these were assessed. Two schools declined to participate and one school had renovations in progress. The same researcher collected all data and took an average of one hour per actual site assessment. Students were not required to be present. Agriscience teachers were contacted to verify their acceptance to participate in this research and to schedule appointments. Due to the generally widespread distances between schools and the availability of the teachers, only one or two laboratories per school day could be assessed.

The data collected on the first part of the instrument or RSM was collected "in situ" by the researcher with the agriscience teacher. The data collected in the second part of the instrument or RSM was also supplied "in situ" by the agriscience teacher after being instructed and advised by the researcher. The data contained in this second part addressed the interacting institutional and community environments, of which the agriscience teacher was the most knowledgeable source of information. Not all items were applicable to all laboratories. Provisions were made in the RSM for non applicable items. They were not considered in subsequent calculations.

Relative Safety Importance Factor (RSIF)

All the items assessed do not have the same impact relative to laboratory safety. Due to this varying impact, a factor of relative importance to safety was considered necessary to be applied to the collected data, to obtain a balanced safety index that would represent both the safety rating and the level of importance of each item assessed. Therefore, a system was designed to apply a factor of relative safety importance to each item assessed. The system consisted of selecting six safety officers or experts whose services were offered on the LSU campus, and requesting their evaluations of the items assessed as to their relative importance to laboratory safety. A list of all 210 items was individually evaluated by these experts on a scale of one to five, with one indicating that the items were of least relative safety importance, and five indicating that the items were of greatest relative safety importance.

Safety Need Index (SNI)

Because of the varying impact to laboratory safety of the items assessed, the relative safety importance factor (RSIF) was applied to the collected data, obtaining a safety need index (SNI) that combines the field safety rating and the level of importance of each item assessed in a balanced numerical representation. This index (SNI) is a modified relative safety level of the items assessed that shows more accurately their need for improvement because of their combined field safety rating and their impact or importance to laboratory safety.

A formula was designed to calculate the safety need index (SNI). This formula increases the individual field safety rating when the relative safety importance factor (RSIF) for that item is lower than the mean relative safety importance factor (RSIF) for all items, and decreases the individual field safety rating when the relative safety importance factor (RSIF) for that item is higher than the mean relative safety importance factor (RSIF) for all items. In other words, by this formula, as an individual item is considered of more safety importance than the average, its assessed rating is affected negatively showing more need for improvement because of its greater importance. On the contrary, as an individual item is considered of less safety importance than the average, its assessed rating is affected positively showing less need for improvement because of its lesser importance. The following formula was designed to attain a safety need index (SNI) of each item assessed:

$$SNI = FSR + [(\mu - f)/\mu] * FSR$$

where,

SNI = Safety need index, expressed as a percentage

FSR = Field safety rating - raw data collected on site

f = relative safety importance factor (RSIF) - experts rating on a scale of 1 to 5 (low to high)

μ = mean relative safety importance factor for all items (RSIF), which is a constant in the formula, is = 3.89

The SNI's obtained through the use of this formula were converted to percentages in order for these numerical values to be more expressive. To obtain these percentages the calculated SNI's were mathematically compared to the highest SNI obtained.

Results and/or Findings

Demographic Data

School populations ranged from 260 to 1,800 students, with an average of 838 and a median of 422. The size of the laboratories varied from 648 to 8,358 square feet, an average of 2,093 and a median of 1,716. The maximum number of students the teachers allowed per laboratory session ranged from 10 to 36 students, with both a mean and median of 26 students. The critical area per student in a laboratory session ranged from 34 to 194 square feet, an average of 85 and median of 73 square feet.

The safety items had been grouped in sectors in both parts of the RSM. The average of all SNI's in the sectors were found as follows, listed in order from greatest to least need of improvement:

- Fire protection 42.6%
- Safety policies and procedures 47.5%
- Safety conditions 49.7%
- Personal protective equipment 51.0%
- Environment 54.7%
- Machines and equipment 55.6%
- General safety practices 57.5%
- Housekeeping 61.3%
- Fire prevention 64.1%
- Building 67.1%
- Ergonomics and safety engineering 71.7%

The fire protection sector must be differentiated from the fire prevention sector. Fire protection refers to items related to protection in case of fire occurrence (fire extinguishers, exits, etc), whereas fire prevention refers to items related to prevention of fire occurrence (fire proofing, condition of buildings, control of flammables, etc.). In general, the sectors that are weaker in laboratory safety require emphasis in better protective equipment, fire proofing, improvement of safety conditions, and implementation of more suitable safety policies and procedures.

The Field Safety Ratings (FSR), Relative Safety Importance Factors (RSIF), and Safety Needs Indices (SNI) for the items in the instrument are presented in Table 2. Twenty-one items marked as "not applicable" in over one-half (21) of the laboratories have been eliminated from this table to conserve space. Caution should be exercised in interpreting these data in those cases where there are moderate to large numbers of "not applicable" ratings. The ideal Safety Need Index percentage (SNI%) is 100%. As the SNI% decreases, the need for improvement for that item increases.

Table 2.
Field Safety Ratings, Relative Safety Importance Factors, and Safety Needs Indices for Agriscience Laboratory Safety Items

ITEMS	N/A	FSR	RSIF	SNI%
BUILDING				
General appearance is conducive to student safety	0	7.2	3.83	57.1%
Floors are kept in a condition conducive to student safety	0	8.5	4.17	62.3%
Walls and ceilings are kept in a condition conducive to student safety	0	8.4	3.00	81.4%
The facilities are free from evident architectural barriers	0	8.9	3.00	85.8%
There are sufficient exits in each laboratory	0	9.4	4.17	68.9%
Storage space for tools and materials is adequate	0	7.3	3.83	57.6%
Storage space for equipment and materials being worked on is adequate	0	6.5	3.80	51.2%
The facilities are wheelchair accessible (including laboratories)	1	6.7	2.33	74.6%
ENVIRONMENT				
Facilities are pleasant & conducive to student safety	0	8.1	3.33	72.2%
Facilities are clean and orderly	0	7.4	3.83	58.8%
The area or square feet of laboratory per student is adequate	0	4.4	3.50	36.5%
Illumination is sufficient/non glare lighting provided for all work areas	0	8.2	3.83	65.0%
Ventilation is adequate and proper for conditions	0	7.2	4.50	48.1%
Air is free from dust, smoke, or other contaminants	0	6.3	4.00	48.0%
MACHINES & EQUIPMENT				
General arrangement conforms to good safety practices	1	8.1	3.50	69.3%
All stationary machines are securely fastened in place	8	4.5	3.17	42.6%
Machines are located for required process compatibility	1	8.2	2.83	81.0%
Auxiliary equipment is orderly and readily available	2	7.9	2.83	78.7%
Work stations designed to prevent hazards from excess heat or noise	2	7.8	3.67	65.1%
Work stations are designed to prevent hazards from fire or fumes	3	8.0	4.17	58.1%
Work stations are designed to prevent hazards from other machines	2	8.2	4.17	59.3%
Parts of machines needing special caution are color coded	4	3.5	4.17	26.8%
All machines guards are in proper position for safe machine operation	2	7.3	4.67	46.6%
Abrasive wheels are equipped with safety eye shields	9	6.9	4.67	46.1%
Abrasive wheels are equipped with tool rests	9	8.3	4.17	63.4%
Abrasive wheels are equipped with guards	9	8.5	4.33	62.3%
Table saws are equipped with guards and anti-kickback system	13	6.1	4.50	41.4%

ITEMS	N/A	FSR	RSIF	SNI%
Radial saws are guarded and equipped with anti-kickback device	18	8.5	4.33	57.0%
Radial saws are equipped with forward stop and positive saw return	19	7.3	4.33	48.8%
Machine belts and pulleys are equipped with guards	11	8.3	4.33	58.6%
Torches and regulators are in good operating condition	3	9.5	4.50	63.9%
Hoses are maintained in good condition	2	9.6	4.17	70.6%
Anti (fire) flashbacks are installed where required in all hoses and lines	6	7.1	4.33	48.6%
Welding arcs cannot strike cylinders, gas or water lines	2	9.2	4.50	61.4%
Electrode holders are maintained and stored in good condition	4	8.8	3.67	72.9%
Proper ventilation is provided in welding areas	2	6.8	4.67	43.2%
All hand-held power tools are equipped with a "dead man" switch	4	5.5	4.33	40.5%
SAFETY CONDITIONS				
Nonskid surfaces are provided around machines	3	2.0	3.67	16.8%
All welding is done in screened areas	3	5.3	3.67	44.2%
Cylinders are secured upright and stored in ventilated and clear areas	2	8.3	4.17	60.4%
Danger zones are properly identified and guarded	2	4.8	4.17	34.9%
Aisles are clear of protruding objects	0	8.1	3.67	67.2%
Electrical outlets and circuits are properly identified	0	6.1	3.67	52.2%
Exits are adequately and properly identified	0	6.4	4.17	45.5%
Walls are clear of hanging objects that might fall	0	8.6	3.50	74.1%
Utility lines are properly located and identified	7	6.9	3.50	57.8%
A master power switch panel controls all electrical outlets	0	8.2	4.17	60.4%
Individual machine power switches are installed in power panels	2	8.8	4.17	64.2%
Extension cords are in good condition (not spliced)	3	9.1	4.00	67.6%
Extension cords have three-way grounded plugs	3	9.4	4.33	65.7%
Cables are routed so that they are accessible for inspection and repair	12	9.4	3.17	87.9%
All switches are enclosed	0	9.3	3.17	86.5%
No temporary wiring is evident	0	9.4	3.33	84.6%
The laboratory has eye wash bottles	2	2.8	4.33	19.3%
The laboratory has chemical spill kits	5	1.4	4.00	10.6%
The laboratory has safety showers	3	1.5	4.33	10.7%
An adequately stocked first aid cabinet is provided	1	4.7	4.83	29.7%
HOUSEKEEPING				
Good housekeeping practices are evident	0	6.9	4.67	43.6%
Benches are kept orderly	5	7.6	3.67	62.5%
Corners and dead spots are clean and clear	0	6.3	3.00	59.7%
Special tool racks are in orderly condition at bench and machine sites	13	7.3	3.00	71.1%
Tools, supplies, and/or materials are orderly	0	7.5	3.67	61.8%
Sufficient scrap boxes are provided	2	6.6	2.67	68.6%
Materials are stored in an orderly and safe condition	1	7.9	3.83	62.2%

ITEMS	N/A	FSR	RSIF	SNI%
FIRE PROTECTION				
Sufficient fire extinguishers are available	0	9.0	4.33	64.3%
Fire extinguishers are of the proper type	1	9.5	4.33	68.0%
Fire extinguishers are adequately located, maintained and supplied	1	8.9	4.33	63.4%
The laboratory has fire detectors	1	4.6	3.67	38.2%
Storage and waste containers are fire-proof	4	2.5	3.50	21.3%
Fire proof storage cabinets are provided for all flammable liquids	9	2.4	3.83	18.9%
ERGONOMICS AND SAFETY ENGINEERING				
Room furniture and equipment are arranged to avoid accidents	0	8.0	3.67	65.7%
Aisles are properly located for efficient performance	1	8.4	3.50	72.3%
The tasks required from students are human factors compatible	0	9.4	2.83	93.6%
Dials, controls and displays conform to human factors standards	2	9.1	2.33	100.0%
There is local or direct lighting for equipment where needed	4	8.5	3.50	73.7%
The work areas are free from direct or reflected glare sources	0	9.0	3.17	84.0%
The work areas are free from evident sharp edges or trip hazards	0	8.6	4.00	65.5%
The work areas are free from evident slip and fall hazards	0	8.1	4.17	58.5%
Tool racks are available where needed	8	7.0	3.17	65.8%
Areas for teaching and demonstration are available	0	9.2	2.83	90.5%
Work stations are designed to prevent hazards from passing students	0	8.1	3.67	67.1%
Work stations are designed to protect observing students from hazards	1	8.5	3.67	70.4%
Safety instructions for each machine are posted or readily available	3	5.0	3.83	38.0%
All machine switches are within easy reach of the operators	2	9.7	4.17	71.0%
A visible "off" position is located on each machine	2	9.6	4.50	64.3%
Machines are located in such way that operator space is adequate	2	8.3	3.67	69.0%
Machines are located so that required supervision is possible	2	9.1	3.67	75.6%
Master and other power panels are easily accessible	1	8.2	3.83	65.6%
INSTITUTIONAL AND COMMUNITY ENVIRONMENT				
A safety policy or rules are enforced for safe shop operation	0	10.0	4.67	63.3%
Number of work groups kept appropriate for respective work stations	1	6.6	3.83	54.6%
Laboratory areas are provided with custodial services	0	2.8	3.00	26.6%
The school uses the services of a safety inspector or advisor	1	4.4	3.50	37.8%
The school promotes and organizes safety contests	2	3.1	2.83	28.4%
Emergency procedures have been established for emptying the facilities	0	9.8	4.17	73.2%
Safety procedures are posted conspicuously near all areas of operation	1	4.8	3.67	40.1%
The school has access to qualified individuals to administer first aid	1	8.0	4.17	58.3%
Instructors are First Aid certified	1	3.5	3.83	27.7%
The school has a policy and/or procedure for administration of first aid	1	8.6	4.00	64.4%
Routine preventative maintenance is practiced	0	9.6	4.00	73.1%
All maintenance problems and requests for improvement are recorded	0	5.8	3.83	46.5%

ITEMS	N/A	FSR	RSIF	SNI%
Facilities are inspected regularly for hazards and needed corrections	1	8.2	4.00	62.7%
An inspection checklist is used when making the above inspections	3	5.0	3.67	39.8%
All defective equipment and hazards are reported immediately	0	8.9	4.50	59.3%
Records of all inspections are readily available for reference	5	5.0	3.00	48.3%
Safety inspections are also made by a student safety committee	3	2.4	3.17	22.3%
Students are rotated on the student safety committee	11	1.9	2.83	18.7%
One instructor has the overall responsibility for each major facility	0	8.5	4.00	63.0%
Instructor supervision is provided at all times during lab sessions	0	9.8	4.83	58.7%
Main power switches are " off " when laboratories are not in session	3	4.5	4.33	32.0%
All machines are shut off when the instructor is out of the laboratory	1	8.9	4.50	59.2%
All machines are shut off while unattended	1	9.8	4.67	61.9%
All machines are off and tagged when being cleaned or adjusted	1	8.0	4.60	51.6%
Continuous proper examples are practiced by the instructor	0	10.0	4.33	69.9%
All accidents are reported for immediate attention and analysis	0	10.0	4.33	69.9%
Accident analyses are used to implement prompt corrective measures	1	8.6	4.17	63.3%
Activities are selected based on students' ability & maturation level	0	10.0	3.67	83.1%
Machine operation instructions are available near areas of operation	3	4.8	4.00	34.8%
Tools are kept sharp, clean, and in safe working order	0	9.3	4.17	70.0%
Materials being worked are secured when the operation so demands	0	10.0	4.33	69.9%
All work undertaken is approved through an established method	1	9.3	3.67	75.5%
Proper warnings are given in using toxics, caustics, volatile materials	6	8.7	4.17	65.9%
The school promotes and develops the sense of safety consciousness	0	9.1	3.67	75.8%
Questions on safety are included in the instructional program	0	10.0	3.83	79.8%
Printed safety rules are given to each student	0	9.1	4.20	64.5%
Motion and/or slide films on safety are used in the instruction	0	9.1	3.17	84.7%
Occasional talks on safety are given by industry or outside specialists	1	6.2	3.17	57.6%
Students who constantly violate safety regulations are removed	0	8.0	4.67	50.9%
Dangerous horseplay and practical jokes are prohibited	0	9.6	4.83	57.4%
A proper record is kept of safety instruction given	0	8.2	3.83	65.8%
Inappropriate garments or other materials are kept out of activity areas	0	9.6	4.17	70.0%
Safety bulletin boards and posters are part of the total safety program	0	6.0	3.33	52.4%
Only spark lighters are used to light torches	2	9.8	3.83	77.9%
Safety cans are provided for storing flammable liquids	9	5.2	4.17	38.4%
Students are tested for safety knowledge	0	10.0	4.33	69.9%
Students are tested for safety ability	0	9.3	4.33	65.3%
Students are instructed in methods for handling and lifting materials	0	8.5	3.67	70.3%
Students are instructed to clear off machines before turning them on	3	9.7	4.00	74.7%
Students are instructed never to leave a machine while it is in operation	1	10.0	4.67	63.3%
Students are instructed not to stop moving parts of a machine by hand	1	10.0	4.67	63.3%

ITEMS	N/A	FSR	RSIF	SNI%
Students are instructed to stay clear of other operating machines	1	10.0	4.33	69.9%
Students are instructed not to annoy or alarm an operator	1	10.0	4.83	60.1%
Students are instructed in the use of the tools/equipment they operate	0	10.0	4.83	60.0%
Students are tested and authorized before operating machines	0	9.8	4.83	58.7%
Students are alerted and monitored for possible hazardous operations	0	10.0	4.83	60.0%
Students are instructed as to how to report hazards and fires	0	9.8	4.17	69.9%
Students sleeves are rolled above elbows when operating machines	4	6.8	3.60	55.7%
Students avoid the use of loose clothing, jewelry, ties, long hair, etc.	1	9.5	4.50	63.6%
The students are not exposed to unreasonable environmental changes	0	9.3	3.17	86.8%
Noise from laboratory sources do not annoy or distract students	1	6.4	3.83	52.8%
Scrap stock is promptly put in scrap boxes	3	6.9	3.67	57.5%
Containers for oily rags are frequently emptied	9	8.0	3.67	64.4%
Waste (shavings, sawdust, paint, etc.) is disposed of daily	3	6.9	3.33	62.2%
Machines are kept in safe operating condition at all times	1	9.1	4.50	60.7%
Temperature control for all seasons is adequate	0	6.3	2.83	62.6%
Noise is always kept within acceptable levels at all laboratory locations	0	7.4	3.33	64.2%
Proper tools and materials are always available for machine cleaning	1	5.9	3.83	47.5%
All guards are used at all times	1	6.4	4.60	41.2%
Signs are always secured to machines that are out of order	2	5.1	4.40	35.2%
Power panel switches are always "off" when machines are out of order	2	7.9	4.20	57.5%
Extension cords are always avoided as permanent installations	1	8.9	4.00	67.9%
Arc welding is always done only in dry areas	3	10.0	4.50	66.6%
Welding is always done only in areas free of combustible materials	3	9.7	4.67	61.9%
Fire proof bulk storage is provided outside the facilities	8	3.7	4.17	27.2%
All waste and oily rags are always placed in the correct containers	8	6.7	4.33	45.0%
Noise levels never affect speech intelligibility or present a health hazard	1	5.9	2.80	61.6%
There are no human factors incompatibilities for working students	4	8.3	3.17	77.0%
Reflective screens are always used as protection from arc flashes/burns	3	6.2	3.83	51.4%
The laboratory keeps an inventory of all chemicals used	11	3.7	3.67	30.8%
The laboratory uses materials safety handling sheets	10	3.9	3.60	30.5%
The instructors are certified in handling chemicals	8	5.3	3.83	40.6%
The instructor (s) has (have) 40 hour hazardous waste training	6	2.3	2.67	23.6%
The laboratory is inspected for safety on a monthly basis	1	3.9	3.50	33.9%
The laboratory has procedures for dealing with chemical spills	9	2.7	3.50	23.2%
The laboratory has a planned response for chemical spills	11	2.8	3.50	24.2%
Personal protective equipment is washed and disinfected as needed	8	7.8	4.33	52.6%
Eye-wash baths and showers are available when using caustic materials	15	3.4	4.33	24.2%
Eye-protective devices are disinfected/returned to proper racks after use	11	5.8	4.50	38.7%
Observers use acceptable protection	3	9.0	4.00	71.3%

ITEMS	N/A	FSR	RSIF	SNI%
Protective clothing (aprons, shoes, gloves, etc.) are used when required	1	9.8	4.67	61.9%
Respiration and noise suppression devices are used as required	13	4.5	4.17	35.9%
Eye protection devices are worn when required	0	10.0	5.00	56.8%
Shields are provided for electric welding	3	10.0	4.83	60.1%
Goggles with the proper lenses are used when torch welding	3	10.0	4.67	63.4%
Arc-welding helmet with correct lenses is used when electric welding	4	10.0	4.83	61.7%
Instructors are knowledgeable in the use of the fire extinguishers	0	10.0	4.50	66.6%
Instructors know the procedures in the event of fire	0	10.0	4.50	66.6%
Students know the location and use of the various fire extinguishers	0	8.7	4.50	59.3%
Students are instructed on the basics of fire prevention	0	9.8	4.50	65.2%
Students are instructed as to how to report fires	0	9.3	4.17	68.4%

Note. N/A = the number of laboratories for which it was inappropriate to rate these items; FSR = Field Safety Rating; RSIF = Relative Safety Importance Factor; SNI = Safety Need Index.

Conclusions

This research have been conducted consistent with the four research objectives set forth at the first of this paper. The conclusions are presented in order by objective:

Objective 1. A methodology to assess the safety conditions of the facilities, materials, equipment and instructional safety methods used in agriscience laboratories in Southeastern Louisiana was developed.

Objective 2. The methodology developed for objective 1 was field validated successfully. The development and validation of the Research Survey Model (RSM) was a relevant part of the methodology. It was validated by interviewing teachers and evaluating data collected from Southeastern Louisiana agriscience laboratories.

Objective 3. The most common safety problems in agriscience laboratories were identified as the above methodology was developed and validated. It has been found that moderate to serious safety problems exist in the agriscience laboratories assessed. Such safety problems have been identified and suggestions for improvement of safety conditions have been addressed. Some agriscience laboratories need considerable more attention than others regarding safety conditions as shown by the differences in Safety Need Indices by school (not reported in this manuscript).

Objective 4. Recommendations about the best use of the validated and improved methodology for future research and safety assessments have been made. The improved RSM, designed as a result of this successful field validation, can be used for future assessments.

Recommendations

Over 100 specific safety improvement recommendations were made as a result of this study. Due to space limitations, those recommendations cannot be included in this manuscript. General recommendations are as follows:

An effort should be made by agriscience instructors to regularly assess safety conditions in order to continuously improve safety conditions. This would alleviate and prevent many of the safety problems identified in this study. Although it would not be feasible to use all 210 items used in this study on a regular basis, agriscience teachers or local administrators may wish to develop an instrument that incorporates the most critical items. The number of items in such an instrument should be based on individual situations.

It is recommended that the Louisiana Department of Education, in conduction with local schools and instructors, immediately initiate a program to address the safety problems identified in this study. The improved instrument or an abbreviated instrument utilizing a critical subset of the 210 items should be utilized on a regular schedule (as often as monthly) until the safety of agriscience laboratories improves to an acceptable level. The continuous use of this instrument should allow the user to identify and track safety problems, and then to initiate solutions.

Although the instrument developed in this study was designed, field tested, and validated with Southeast Louisiana agriscience laboratories, it is reasonable to expect that this instrument would also be valid in other agriscience laboratories in Louisiana and other states. In addition, a modified version of this instrument could be utilized in other vocational laboratories.

It is recommended that agriscience instructors develop and implement safety guides, policies and procedures that will insure the safety of students in the agriscience laboratory in the future.

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A COMPARISON OF STUDENT AND FACULTY LEARNING STYLES IN THE UNIVERSITY OF FLORIDA COLLEGE OF AGRICULTURE

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Introduction and Theoretical Framework

The success of education hinges on the adaptation of teaching to the learning differences among the students (Snow & Yallow, 1982). Learning styles of students are often studied at four levels: (1) personality, (2) information processing, (3) social interaction, and (4) instructional methods (Claxton & Murrel, 1987). Kirby (1979) speculates that the several models have correlates that describe two basic orientations to learning: "splitters" who tend to be analytical and logical, breaking complex issues into manageable parts, and "lumpers" who learn through identifying relationships and patterns between parts.

Dunn and Dunn (1993) placed learners into two categories, analytical and global. Analytical learners prefer to learn in formal situations with few distractions, while global learners prefer to learn in a less formal environment and can work on several tasks at once.

Witkin (1976) identifies learners by their ability to deal with fields either independently or as a whole. By ascertaining an individuals' ability to locate a simple figure within an organized, complex figure Witkin claims that learning style can be classified as either field dependent or field independent. Witkins' (1976), field dependent learners appear to be aligned with Kirbys' (1979) "lumpers" and the global thinkers identified by Dunn & Dunn (1993), while the field independent learners seem to be identified with splitters (Kirby, 1979) and analytical learners (Dunn & Dunn, 1993).

Field dependent learners tend to be more social, have a more global perspective and learn more effectively in a non-formal environment than field independent learners. While field independent learners are better able to discern individual components and learn well in formalized settings. Learning style goes beyond cognition into the psychological realm of learning (Witkin, 1976). Witkin also noted in a review of literature that there seemed to be a relationship between careers selected by individuals and their learning style. He found that field independent learners tended to be attracted to careers that required the use of their analytical skills (mathematics, engineering, biological sciences) while field dependent learners preferred careers that required interpersonal skills (social sciences, elementary school teaching, management).

Professors that are field dependent learners tend to teach in ways that facilitate field dependent learners and teachers who are field independent learners tend to teach in ways that facilitate field dependent learners (Jacobson, 1992; Garger & Guild, 1984; Smith, 1982; Dunn & Dunn, 1979). Unfortunately, few teachers consider that the students have preferred learning modes (learning styles) that may or may not be that same as theirs! It is almost assured that in any given college course some students' learning styles will be aligned with the teachers' teaching style. Conversely, there will be students who are not aligned with the teachers style of delivering instruction.

Several instruments have been developed and used to assess individual learning styles (Claxton & Murrell, 1987; Cox, Sproles, & Sproles, 1988). The Group Embedded Figures test (GEFT) has been widely utilized in agricultural education to measure learning styles (Cano, Garton, & Raven, 1992a; Cano, Garton, & Raven, 1992b; Cano, Garton, & Raven, 1991; Raven, Cano, Garton, & Shelhamer, 1993; Cano, & Garton, 1994; Cano, & Metzger, 1995; Raven, Garton, & Cano, 1995, Torres, & Cano, 1995; Baker, Hoover, & Rudd, 1996).

The national average for the GEFT is 11.4 (Witkin, Oltman, P.K., Raskin, E., & Karp, S.A. 1971) out of a possible 18 (the average person can find 11.4 of the 18 simple figures embedded in the complex figures). For the purpose of this study, individuals and groups scoring the national average and above were classified as field independent while those scoring below the national average were classified as field dependent.

Recent studies in Colleges of Agriculture and with agricultural education students have revealed a great deal about the learning styles of students and faculty members. Differences between undergraduate students in agricultural education were identified by Cano, et. al. (1992a). Geographic differences in student learning styles were identified by Raven, et. al. (1993 & 1995). Baker, et. al. (1996) found that faculty members in the College of Agriculture at the University of Florida tended to be field dependent learners.

The relationship between learning style and college major for agriculture students, and the relationship between a College of Agriculture faculty members' learning styles and their field of study have not been adequately addressed. Are there relationships between a students learning style and the major they choose to pursue? Is there a relationship between a faculty members' academic unit and his/her learning style? Are students with a particular learning style drawn to academic units where faculty members possess similar learning styles? These are the questions to be addressed in this paper.

Purpose and Objectives

The purpose of this study was to identify student and faculty learning styles in the College of Agriculture at the University of Florida. The following objectives guided this study:

1. determine student learning styles by college major,
2. determine faculty learning styles by academic unit, and
3. compare student learning styles by college major to faculty learning styles by academic unit.

Methodology

The target populations for this descriptive study consisted of 410 (N=410) students enrolled in College of Agriculture courses at the University of Florida in the spring and summer semesters of 1996, and 345 College of Agriculture teaching faculty at the University of Florida.

Data were collected from students enrolled in several College of Agriculture courses. Courses surveyed in spring 1996 included: ASG 3000C - Introduction to Animal Science (n=55); ASG 3334 - Reproductive Physiology and Endocrinology in Animal Science (n=72); ANS 5446 - Animal Nutrition (n=11); AGR 3001 - Environment, Food, and Safety (n=35); AGR 4210 - Field Crop Science (n=10); AEB 3510 - Quantitative Methods in Food and Resource Economics (n=22); AEB 3103 - Principles of Food and Resource Economics (n=15); and AEB 3341 - Strategic Selling (n=32). Courses surveyed in summer 1996 included: ASG 3003 - Introduction to Animal Science (n=60); and AEE 3030 - Effective Oral Communication (n=98). A purposeful sample of 56 College of Agriculture teaching faculty members was utilized in this study (n=56). The findings of this study are limited to the purposeful samples.

Instrumentation

Learning styles of the students and faculty participating in this study were measured with the Group Embedded Figures Test (GEFT) developed in 1971 by Witkin, et. al. The validity and reliability of the Group Embedded Figures Test have been established by the developers of the instrument.

Data were analyzed using the SPSS/PC+ statistical software package. The researchers utilized descriptive statistics to interpret the data.

Findings

The first research objective was to determine student learning styles by College of Agriculture major. Students from 14 majors within the College of Agriculture were surveyed (n = 306). The remaining students were majors outside of the College of Agriculture, graduate students, or did not declare a major. The overall GEFT score for students in the College of Agriculture was 11.7 (SD = 4.8). Animal science majors had a mean GEFT score of 11.4 (SD = 4.9) and accounted for nearly 1/3 of the students surveyed. Agronomy and Entomology / Nematology students had the lowest mean scores (8.4 and 9.0 respectively) while Soil & Water and Natural Resources students posted the highest mean scores at 14.0 (Table 1).

Social science majors within the College of Agriculture included Agricultural Education and Communication and Food and Resource Economics. Students majoring in Agricultural Education and Communication had a mean GEFT score of 9.8 (SD =5.8). Food and Resource Economics students posted a mean score of 12.1 (SD = 4.9).

The second research objective that guided this study was to determine the learning styles of the teaching faculty in the College of Agriculture. A total of 56 faculty members completed the GEFT. The mean score for the faculty was 10.6 with a standard deviation of 4.3. Only six of the academic units in the College of Agriculture had four or more faculty members participate in the study. Of those six units, Dairy and Poultry Science had the greatest mean score (13.8) with a standard deviation of 2.2. Horticulture, (9.3, SD = 5.6), Animal Science, (9.7, SD = .43) and Food and Resource Economics (9.8, SD = 4.6) had the lowest mean scores (See Table 2).

Faculty members representing the social sciences in the College of Agriculture include Agricultural Education and Communication (GEFT mean score = 10.3, SD = 3.1) and Food and Resource Economics (GEFT mean score = 9.8, SD = 4.6).

Table 1.
GEFT Scores by Student Major (n = 306)

Major	n	%	GEFT Mean Score	SD
Food Science Health and Nutrition	18	5.8	12.8	5.3
Animal Science	99	32.4	11.4	4.9
Ag. Education and Communication	11	3.6	9.8	5.8
Horticulture	10	3.2	12.1	5.5
Dairy and Poultry Science	8	2.6	11.4	6.6
Food and Resource Economics	51	16.7	12.1	4.9
Soil and Water	2	.7	14.0	0.0
Agricultural Engineering / Agricultural Operations Management	25	8.2	12.0	4.6
Agronomy	11	3.6	9.0	3.8
Plant Pathology	2	.7	13.0	4.2
Pre-Veterinary Medicine	29	9.5	13.6	4.2
Microbiology	22	7.2	12.2	4.3
Forestry and Natural Resources	13	4.2	14.0	3.0
Entomology / Nematology	5	1.6	8.4	3.6
Statistics	--	---	---	---
Total	306	100.0	11.7	4.8

* Students of 11.4 and greater are considered field independent learners
** Students with scores less than 11.4 are considered field dependent learners

Horticulture students had a mean GEFT score of 12.1, indicating they were field independent learners and faculty members in Horticulture had a mean score of 9.3, indicating a field dependent learning style. Food and Resource Economics students had a mean score of 12.1 while the faculty in the academic unit had a mean score of 9.8. These scores would characterize the Food and Resource Economics students as field independent learners and the faculty as field dependent learners.

Other notable differences were present in Entomology and Nematology, where the student GEFT mean score was 8.4 and the faculty mean score was 15.5, Forestry and Natural Resources where the faculty mean score was 11.0 and the student mean score was 14.0, and in Plant Pathology where the student mean GEFT score was 13 and the faculty mean score was 8.

Table 2.
GEFT Scores of Faculty Members by Academic Unit (n = 56)

Academic Unit	n	%	GEFT Mean Score	SD
Food Science Health and Nutrition	1	1.8	16.0	0.0
Animal Science	9	16.1	9.7	4.3
Ag. Education and Communication	7	12.5	10.3	3.1
Horticulture	12	21.3	9.3	5.6
Dairy and Poultry Science	4	7.1	13.8	2.2
Food and Resource Economics	4	7.1	9.8	4.6
Soil and Water	1	1.8	16.0	0.0
Agricultural Engineering / Agricultural Operations Management	1	1.8	13.0	0.0
Agronomy	9	16.1	10.7	4.8
Plant Pathology	2	3.6	8.0	2.8
Pre-Veterinary Medicine	1	1.8	12.0	0.0
Microbiology	1	1.8	10.0	0.0
Forestry and Natural Resources	2	3.6	11.0	1.4
Entomology / Nematology	2	3.6	15.5	2.1
Statistics	1	1.8	9.0	0.0
Total	56	100.0	10.6	4.3

* Faculty with scores of 11.4 and greater are considered field independent learners

** Faculty with scores less than 11.2 are considered field dependent learners

The third objective that guided this study was to compare learning styles of students majoring within academic units to the faculty members teaching in those academic units. Of the six academic areas where four or more faculty were surveyed, four had similar faculty and student learning styles (Table 3).

The overall means for students and faculty members also differed. The grand mean for the students was 11.7 which indicated a field independent learning style. Faculty in the College of Agriculture had a grand mean score of 10.6, denoting a field dependent learning style.

Table 3.
Comparison of Faculty and Student GEFT Scores by Academic Area

Academic Area	Student Mean Scores	Faculty Mean Scores
Food Science Health and Nutrition	12.8	16.0
Animal Science	11.4	9.7
Ag. Education and Communication	9.8	10.3
Horticulture	12.1	9.3
Dairy and Poultry Science	11.4	13.8
Food and Resource Economics	12.1	9.8
Soil and Water	14.0	16.0
Agricultural Engineering	12.0	13.0
Agricultural Operations Management		
Agronomy	9.0	10.7
Plant Pathology	13.0	8.0
Pre-Veterinary Medicine	13.6	12.0
Microbiology	12.2	10.0
Forestry and Natural Resources	14.0	11.0
Entomology / Nematology	8.4	15.5
Statistics	---	9.0
Grand Mean	11.7	10.6

* Scores of 11.4 and greater are considered to indicate field independent learning styles

** Scores less than 11.2 are considered to indicate field dependent learning styles

Conclusions

Students from 14 academic majors in the College of Agriculture were represented in this study. The mean GEFT score (11.7) indicates that the students in the College of Agriculture tend to be field independent learners. Student GEFT mean scores between majors varied greatly. While Animal Science majors scored at the national mean (11.4), Agronomy and Entomology/Nematology students scored well below the national average (mean scores of 8.4 and 9 respectively).

Students in Agricultural Education and Communication had a mean score of 9.8 and the faculty in the department had a mean score of 10.3, both scores indicating field dependent learners. This finding seems to support Witkin (1976) in that individuals with field dependent learning styles would seek careers where they would be able to utilize their interpersonal skills. Conversely, both students and faculty in Agronomy fell well into the field dependent learner category, apparently conflicting with Witkins' findings.

While the students tended to be field independent learners, the College of Agriculture faculty can be classified as field dependent learners. Of the six academic units where four or more faculty were surveyed, only the Dairy and Poultry Science faculty were classified as field independent learners (GEFT mean score = 13.8, SD = 2.2). Of the 15 academic units represented, six had faculty mean scores that fell into the field independent learner category.

When comparing student learning styles to faculty learning styles within academic units, several differences were evident. Seven of the academic units had faculty and students with similar learning styles, seven had faculty and students with differing learning styles and one academic unit (statistics) did not have students in the survey for comparison.

Implications

Although the results of this study can only be applied to the purposefully selected sample, several implications arise from this study. It is clear that there are cases where student and faculty learning styles differ. The faculty in the College of Agriculture need to be made aware of these differences and given instructional tools to better meet the needs of students with learning styles different from their own.

Although students and faculty in Agricultural Education conform with the findings by Witkin, et. al. (1976), several academic units do not. Further research is warranted to explore this phenomena.

The GEFT needs to be administered to additional faculty members and students in academic units with low representation in this study. This data is needed to determine if students are indeed attracted to academic units that have faculty with learning styles similar to their own.

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AGRICULTURAL LITERACY OF RADIO STATION NEWS REPORTERS IN OKLAHOMA

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Theoretical Framework and Introduction

The twenty-first century is quickly approaching and with it the continued awakening of public policy issues and environmental awareness as they apply to agriculture. Recently, in the minds of some so-called experts, agriculture has gone from a world resource champion to a world resource destroyer. In some circles, the agriculture industry has become the environmental enemy and will continue to fall under attack unless a different message is conveyed to the public.

Several recent studies have pointed out the lack of understanding Americans have for the agriculture industry. Up until now, most research efforts have focused on the agricultural knowledge levels of teachers, elementary and secondary students and college students. However, as the media continues to gain power and influence over the American public, researchers have begun to look toward the agricultural knowledge levels of those attempting to shape opinion via the media.

Raven (1994) stated that American agriculture has become less appreciated and understood. Raven further stated that today's youth believe that milk comes from the supermarket and that certain food products are less than desirable. Unless properly educated, it becomes difficult for consumers to separate factual agricultural information from false accusations and propaganda induced scare tactics. Therefore, consumers, including policy makers, are likely to fall prey to misleading information about the American Food and Fiber Industry.

This lack of agriculture knowledge is not however, specific to one particular group. It has been found to touch all ages, races and educational levels. This new awareness of agricultural knowledge levels was brought to national attention in 1986, when Horn and Vining completed a study designed to gain a better understanding of agricultural knowledge levels among elementary and secondary public school students in Kansas. The results were clear. Kansas students did not know basic facts, except for very obvious situations.

According to Hillgren (1989), good reporting often requires deeper knowledge than that which can be gained with occasional stories, and good stories go unreported when no one is assigned to keep a close eye on the beat, while newspapers rely on press releases as a major source of tips. Since agriculture has such an important impact on world sustainability, it becomes more important than ever that accurate and factual information be presented to the public.

Agriculture needs an ally. The industry supplying America and much of the world's basic life needs is fighting an uphill battle against an environmentally conscious audience that possess less than enough knowledge to pass judgement on agriculture. "Public impressions of agriculture have been tainted by the actions of special interest groups and information provided through the media" (Lichte & Birkenholz, 1993, p. 15). Additionally, when editors are seldom acquainted with agricultural issues, their direction of agricultural coverage is weak (Hillgren, 1989).

The media often sensationalize stories such as the bst and alar-type scares. However, these are seen in context by people with a basic knowledge of agriculture. Without agricultural knowledge, the resulting damage to the industry is devastating (Tisdale, 1991).

Numerous studies (Horn & Vining, 1986; Frick, Kahler, & Miller, 1992; Terry, Jr., 1994) have shown that Americans do not have an adequate knowledge of agriculture. The term "agricultural literacy" has been coined to describe this knowledge dilemma. Frick, Kahler, and Miller (1992), defined agricultural literacy as the understanding and knowledge necessary to synthesize, analyze and communicate basic information about agriculture. Agricultural literacy is based on the belief that every citizen should possess a minimum level of knowledge of the industry which produces and markets the food and fiber needed for human survival.

Terry, Jr. (1994) targeted television news reporters in Texas concerning agricultural literacy levels. He discovered that while most television reporters like reporting news about agriculture and feel qualified to do so, few have the technical knowledge and understanding to accurately inform the public about the industry.

Purpose and Objectives

The purpose of this study was to determine the agricultural knowledge levels of broadcast news representatives of radio stations in Oklahoma.

The following specific objectives were formulated to accomplish the purpose:

1. Determine the demographic characteristics of broadcast reporters employed by radio stations in Oklahoma;
2 Identify and determine relative levels of agricultural literacy among broadcast news reporters of radio stations in Oklahoma;
3 Determine if a relationship exists in the levels of agricultural literacy between those who have had some form of agricultural education and those who have not;
4 Determine if radio broadcast news reporters feel qualified to report agricultural news and activities;
5. Determine if radio reporters feel a need to report agricultural news and activities to the public.

Methods and Procedures

Population

The population of this study included broadcast news representatives responsible for on-air news at 129 AM/FM radio stations in Oklahoma as listed in the Oklahoma Press Guide. Sixty-nine radio station news reporters/representatives returned useable survey instrument for a 53.5 percent response rate.

Instrumentation

The instrument used to collect the research data was in the form of a two-part questionnaire designed by the researcher and patterned with permission from Terry (1994) and Cox (1994). Part I consisted of 18 forced-response demographic items used to identify professional and personal characteristics of the reporters. Part II consisted of 30 multiple choice questions developed and based upon agricultural literacy elements identified by Frick (1993). The elements selected were: (1) agriculture's important relationship with the environment, (2) processing of agricultural products, (3) public agricultural policies, (4) agriculture's important relationship with natural resources, (5) production of animal products, (6) societal significance of agriculture, (7) production of plant products, (8) economic impact of agriculture, (9) marketing of agricultural products, (10) distribution of agricultural products and (11) global significance of agriculture. Each question was accompanied by five multiple choice answers so as to give the respondent only a 20 percent chance of guessing the correct answer. This section of questions was used to determine agricultural knowledge levels of news reporters.

Pilot tests were administered to 71 Oklahoma State University students enrolled in a radio news writing class in the Oklahoma State University School of Journalism and Broadcasting. In addition, graduate students enrolled in the Department of Agricultural Education's Research Design class also reviewed the instrument for face validity, and clarity of the questions. Reliability of the instrument on Part I, as determined using Cronbach's alpha was 0.76; reliability of Part II using Cronbach's alpha was 0.80.

Collection of the Data

One reporter from each of the 129 radio stations in Oklahoma was selected to receive the survey. If the station did not employ a broadcast news reporter, the survey was sent to the program director. When no program director was available, the survey was then sent to a general manager. Finally, if no general manager was employed by the radio station, the survey was sent to the owner. Essentially, the survey was sent to the person responsible for the radio station's broadcast news reports.

The initial survey was mailed to 129 radio news reporters in early June 1995 accompanied by a descriptive cover letter, a pre-addressed stamped envelope, and an ink pen. At the end of two weeks, a postcard was sent to nonrespondents to remind them to return the survey within the week. Three weeks after the initial survey was mailed to the reporters, another survey, cover letter, and a pre-addressed stamped envelope were sent to nonrespondents. A telephone follow-up was conducted ten days later concerning the remaining non-respondents. The result or the telephone follow-up resulted in no response.

Analysis of Data

Due to the fact that this was a descriptive study to determine levels of agricultural literacy among persons responsible for radio station news reports, measures of central tendency and variability were used to describe the data as well as frequency distributions and percentages. The data were further analyzed to determine relationships, if any, existed between selected demographics of the respondents and the mean number of correct responses (scores) achieved. To accomplish the comparison, a two-group analysis of those having an agriculture background and those not having an agriculture background was performed using the t-test. In addition, a comparison concerning the mean scores of respondents with agriculture majors and non-agriculture majors was conducted. Statistical significance was established at alpha = 0.05.

The number of respondents totaled 69 or a 53.5 percent response rate. Some participants did not provide responses to every survey item. As a result, the value of N (69) varied for each question in the survey.

Results

Objective One

Almost 80 percent (Table 1) of the radio station reporters across Oklahoma were male between the ages of 30 and 45 and grew up in a small town with a population between 10,000 and 50,000. More than half of the radio reporters have bachelor degrees in journalism and nearly three-fourths have reported agriculturally related stories or events. One-fourth of those surveyed covered a non-agriculture beat and only 7.5 percent covered agriculture. In addition, over 69 percent worked in a non-metropolitan market and slightly less than 60 percent completed a college degree.

Objective Two

Absolute standards regarding the agricultural literacy levels could not be defined since knowledge levels required to be considered literate change as time passes (Frick and Spotanski, 1990). Knowledge assessment of the study was pre-tested for validity and reliability at Cronbach's alpha of 0.76, Part I; and alpha 0.80, Part II. Therefore, consideration should be given to the performance of the group as a whole. The mean correct score on the knowledge assessment section (Part II) of the survey was 19.06, while almost 50 percent of the broadcast representatives completed 20 (66.67 percent) or more of the 30 possible responses correctly.

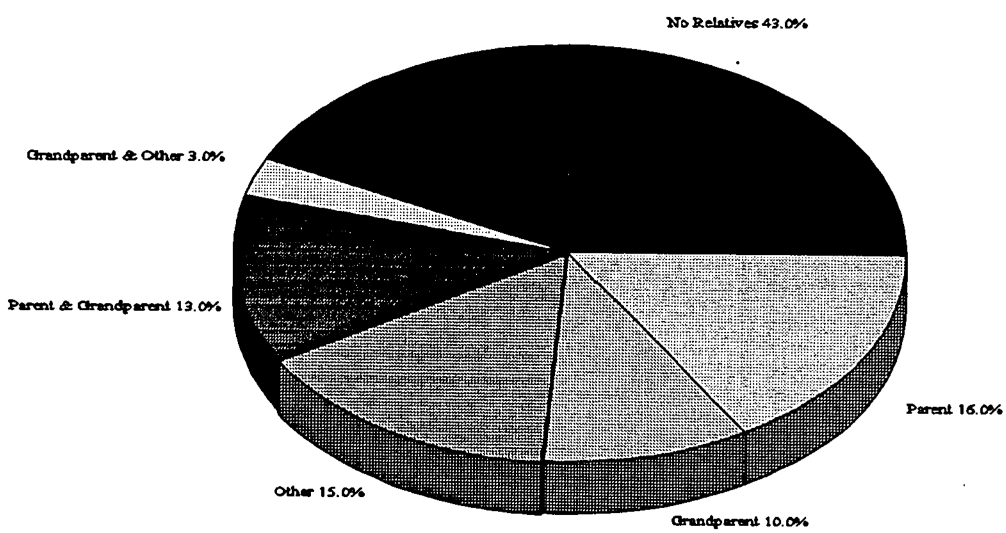
Table 1.
A Distribution of the Respondents by Category of Demographic

Demographic Characteristic(s)	Frequency N=69	Percent (%)
Gender		
Male	55	79.7
Female	14	20.3
Station Market		
Metro Area (>100,000)	21	30.9
Non-Metro Area (<100,000)	47	69.1
Population of Hometown		
Farm or Ranch	5	7.2
Rural, Non Farm	4	5.8
Small Town	7	10.1
Large Town	13	18.8
Small City	18	26.1
Large City	6	8.7
Metro Area	16	23.2
Highest Degree Completed		
High School	18	26.1
Bachelor Degree	36	52.2
Masters Degree	4	5.8
Doctoral Degree	1	1.4
Continuing Education	8	11.6
College Major		
Did Not Attend	7	10.4
Agriculture	1	1.5
Journalism/Communication	40	59.7
Other	19	28.4
Ever Reported An Agriculture Event		
Yes	49	71.0
No	20	29.0
Regular Reporting Beat		
Ag & Related Areas	5	7.5
Non-Ag Area	25	37.3
Get News From Wire Service	23	34.3
Do Not Carry News	2	3.0
Ag/Non-Ag/Wire Service	4	6.0
Ag & Non-Ag Areas	4	6.0
Ag & Wire Service	1	1.5
Wire Service/Do Not Carry News	3	4.5

Objective Three

Figure 1 reveals the number of respondents' relatives involved in agriculture. It was not possible, however, to determine a relationship between agricultural education levels of respondents due to the lack of respondents with an agriculture background. However, consideration should be given to the performance of the agriculture versus non-agriculture college majors. Those with an agriculture college major scored six points higher than those with non-agriculture majors on the knowledge assessment portion of the survey.

Figure 1. RESPONDENTS WITH RELATIVES INVOLVED IN AGRICULTURE



Objective Four

Table 2 showed that almost 70 percent of the radio reporters who responded to this study felt qualified to report agriculture news to the public, while nearly 15 percent did not. However, the t-test indicated no relationship between those that felt qualified and those that did not at the probability level of alpha = 0.05.

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Table 2.
A Distribution of Respondents' Attitudes Toward Reporting Agriculture

Interest, Need and Qualification Characteristic(s)	Frequency N=54	Percent (%)
Did You Feel Qualified to Report the Agriculture Story		
Definitely yes	11	20.4
Yes	26	48.1
Don't Know	9	16.7
No	6	11.1
Definitely No	2	3.7

Objective Five

Ninety percent of the reporters responding to this study felt that there was a need to report agriculture news to the public, while 10 percent did not.

Conclusions

Objective One

The typical radio station reporter respondent in this study was a young adult male who grew up in a small town and was primarily involved in reporting non-agricultural news.

Objective Two

Based on the major findings, it seemed that the representatives/respondents were knowledgeable concerning the basics of agriculture. However, it was apparent that there was little understanding of the technical and policy issues of the industry.

Objective Three

Oklahoma radio station reporters were primarily educated in the liberal arts with little or no agricultural education. It was also evident that the respondent with agricultural training had a higher level of agriculture than his/her counterparts. Furthermore, based on the mean scores of the knowledge assessment section, no apparent relationship existed between those respondents with an agriculture background and those without. In addition, reporters with no ties to agriculture seem to be as knowledgeable about agriculture as those with agriculture backgrounds.

Objective Four

The typical radio station respondent felt qualified to report agriculture news and events even though they had little to no agriculture background or education. However, the respondents apparently perceived the need to report agriculture news and events to the public because of either previous experience and/or current responsibility for agriculture news events/activities.

Objective Five

The typical Oklahoma radio station reporter has had the responsibility at some time for agriculture news stories and/or events and felt a need to report agriculture news stories and events to the public. In addition, the typical radio news respondent also has relatives involved in production agriculture. However, specific relatives were likely to be parents or grandparents. Furthermore, there was no apparent relationship in responses concerning the knowledge assessment between those with relatives in agriculture and those without.

Recommendations

Objective One

Radio broadcast reporters, as major contributors and shapers of public attitudes and opinions, should recognize the importance of maintaining a high level of integrity concerning their knowledge of agriculture. As a group, in-service and/or continuing educational opportunities in agriculture would assist radio broadcasters in providing more accurate and meaningful information to the publics that they serve.

Objective Two

While most radio news reporters in Oklahoma know and have a basic understanding about agriculture and agriculture news, a greater effort should be made to seek educational opportunities about the scientific and technical aspects of the industry.

Objective Three

Based on the major finding that more than 80 percent of Oklahoma reporters in this study had college degrees in areas other than agriculture, yet only 15 of the 69 respondents had taken an agriculture class of any kind, liberal arts programs across the state should include a general agriculture class as a requirement in liberal arts curricula if citizens of Oklahoma are to become better informed concerning agriculture.

Objective Four

Based on the major finding that only 7.5 percent of the radio stations in Oklahoma air agricultural news and 90 percent feel qualified to report agriculture, an increased effort should be made by more radio stations to air agricultural news stories and events. If citizens are to be aware and literate about agriculture and its practices, media groups should make a concentrated effort to provide accurate and meaningful information concerning the industry.

Objective Five

Based on the indicated interest level in reporting agriculture and the perceived need of accurate agriculture news availability, radio station program directors should assign staff reporters to cover agriculturally related stories and events.

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THE INFLUENCE OF INSTRUCTORS' COMPUTER PROFICIENCY ON ACHIEVEMENT AND CHANGES IN STUDENT ATTITUDES IN A WORLD WIDE WEB BASED TECHNICAL WRITING IN AGRICOMMUNICATION COURSE

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Introduction and Theoretical Framework

The use of educational technologies such as computers and telecommunications offers great potential for improving the delivery of high quality instructional programs (McCaslin & Torres, 1992). In the future, our information society projects a world linked entirely by telecommunications (Dyrli, 1993). The World Wide Web (WWW) is currently the most exciting, user friendly, and fastest way to share information on the Internet. A multimedia/hypermedia part of the Internet, the WWW brings a graphical user interface to world wide networking by allowing full integration of color graphics, text of varying typefaces, animation, video and sound (Seguin & Seguin, 1995). Over 24 million people worldwide currently use the Internet, 18 million of whom are in the United States, with the number growing geometrically (Nielsen, 1995; Raven & Settle, 1995).

"Multimedia is a multi-faceted approach to computer based education that brings together text, animation, graphics, video, and audio" (Marrison & Frick, 1994, p.26). Many companies have developed multimedia packages to aid in instruction. However a new innovation is that of hypermedia. Hypermedia, as an information presentation and representation system, has four advantages: nonlinearness, associativity, flexibility, and efficiency (Liu, 1994). Hypermedia differs from traditional instruction because there is no specific sequence for proceeding from one point to another (Liu, 1994). Therefore learners are able to choose their own ways of pursuing the content. Because of its ability to present information through text, graphics, audio, and video, hypermedia holds much potential for optimizing learning (Liu, 1994).

Numerous universities throughout the country have on-line classes, with the number of hypermedia-based course materials and lessons being placed on home pages increasing (Raven & Settle, 1995). These classes provide students with an additional supplement to the classroom experience in the form of a class Website. Students are able to access assignments, reading materials, quizzes, videos, graphics, audio, slide presentations, and other useful information. In agriculture, however, very few professors have courses on-line at the present time (Newman, Terry, & Raven, 1995).

"A continual dilemma experienced by educators is how to respond to the changing face of society and stay focused on the impacts technology could have in the teaching and learning process" (Marrison & Frick, 1994, p.26). Because the World Wide Web is such a new medium, little information exists on the effectiveness of courses taught using the Web. Some benefits include improving students' computer abilities and information processing abilities, providing students with teachers' lecture materials, and providing students with links to related information so they can study the subject matter in more depth (Newman, Raven, & Day, 1995; Newman, Terry, & Raven, 1995).

Providing on-line course materials such as lecture notes may increase the connection between the class and other course content (Butler, 1995). Further, supplying good on-line documentation of course content may increase how students use other course materials such as textbooks (Butler, 1995).

According to an Australian study, the use of hypertext showed no evidence of increasing teaching effectiveness. In the same study, however, students enjoyed learning from the World Wide, and using a class web page increased the efficiency of the instructor in disseminating information (Hart, 1995).

Student Achievement and Attitudes

According to Chinien and Boutin (1994), changes in instructional materials and methods should be evaluated in terms of achievement, study time, and attitude toward the course material. In an experimental study of computer-assisted instruction in mathematics, Ganguli (1992) found that the CAI instruction group experienced higher enjoyment, more motivation, and better understanding of the concepts in the course. In a college chemistry course, subjects taught using a computer simulation scored better than students taught using the traditional lecture method and the learning cycle method (Jackman, Moellenberg, & Brabson, 1987).

Researchers have differed in their findings, however, when studying student attitudes toward the computer as an instructional tool. Some researchers have found that giving students the opportunity to use computers in instruction increases their attitudes toward using the computer (Kinzie, Delcourt, & Powers, 1994; Busch, 1995). Other researchers have concluded that students' attitudes may either increase or decrease with more experience (Weil, Rosen, & Wugalter, 1990; Campbell & Williams, 1990).

Problem Statement

The World Wide Web is a new innovation that only recently has been used as an instructional tool. Consequently, there is no literature regarding the influence of the instructors' computer proficiency on student achievement and attitude in a course that has a computer-based component, such as the World Wide Web. Newcomb, McCracken, and Warmbrod (1993) stated the knowledge and skill of the teacher is the key to the process of learning. Additionally, Newcomb et al. (1993) argued that teachers must have pedagogical and technical competence in order to effectively direct the learning process and maximize student achievement. Newcomb et al. (1993) concluded that teachers must continually update their knowledge and skill in both pedagogical and technical areas in order to remain effective teachers. Should instructors learn how to use the World Wide Web and other information technologies in order to remain effective instructors?

Browsers such as Netscape are software packages that are used to access the World Wide Web. These browsers utilize a graphical user interface (GUI) and help make the Internet friendly for the typical user (Raven & Settle, 1995). Does the advent of these user-friendly software packages make it easier for instructors with limited computing proficiency to teach courses that are supplemented with the World Wide Web? Or does the instructor need some training on how to use these new technologies prior to using them in the classroom? If the instructor has little prior experience with these technologies how will this influence the students' achievement in the course and their attitudes? Newman, Raven, and Day (1996) stated that research is needed to determine the influence of instructors' familiarity with new information technologies on their instruction.

Purpose

The purpose of this study was to determine the influence of instructors' computer proficiency on student achievement and attitudes in a three-credit hour, World Wide Web (WWW) based technical writing in agricommunication course. The instructors taught the course using the World Wide Web to supplement classroom instruction and to provide time to offer a laboratory. One instructor was an proficient user of computers and the Internet while the other instructor's computer proficiency was limited. To accomplish the purpose, two research hypotheses were developed:

H_1: Students in the WWW based AEE 3203 - Technical Writing in Agricommunication taught by the computer-proficient instructor will have higher group means on the major class project than those taught by the instructor with limited computing proficiency.

H_2: Students in WWW based AEE 3203 - Technical Writing in Agricommunication taught by the computer-proficient instructor will have higher means than those taught by the instructor with limited computing proficiency on the following attitude scales:

a. Attitude toward writing,
b. Attitude toward learning about writing,
c. Attitude toward computers, and
d. Attitude toward the Internet.

Methods

To determine the influence of instructors' computer proficiency on students' achievement, a static group comparison quasi-experimental design was used (Borg & Gall, 1989). According to Campbell and Stanley (1966), this design does not control for selection, mortality, or interaction of selection and maturation as threats to internal validity. To determine the influence of instructors' computer proficiency on student attitudes, a nonequivalent control group quasi-experimental design was used (Borg & Gall, 1989). Campbell and Stanley (1966) stated that this design controls all the major threats to internal validity except for interaction of selection and maturation.

Population and Sampling

The population of the study consisted of 58 undergraduate students at Mississippi State University enrolled in AEE 3203, Technical Writing in Agricommunication during Fall semester, 1995. AEE 3203 is a technical writing course for juniors and seniors in the College of Agriculture and Home Economics. Twenty-eight students registered for Section 1 of the class and 30 students enrolled in Section 3 of the class. One student dropped from Section 1 and three students dropped from Section 3 during the semester.

Students in both sections participated in a "Web-supported class" (Newman, Terry, & Raven, 1995). Students in both sections attended 100 minutes of class sessions and 50 minutes of laboratory each week. The primary media used by the computer-proficient instructor in the class sessions were computer-generated slides using a computer, overhead projector, and LCD projection panel. The non-computer-proficient instructor primarily used transparencies for his class sessions.

The laboratory consisted of assignments based on each week's class sessions which the students completed in a computer laboratory under the supervision of the course instructor. Some assignments could be completed in the laboratory, but others required students to continue to work on the assignments outside of regular class time. Students could turn in these assignments using electronic mail. Students purchased the course textbook but did not purchase the handout materials. All supplemental course materials, including regular and laboratory assignments, were provided on the AEE 3203 home page on the World Wide Web (URL: http://www.msstate.edu/Dept/AgEdExp/3203/). In addition, all of the computer-generated slides used in the class sessions were available to students in both sections via the AEE 3203 home page. Each student completed seven major assignments for the class: a review of a journal article, a memorandum, a business letter, a letter of application, a press release, a technical report (about a subject in their field), and an oral presentation about the technical report. A midterm and final examination also were given.

The AEE 3203 home page consists of links to twelve units for technical writing in agricommunication. A typical unit includes lab assignments, regular assignments, score sheets, reading assignments, links to other sources, content not provided in the textbook, slides from lectures, and examples of good and bad assignments from previous semesters.

Description of Treatments

The computer-proficient instructor who was in charge of Section 1 designed and developed the Website for the course. The computer-proficient instructor also teaches a computer application course, is proficient in the use of the MS-DOS/Windows, MacOS, and Unix operating systems, and is an accomplished user of WordPerfect 6.1 and Netscape. The non-computer-proficient instructor in charge of Section 3 had never used the WWW prior to the beginning of the semester and was unfamiliar with the MS-DOS/Windows environment. He was proficient with WordPerfect for Macintosh.

Instrumentation

The major class project, a technical report, was used to determine students' achievement. The technical report accounted for 25% of their course grade. The technical report was to be written following the guidelines set forth in Writing for Technicians (Barnett, 1987), the textbook for the course, and on the class Website. Each technical report was graded by the researchers using a standardized rating scale that incorporated the criteria presented in the class, in the text, and on the Website. The inter-rater reliability among the researchers was over 95% agreement.

To measure the attitudes of the students toward writing, learning about writing, computers, and the Internet, the researchers developed semantic differential instruments. Each instrument contained 10 sets of bipolar adjectives with a seven-place scale between for students to indicate where their feelings existed. All four instruments contained the same 10 sets of adjectives.

Reliability estimates for the semantic differential instruments was obtained through use of a pilot test. The pilot test was conducted during a Summer 1995 session of AEE 3203--the same class used for this study. Obtained reliability estimates were as follows: computers-.96, writing-.81, the Internet-.84, and learning about writing-.87. Since the groups were not randomly assigned student attitudes were measured on the first day of class and the last day of class.

Statistical Analysis

For the purpose of statistical analysis, the researchers treated the students in the study as a sample of possible students who might enroll in the course (Allen, Abaye, McKenna, & Camp, 1995). Based on this approach, inferential statistics were used in the analyses. The following null hypotheses were tested at the *a priori* alpha level of .05:

$H1_o$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group means on the major class project between students taught by the computer-proficient instructor and those taught by the non-computer-proficient instructor.

$H2_o$: For students in AEE 3203 - Technical Writing in Agricommunication there will be no differences in group means on the following attitude scales between students taught by the computer-proficient instructor and those taught by the non-computer-proficient instructor:

a. Attitude toward writing,
b Attitude toward learning about writing,
c Attitude toward computers, and
d. Attitude toward the Internet.

An analysis of variance was used to determine the difference between group means on the technical report. This statistic is appropriate when determining the differences between two independent groups on one dependent variable (Borg & Gall, 1989). An analysis of co-variance was used to determine if the students were different on each attitude scale.

Results

Hypothesis 1

Section 1, the group taught by the computer-proficient instructor, had a mean of 225.3 out of a possible 250 points on the technical report. Section 3 , the group taught by the non-computer-proficient instructor, had a mean of 186.7 (see Table 1). The analysis of variance yielded a significant F-value, indicating the group means were significantly different. The null hypothesis was rejected.

Table 1.
Comparison of Group Means for Achievement (N=54)

Group	n	Mean	F	Significance
Computer-proficient Instructor	27	225.3	36.2	.0000
Non-Computer-proficient Instructor	27	186.7		

Hypothesis 2

An analysis of variance was conducted for each of the attitude scales using the pretest as the covariate. Tables 2 and 3 summarize the data for students' attitude toward writing. Students' attitudes toward writing increased in both sections during the semester. However, there was not a statistically significant difference in attitudes toward writing between students' taught by the computer-proficient instructor and students taught by the non-computer-proficient instructor.

Table 2.
Pretest and Posttest Means of Students' Attitudes toward Writing (n=47)

Group	Pretest	Posttest	
		Adjusted	Unadjusted
Computer-proficient Instructor	46.3	47.4	48.6
Non-computer-proficient Instructor	43.8	48.4	47.4

Table 3.
Analysis of Covariance of Students' Attitude toward Writing: Posttest Scores with the Pretest as the Covariate (n=47)

Source	SS	df	MS	F	p
Covariate (Pretest)	2982.3	1	2982.3	88.1	.000
Instructor	12.1	1	12.1	.4	.553
Residual	1489.1	44	33.8		
Total	4484.8	46	97.5		

Tables 4 and 5 summarize the data for students' attitude toward learning about writing. Students' attitudes toward learning about writing increased in both sections during the semester. However, there was not a statistically significant difference in attitudes toward learning about writing between students' taught by the computer-proficient instructor and students taught by the non-computer-proficient instructor.

Table 4.
Pretest and Posttest Means of Students' Attitudes toward Learning about Writing (n=47)

Group	Pretest	Posttest	
		Adjusted	Unadjusted
Computer-proficient Instructor	47.1	48.8	48.4
Non-computer-proficient Instructor	47.8	50.5	50.8

Table 5.
Analysis of Covariance of Students' Attitude toward Learning about Writing: Posttest Scores with the Pretest as the Covariate (n=47)

Source	SS	df	MS	F	p
Covariate (Pretest)	2615.2	1	2615.1	56.1	.000
Instructor	32.8	1	32.8	.7	.406
Residual	2052.7	44	46.6		
Total	4729.1	46	102.8		

Tables 6 and 7 summarize the data for students' attitude toward computers. Students' attitudes toward computers increased in both sections during the semester. However, there was not a statistically significant difference in attitudes toward computers between students' taught by the computer-proficient instructor and students taught by the non-computer-proficient instructor.

Table 6.
Pretest and Posttest Means of Students' Attitudes toward Computers(n=47)

Group	Pretest	Posttest	
		Adjusted	Unadjusted
Computer-proficient Instructor	45.5	5.32	5.25
Non-computer-proficient Instructor	47.9	50.1	50.7

Table 7.
Analysis of Covariance of Students' Attitudes toward Computers: Posttest Scores with the Pretest as the Covariate(n=47)

Source	SS	df	MS	F	p
Covariate (Pretest)	1419.8	1	1419.8	14.6	.000
Instructor	112.4	1	112.4	1.2	.287
Residual	4260.6	44	96.8		
Total	5716.9	46	124.3		

Tables 8 and 9 summarize the data for students' attitude toward learning the Internet.Students' attitudes toward the Internet increased in both sections during the semester. However, there was not a statistically significant difference in attitudes toward the Internet between students' taught by the computer-proficient instructor and students taught by the non-computer-proficient instructor.

Table 8.
Pretest and Posttest Means of Students' Attitudes toward the Internet (n=47)

Group	Pretest	Posttest	
		Adjusted	Unadjusted
Computer-proficient Instructor	41.0	54.1	53.8
Non-computer-proficient Instructor	41.9	54.3	54.7

Table 9.
Analysis of Covariance of Students' Attitudes toward the Internet: Posttest Scores with the Pretest as the Covariate (n=47)

Source	SS	df	MS	F	p
Covariate (Pretest)	2877.0	1	2877.0	33.5	.000
Instructor	.3	1	.3	.003	.995
Residual	3782.2	44	86.0		
Total	6667.9	46	145.0		

Discussion

Conclusions

Students who were taught by the computer-proficient instructor achieved at a higher level than those students who were taught by the non-computer-proficient instructor. A possible explanation for this result is perhaps the computer-proficient instructor was able to spend more time in lab helping students with their writing because of his familiarity with the programs whereas the non-computer-proficient instructor spent more time in lab becoming familiar with the programs. Additionally, the computer-proficient instructor generated and used a computer generated slide show for every classroom presentation whereas the non-computer-proficient instructor used traditional overheads. Even though both classes had access to the presentations from the Website the computer-proficient instructor's class was probably more likely to take advantage of them since they were familiar with them. Furthermore, the computer-proficient instructor used a projection panel and overhead when teaching the laboratories whereas the non-computer-proficient instructor did not even though one was available. Perhaps as a result students taught by the non-computer-proficient instructor did not learn how to navigate the WWW as quickly and/or as well as the students taught by the computer-proficient instructor which was reflected in their technical reports.

There were no differences in students' attitudes toward writing, learning about writing, computers, and the Internet between students taught by a computer-proficient instructor and those taught by a non-computer-proficient instructor. Instructors' computer proficiency did not influence students' attitudes toward writing or computers. Students' attitudes toward writing, learning about writing, computers, and the Internet increased during the semester in both sections. Perhaps why there was no difference in attitude between the two sections is that both classes had to write the same assignments, were taught the same content in the same sequence, had to complete assignments using computers, were forced to obtain class content off the class Website, and had the same laboratories. As a result the influence of the instructors' computer proficiency on students' attitudes was negated as students used and became more familiar with these technologies.

Recommendations

The researchers recommend that instructors who teach future sections of AEE 3203 - Technical Writing in Agricommunication at Mississippi State University should be provided inservice education on how to use Netscape, navigate the WWW and how to incorporate the WWW into their teaching. Specifically a computer-proficient instructor should teach all of the labs to the non-computer-proficient instructors and show them how to navigate the class Website. Additionally, all instructors should be provided with inservice education on how to create classroom presentations using a presentation package (e.g. MicroSoft PowerPoint), how to use the instructional computing station in the classroom, and how to place their computer generated presentations on the class Website for student use. Furthermore, all instructors should be provided with the necessary technology to teach this course. This includes a desktop machine capable of accessing the WWW; necessary software such as Netscape, WordPerfect 6.1, PowerPoint, and Acrobat Exchange; access to a projection panel and high lumen overhead, and a computing teaching station. These recommendations will be implemented beginning with the Fall Semester, 1996.

Researcher Concerns

The threat of selection was a concern to the researchers on the first hypothesis due to the static group comparison design. However, analysis of the pre-test attitude scores showed that the groups were equivalent on this measure. Therefore, the researchers concluded that selection was not a serious threat to the internal validity of the study.

Another possible threat to internal validity was mortality. However, the four students that dropped from the course did so early in the semester, one from the section taught by the computer-proficient instructor and three from the section taught by the non-computer-proficient instructor. This is a common occurrence as students adjust schedules to fit changes in other classes and work hours. It is unlikely that any of these students dropped because of the instructor's computer proficiency or lack of proficiency.

Maturation and selection-maturation interaction were also possible threats to interaction. However, given the relatively short duration of the study (16 weeks) and that this is the standard length of a semester course the researchers concluded that maturation and selection-maturation interaction were not serious threats to the internal validity of the study.

There is a need to replicate this study with the same instructors in order to determine if the difference between groups decreases as the non-computer-proficient instructor becomes more familiar with these information technologies. More research is needed to further explain the effectiveness of the World Wide Web as an instructional technique. The Web is a fast-growing medium and there is little research that has focused on the using the Web for college-level instruction. The results of this study cannot be generalized to other populations or other subject matter.

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A COMPARISON OF COGNITIVE PERFORMANCE OF DISTANCE AND RESIDENT CLASSROOM AGRICULTURAL EDUCATION GRADUATE STUDENTS

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Introduction

Daniel (1984) indicated that distance education is an emerging means to deliver instruction and educators who use distance education must provide educational experiences that will equal resident education in terms of both quality and quantity. Both resident and distance education are intended to provide the student with valid, useful information that will promote learning. Resident education occurs when the instructor and students meet at a predetermined location, thus providing easy interaction. Distance education has been accepted as teaching when the instructor and students are physically separated in terms of location. The instructor can be in different buildings, cities, counties, states, or even countries. According to Barker, Frisbie, and Patrick (1989), distance education refers to "the simultaneous telecommunicated delivery of instruction from a host site or classroom to distant sites, coupled with live audio and/or video interaction between teacher and student(s)--not to correspondence study" (p. 21).

Garrison and Shale (1987) indicated that advancements in communications technology have dissolved some of the distinguishable characteristics between distance and traditional resident education. According to Smith and Kelly (1987), methods of teaching at a distance and resident education are beginning to converge because traditional teaching methods are being abandoned or modified in favor of a resource-based approach that de-emphasizes the teacher as the main source of knowledge. In 1973, Moore analyzed resident and distance education and developed a framework for determining the relationship between the two methods of instruction. He also noted that developing technology will eventually merge distance education with the traditional approach so that distinctions cannot be made between the two methods. However, Kelly (1990), indicated that the transition from resident classroom teaching to distance education requires educators to develop new skills in instructional methods, teaching techniques, timing, teacher/student interaction, feedback, printed supplement materials, and evaluation.

Souder (1993) compared distance learners and tradition resident learners. The distance learners performed better than the resident learners on several dimensions, which include exams and homework assignments. This finding was attributed to the extraordinary commitment and high maturity and motivation of the distance learner. However, this finding is contrary to other evidence that distance learners are at a disadvantage in their learning experience, especially evaluation of their cognitive performance (DeLoughry, 1988; Moore and Thompson, 1990).

The increasing availability of telecommunications has also provided agricultural education faculty with unique opportunities to plan and deliver distance education courses and programs. Agricultural education students are also enrolling in more distance learning courses and programs due to availability, time, and place.

However, there is a lack of studies that compare the cognitive performance of agricultural education students receiving instruction via distance learning versus those students receiving the same instruction through the traditional resident classroom setting.

Purpose and Hypothesis

The purpose of this study was to test the hypothesized difference between the cognitive performance of agricultural education graduate students in the same room as the instructor and the cognitive performance of agricultural education graduate students who were physically separated from the instructor. The study was guided by the research hypothesis:

H_1: Agricultural education graduate students who are in the same room as the instructor will achieve a higher score on the posttest than agricultural education graduate students who are physically separated from the instructor.

Methods/Procedures

The target population for the study was agricultural education graduate students at Mississippi State University (MSU). The accessible sample consisted of agricultural education graduate students enrolled in *Agricultural and Extension Education 8803 -- Applying Research Methods to Agricultural and Extension Education* (AEE 8803) (n=9). Caution should be exercised when generalizing the results beyond the accessible sample.

The study followed a quasi-experimental nonequivalent control group design (Campbell and Stanley, 1963). The course AEE 8803 was taught to two groups of agricultural education graduate students at MSU. The control group (n_o=5) consisted of graduate students who were in a resident classroom on the campus of MSU with the instructor. The treatment group (n_x=4) consisted of graduate students who were at a distance, physically separated from the instructor and in-resident students. These students were located approximately 130 miles away on the campus of a community college. The instructor and in-resident student group (control group) were linked to the students at a distance (treatment group) through a compressed video teleconferencing system.

Characteristics of compressed video teleconferencing include real-time two-way audio and video between sites, site specificity, ability to link to multiple sites, and utilization of multiple phone lines, fiber optics or cable. The Community College Network (CCN) in Mississippi links the resident classroom at MSU with 16 community college campuses in the state. However, for the purpose of this study, only one distance site was used. The compressed video teleconferencing system used in the study also provides a computer link to the system that was used to display information via transparencies, notes, and handouts.

The strengths of compressed video teleconferencing include the ability for all participants to see and hear each other, the simulation of a classroom setting, easy transmission of visuals, minimal technical support at the time of delivery, and the ability to videotape for future use. Compressed video was not originally designed for large groups and this is one of its weaknesses. Additionally, the use of compressed video requires strong instructor facilitation skills and requires participants to be in a specific place at a specific time.

The course provided 45 clock hours of instruction and assignments focused on basic educational research as it applies to agricultural and extension education. The instructor had previously taught the course. Assignments included five exercises, three quizzes, three research article critiques, and a final exam. The final exam was used as the posttest. Both groups received instruction and assignments simultaneously.

One week before the first class session, the students in each group were contacted and ask to participate in the study. After agreeing to participate, each student was given a pretest that consisted of 40 multiple choice items related to research methods in agricultural and extension education. The students were also informed that the same test was being administered to both groups (resident and distance). At the completion of the course, the students were administered a posttest (final exam), which also consisted of 40 multiple choice items. Both groups received the same posttest. The pretest and posttest were developed by agricultural educators that teach research methods. Both tests have been used as finals in previous years at a different university and contained questions related to the entire course content. The pretest had a Cronbach's alpha of .88 and the posttest had a Cronbach's alpha of .91.

Analysis of Data

The posttest was hand scored by one of the researchers. All data were analyzed utilizing the SPSS/PC+ computer program. The alpha level was established a priori at .05.

The null hypothesis tested was: H_0: μ_o (adjusted) = μ_x (adjusted)

The research hypothesis was: H_1: μ_o (adjusted) > μ_x (adjusted)

Analysis of covariance (ANCOVA) was used to test the null hypotheses. ANCOVA was used to statistically equate the control and treatment groups to control threats to internal validity. The pretest was used as a covariate, which was taken before the treatment was applied and is related to the dependent variable (posttest scores).

Results

Table 1 presents the mean pretest scores and the mean unadjusted and adjusted posttest scores. The pretest mean score of the distance students at a distance (treatment group) was 47.0. The resident students (control group) had a pretest mean score of 47.2. The mean unadjusted posttest score of the treatment group was 73.5 while the adjusted mean was 73.4. The mean unadjusted posttest score of the control group was 79.2 while the adjusted mean was 79.2. The overall posttest mean of the total population was 76.6.

Table 1.
Pretest and Posttest Means of Distance and In-Resident Students

Group	n	Pretest	Posttest	
			Adjusted	Unadjusted
Distance Students	4	47.0	73.4	73.5
In-Resident Students	5	47.2	79.2	79.2
Total	9	47.1	76.3	76.3

Table 2 displays summary statistics for the analysis of covariance of the posttest with the pretest as the covariate. The null hypothesis was: There is no difference in posttest scores between distance and in-resident agricultural education graduate students in the research method course. The ANCOVA was used to test the null hypothesis resulting in a F of 4.6 (p=.076). Therefore, the null hypothesis was retained as a tenable possibility. There was not a statistically significant difference between distance and in-resident students in their posttest scores.

Table 2.
Analysis of Covariance: Posttest Scores with the Pretest as the Covariate

Source	Sum of Squares	df	MS	F	p
Pretest (Covariate)	3.14	1	3.10	.20	.673
Posttest (Treatment)	72.64	1	72.64	4.60	.076
Residual	94.67	6	15.78		
Total	170.00	8	21.25		

Conclusions, Implications and/or Recommendations

Based on the data collected in this study, there were no significant differences in the cognitive performance of students who received graduate level instruction in agricultural and extension education instruction through the traditional resident classroom method versus receiving the instruction via distance learning. Students were able to achieve at the same cognitive level as measured by the course final regardless of learning via the compressed video teleconferencing or actually receiving instruction in the traditional resident classroom setting. However, these results should be generalized past the study due to the small sample size and the quasi-experimental design of the study. Therefore, ideally this study should be replicated with a larger sample size. In lieu of larger sample sizes, it should be replicated with available student numbers to determine if the results can be duplicated.

The students that received instruction via the compressed video teleconferencing achieved at the same cognitive level yet saved time and money in terms of travel. Additionally, the savings in time provided these students an increased opportunity to enroll in and complete the course. The use of this technology allowed an instructor to reach larger audiences. Many of the students who took the course off campus would not have enrolled if they had to travel. The ability for agricultural educators to reach larger audiences is a major incentive for planning and delivering distance education courses and programs (Jackson, 1993).

As new information technologies are increasingly used in distance education it is important that student performance be evaluated to ensure that they are receiving an education that is comparable or better than traditional instruction. Additionally, the findings of this study are different from both Souder (1993) who found distance students at an advantage and Moore and Thompson (1990) who found distance students at a disadvantage. Information technologies such as compressed video teleconferencing are expensive solutions for conducting distance learning. Consequently, it is crucial that the efficacy of this instructional technology is educationally sound. Therefore, there is a need to continue to compare the cognitive achievement of distance learners and learners in traditional settings.

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COMMUNITY PERCEPTIONS OF A LOCAL AGRICULTURAL EDUCATION PROGRAM

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Introduction and Theoretical Framework

The agricultural education program fills many roles in a local community. In addition to being an educational program, it often serves as a focus for social and leadership development activities for both its enrollees and many others with whom it has contact in the community. While the community expects the agricultural education program to fulfill each of these roles, it must fulfill its primary role -- education of youth -- with excellence. At times, it may appear to be difficult for citizens within a community to distinguish which role is most critical. This difficulty was expressed for the larger school by Taylor,

> We Americans expect much from our schools. We expect them to capacitate youth with basic skills, transmit the cultural heritage, prepare people for work, assure adequate health habits, instill the essential capacities to participate as a citizen in a democratic society, to become safe drivers, and to deal with the issues such as consumerism, sex and marriage, and differing values and attitudes, to name a few. Schools mirror our society. We ask them to fulfill the dual and seemingly contradictory roles of preserving and unifying our society, and at the same time, transforming it. It is not surprising in a pluralistic society, such as ours, that there are different views regarding what the schools are to achieve, how well they are doing, and the appropriateness of their relative emphases and likely future directions. (Taylor in National Commission on Secondary Vocational Education, 1984, p. v)

In a 1991 search for institutional factors which contribute to excellence in education, Wardlow and Swanson noted that the American educational system is a dynamic and continually evolving enterprise. Society continually exerts strong influences on the system to meet the demands of society. These influences are often conflicting. Vocational and agricultural education has long been a part of the American educational system and, thus, has faced these issues. This study represents one community's attempt to describe and understand the status of its agricultural education program.

Purpose and Objectives

This study sought to develop an understanding of the perceptions held by citizens of a rural community regarding the agricultural education program in their local school. Specifically, it sought to identify and interpret the perceptions held by community members of:

1. the overall quality of the school system,
2. the quality of the high school and its programs, and
3. the quality of the agricultural education program.

Methods and Procedures

The researcher met with school administrators and collectively determined that a formal questionnaire would not adequately address the nature of the question under study. Since the development of an understanding of the feelings held by citizens regarding their school and its agricultural education program was sought, it was determined that person-to-person interviews would be preferable in order to solicit detailed responses from community members. However, interviews allow for interviewer bias through predetermined questions. It was decided that non-directive group interviews, conducted by an objective third party, would allow participants to develop shared insights into the question under study. It was determined that focus group interviews (Krueger, 1988) should be conducted with several groups of community members.

This study utilized a naturalistic research design in which focus group interviews were used to elicit responses from individuals in small group settings. A representative of the school system and the researcher identified several community groups from which to solicit participation. Individuals within each group were identified by two means: some were randomly selected to ensure a variety of responses, and some were purposively selected to ensure representation of a wide range of alternative views. There was a total of 82 participants. The following groups were represented (numbers of participants by group represented in parentheses, some individuals represented more than one category):

1. Retired citizens (12)
2. Agricultural industry, including farm owners/operators, and agribusiness managers and employees (8)
3. Local business and industry, including business owners, managers and employees, both professionals and nonprofessional (22)
4. School personnel, including a bus driver, a cafeteria worker, a retired administrator, and teachers (8)
5. High school students, including 9th grade (3), 10th grade (3), 11th grade (3), and 12th grade (4)
6. Parents of both current students and graduates (18)
7. City and county public officials (5).

Six focus group interviews were conducted with approximately 10 to 15 subjects per group. Five of the interviews were conducted in a neutral location in the community, the community room at the local bank. The interview with the high school student group was conducted at the school. The interview sessions were a minimum of 90 minutes in length. The interviews were conducted by the researcher, who served as moderator, with an assistant who served as recorder. All interviews were audio-recorded and later transcribed.

The interview protocol questions, which were developed jointly by the researcher and the high school principal, were based on the specific interests of the school personnel regarding their agricultural education program and on literature related to school effectiveness. The transcriptions of the interviews were reviewed by the researcher to identify consistent themes among the subjects' discussions, and to identify representative comments to represent those themes.

The findings were organized according to the original interview protocol which begins with general questions about the quality of the school within the community context and moves toward specific questions about the agricultural education program. According to Krueger (1988), focus group questions should be arranged in a sequence that seems logical to participants. He explained, "The most common procedure is to go from general to specific -- that is, beginning with general overview questions that funnel into more specific questions of critical interest" (p. 66). The findings included in this report are illustrated by typical participant comments, which serve as interpretive research data. The comments are representative of a consensus of group opinion, unless specifically noted. The reader should note that, in order to maintain the integrity of the data, the direct quotes of the participants have not been edited for grammar or writing style.

The school district under study is located in a rural community in the South central U.S. The population of the town is approximately 6,000 and the school averages approximately 120 students per grade level. Key industries include production agriculture and agribusiness, and light manufacturing. A two-year college exists in the community.

Findings

Overall Perceptions of the School System

Participants from all focus groups were generally very pleased with the overall quality of the school system. However, many were quick to point out areas for which they perceived the need for improvement. Representative comments about the school system included,

> I think there is no doubt that (XXXXX) has an excellent school.
>
> I think they're doing real good [sic].
>
> I think they are doing very well in certain areas, without question.

Some participants were concerned for maintaining academic standards that are comparable to State and National standards, and noted that graduates compete in the education and work place arenas with individuals from many other systems.

> ... one of the handicaps of all students at a school like the size of (XXXXX), ... (is that students) suffer from lack of competition. ... I don't know if we have moved our standard of excellence up high enough so it is in competition with the outside.

Several participants agreed with an employer who felt that the school system was a factor in attracting people to the community.

> What I hear when we hire people, they can't wait to get their children into the school system because they've heard nothing but positive things. There is something very unique about the (XXXXX) school system.

When asked about the quality of the school, some participant responses were based on the assumption that the mission of the school is to prepare students for higher education. Not all participants agreed with this assumption.

> We had several students who have gone on to higher education. They do an excellent job if kids want to learn.
>
> But, I do think we put too much emphasis on preparing a kid for college.... ... it seems they're pushing kids down around the seventh and eighth grades now to specialize. I think some of the basics are missed if you try to get a child that is in the seventh grade to try to determine what he's going to be when he grows up....

One participant astutely observed that the school and the community are inextricably linked.

> I feel like (XXXXX) has one of the finest school systems in the State. I have heard several teachers comment, "I wouldn't go anywhere else to teach," because (XXXXX) is (XXXXX). It's not so much the school, but the area we live in. ... The school is the pulse of the community.

Perceptions About the Quality of Programs in the School

Participants were asked to comment on the quality of individual programs in the school. While no programs were specifically identified in this question by the interviewer, participants identified several with both positive and negative observations. Those for which there was some degree of consensus are noted. Overall, they were satisfied with the quality of programs offered by the school, particularly the attention to college preparation.

However, there was concern for the preparation of non-college bound youth. This concern was for their preparation in "the basics," as well as in preparation for work.

> I think as a parent who had children go through the school, they prepared our college students very well. I think we need more -- and you may have it now, I don't know -- but more training that's not college bound.
>
> If we were weak in anything, it would be math and science.
>
> I'm speaking as an employer. At one operation, we have a problem with the basics with our employees. Reading is number one, being able to read and comprehend. Arithmetic, basic arithmetic like what I had as a child, two and two is four, a large problem with that.
>
> .... one of the things that's not really stressed is really digging out information on your own and learning how to study.

Without solicitation and regardless of the make-up of the group, many positive comments were made about the agricultural education program in several of the groups. These comments will be included in the section on the agriculture program later in this report.

There were discussions on which programs were most visible within the larger community. Group consensus placed sports, band, and the FFA as the most visible. Many participants reflected on the positive value of educational programs which extend beyond the normal school day.

> I am glad to see... the FFA, GCE, CCE put them (the students) into the community and interact with other people and the real world. It's not just baloney. I'm glad to see with the FFA, they have started attending state functions and this type of thing with the instructor that we've got now. ... this is something that the kids, that gives them a little extra to go on.

Participants were asked to identify which programs need more emphasis. There was a high level of consensus that the agricultural education program deserved more emphasis.

> I think the agriculture program needs more emphasis. It's just that they're kind of slighted, or whatever.
>
> Stuck off over in a corner.
>
> If it weren't for agriculture, this town wouldn't exist.

Perceptions of the Value of Vocational Education

A consensus was easily obtained in each focus group on the value of providing educational programs that prepare students for something other than, or in addition to, the pursuit of a college education after high school. There was a general consensus across all groups for strengthening vocational education.

> Right now I have young people working for me that are high school graduates that are making $60,000 a year. They are not college material, but they are priceless in their own line.... I think its astounding, the work ethic that was established in this school system is very evident.

> The vocational end should be strengthened considerably. We must recognize that not all folks are going to college.... ...whether it be in the agricultural end, machinery, welding, whatever it is.... ... there should be some way to teach these folks how to make a living once they get out of high school.

> I think in general, the vocational programs need more emphasis. Out of 100 to 150 kids that are going to graduate each year, how many are going to go to college? I don't know what the percentage is, but there are a lot of kids that need something besides college prep. I'm not sure we are providing them in a vocational area with what they really need to go out and get a job.

> College graduates, if they don't have vocational training, they're out of luck. I would prefer to hire an engineer with a little practical experience that one who has a degree. I would prefer one who has both.

> I have wondered... if employers, when they put an ad in the paper wanting an employee ... (could include) a statement such as, 'We prefer to hire people who can read and write, and we will insist that you be able to do this before you will be hired by us.'

> If we all work together to show we want educated (people) out of this system -- not just colleges want them -- but people who have farms (also want them).

One participant explained that his brother, who has a college degree in animal science, interviewed for a job with a large firm in the oil industry, "I don't guess you knew my degree was in animal science, that it isn't in the oil business." The individual interviewing him responded, "I know that, but our agriculture students know how to work. ... you'll be digging a ditch, but you know how to work. We want you for a management position up the road."

> That's the thing, certain teachers can motivate certain types of students. Not every kid can be put in ag. -- not every kid can be put in band or athletics. It takes all programs working together.

One participant related a conversation with a student who, nearing the age of 16, was anticipating getting his driver license. The participant related the story:

> "What are you going to do after you have your license? Do you have a car?" No, his daddy had a logging truck, and he was going to quit school and go to work for him in the woods with his truck. "You're not going on to graduate?" "No, I don't need to graduate! Why

should I graduate? My daddy has done real well with his logging truck over the years and why shouldn't I?" I worried about that for I don't know how long, someone who has no more incentive to go on than that.... It really upset me to hear this young fellow say that. A good-looking fellow....

In response, another participant added,

> That's why I think the agriculture department should have more emphasis on it, because when you get a kid in FFA and ag., he's exposed to electricity, welding, how to overhaul a lawn mower, so many different things that he gets exposed to in that department. Somewhere in there, maybe he's not a college student, maybe he'll hit on something that he might like, like working with electricity. If he wants to be an electrician, he'll go on to college, because you expose him to it.

The curricular move toward Tech-Prep was identified by participants in several groups. While participants were supportive of the concept of a renewed focus on programs that prepare people for work, they were not supportive of programs that they perceived as limiting educational opportunities by forcing students into an either/or choice (Tech-Prep or college prep) early in their academic programs. While they felt that students who pursue work immediately after high school need expanded training in workplace skills, they also need better training in basic academic skills that they referred to as "the basics." Participants, particularly business owners and parents of college students, also noted that college bound students were deficient in work-related skills. Specific concerns were voiced about the implied tracking of students as a result of implementing a tech-prep / college-prep system. These discussions included concerns for the quality of counseling received by students and wonder about the qualifications of the counselors to equitably represent career choices without bias.

> Its going to start next year, they're going to start the kids when they're young, I believe the 8th grade, they will decide then, starting 9th grade, whether they're going to go to college, tech-prep, or just complete high school.
>
> Too young to be making such a big decision.
>
> There are 18-year-olds that still don't know what they want to do.
>
> I work with 9th graders all the time, those kids don't have a clue as to what they want to do.
>
> I've had two boys graduate and they still don't know what they want to do.
>
> I think kids get a message now, I hear it a lot, "If you don't have a college education, you can't make nothing out of yourself." That's not true.

Perceptions of the Agricultural Education Program

One of the objectives of the study was to determine perceptions of the agricultural education program held by citizens in the community. The interview protocol was designed to hold the discussions about this question near the end of the interview. However, many participants opened discussions about the agriculture program much earlier in the interviews as a result of questions about the overall quality of the school, about the quality of programs, or about specific needs of the school.

Overall, participants were pleased with the quality of the agricultural education program. They made many positive comments about the value of it to the community, its educational value to students, and the quality of the teachers. However, it was consistently listed as a program in need of attention. Needs of the agricultural education program generally centered on improving its facilities and equipment, and increasing student access to it.

> I feel like our ag. program here at (XXXX), for what it has to work with, we're getting an exceptional value for every dollar invested.
>
> Our program is real good.... Those (programs, including athletics and band) are the kind of social programs that help pull a community together. They are largely supported. Our agriculture program has done a lot for the past several years here at (XXXX).
>
> From what I know about it, I think its very good.
>
> I have heard of kids taking that course thinking it was an easy grade.
>
> It's not. No, it's not. It's hard.
>
> I think its important. They not only provide knowledge (to students) as far as ... agriculture..., they have parliamentary procedure, ... plus the camaraderie they have... and common sense, too. That's very important to survive in this day and time.... I think it is imperative that we keep (the agriculture program) in the school system.
>
> ... the agriculture program has come a long way from where it used to be.

One participant summarized the popular perception that the agriculture program could prepare students for either work or college.

> I agree we have a very good agriculture program.... I went to the University and graduated from Engineering there.... The first time I ever welded anything, the first house I did the electrical work in, I did in (XXXX) High School in the Vo-Ag program. Those are very important to me, and those are very important from a manufacturing standpoint as far as what people get exposed to and what experience they have. A lot of kids today don't get that at home....

Asked, if the agriculture program influenced him go on to college, he replied, "Yes, most definitely."

There was considerable discussion about the quality of the teachers in the agricultural education program. There was group consensus that the teachers were a primary reason behind program success. Individual comments noted specific positive attributes and skills possessed by the teachers which they felt related to program quality.

> I feel we're real fortunate, the two teachers that we have, ... they're real people-type people. They can see potential in some kids and help them excel and get to the top. They can take this kid that's going to be a 9 to 5 (employee) working minimum wage almost all of his life, and help him ... have some basic skills....

One of the strongest points of the agriculture classes comes from the teachers that they have. They have probably one of the strongest (teachers) at the high school now that has ever been around. He knows what public speaking, parliamentary work, working with kids is.... Some way they have motivated these kids to a point where its a challenge....

Participants in the study made several observations about the relevance of the agricultural education program to community and student needs. The individuals interviewed had a positive understanding of the value of the program in contributing to the larger community. However, there was some concern voiced that others in the community may not realize the positive contributions that they felt the program made to individuals and the community.

We need real strong support of the vocational agriculture program.

It builds character and self-confidence.

... 50% of this county over the age of 25 do not have a high school diploma. The per capita income for (XXXX) County is $12,000. ... But you know, we've got tremendous pride. ... Its not a matter of not being able to learn. ... Sometimes it takes longer to outgrow bad habits. I don't know how you can get this drive into people. For instance, in this county $40,000,000 in wages is [sic] earned in agriculture. But, lots of people don't think of us as an agriculture (community) because we don't see farms, we don't see row crops.

In regard to that lower percentage (students who do not pursue college), a lot of kids want to stay here, if they have some basic skills to know how to get out here and make a living. .... The vocational agriculture program introduces these kids to so many areas to enlarge their vision.

One of the smartest kids I knew is (named). ... She majored in agricultural economics (at the University) and now works for (a named agri-business corporation). If you were to have (her) sit down in a traditional (high school) counselors office, they would not say, "you should major in agricultural economics." They would say, "you should be in marketing or communications." But we all know that the career (she) has chosen was one that her family directed her into because they know the value and the multitude of opportunities in agriculture. I think that we do not have a large enough vision....

I don't think there is enough emphasis shown for agriculture in (XXXX) County through our school system. I think they neglect the backbone of our county.

There was discussion in several groups about the need for the agriculture program to offer more "hands-on" vocational skills. This was interpreted as a need for the school to expand its vocational offerings, including both agriculturally related and non-agriculturally related vocational education. Many participants viewed the agriculture program as the only vocational program and the aforementioned observation was an expression of a need for a vocational program which is larger than the mission of agricultural education.

While supportive of the program, many participants commented on the apparent needs of the agriculture program. Most obvious were comments about the need to upgrade facilities. Several of the groups achieved concensus about the need to expand facilities and update equipment in the program. They determined that facility deficiencies severely limited educational opportunities and access.

> ... they don't have (enough) hands-on... because they don't have the facility for it.
>
> ... and the horticulture part.
>
> It's such a small contained area, 5 or 6 kids is all that can really learn. That's not enough.
>
> ... the facilities are not adequate for what they are doing. .... I think they are lacking on facilities more than anything.

One group noted the diversity of the agriculture curriculum and tied the need for facility planning to it. Some of this discussion included observations about curricular changes in the agricultural education program, noting that the program was moving to emphasize more of the science of agriculture.

> They teach horticulture, they have forestry. They teach ag mechanics, electricity, welding, woodworking. It's all out there.
>
> It's like having a science class with one lab. You don't learn a lot.
>
> I think they are doing a good job out there with what they have to work with.
>
> There are fixing to be some changes in the VoAg program.... They are getting more towards science.

Conclusions

Participants in the focus groups were generally very pleased with the overall quality of their schools. There were many positive comments about the "excellent school" system and several noted that it was a factor in attracting people to the community. However, some concerns were raised. Participants believed that the schools must maintain academic standards that are comparable to State and National standards. While some participants couched their responses regarding high quality in the assumption that the mission of the school is to prepare students for higher education, others observed that the school and community are linked and, therefore, must address the needs of all students, including those not college bound.

Overall, participants were satisfied with the quality of programs offered by the school, particularly those which are aimed at preparing students for higher education. There was concern for the preparation of non-college bound youth, in work-related skills as well as in "the basics." However, participants were not supportive of programs that they perceived as limiting educational opportunities by forcing students into an either/or choice early in their academic programs. Many positive comments were offered about the agricultural education program. It was seen as a program that prepared students for both the world of work as well as for higher education.

Community members recognized the importance of school programs to the community and to youth. They felt there was a positive relationship between the school and the community. There was much discussion for strengthening vocational education programs, with the agriculture department consistently listed as in need of expansion and additional facilities.

Overall, participants were pleased with the quality of the agricultural education program. They affirmed the need for the program in the community and listed the community as "fortunate" to have the particular teachers they have in the program. However, it was consistently identified as a program in need of attention, especially in terms of improving facilities and student access to it. One group noted the diversity of the agriculture curriculum and its move to emphasize more of the science of agriculture.

Nearly all participants commented on the interview process as a means to develop understandings about the school and its programs. They felt good about being asked to discuss their opinions about the school. It appears that this process is an effective procedure to gain insight into public perceptions about agricultural education programs. It also has the potential to build support for the program and the school by allowing citizens to have direct involvement in the review process.

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Abstracts

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APPLIED ENVIRONMENTAL SCIENCE: EDUCATING OUR YOUTH

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The environment and its protection is a major issue facing this country and many other countries in the world. Americans have become more conscious and concerned for the conservation of their environment. The agricultural industry has not been immune to environmental concerns. The industry of agriculture is directly related to the environment through its use of natural resources in the production of our food and fiber. With these issues in mind the National Council for Agricultural Education sought funding for the development of instructional materials to assist agriculture and science teachers in teaching about the environment and its relationship to the agricultural industry.

The purpose of the *Applied Environmental Science* instructional materials is to assist teachers who seek to enhance the environmental consciousness of their students. The teaching materials are designed to be utilized: (a) to supplement existing instruction in agricultural education and natural resources courses, (b) as independent units of instruction on environmental concerns, and (c) as "Hands-on" learning activities to enliven the educational experience for students and teachers. As a result of teaching the *Applied Environmental Science* materials students should be able to:

1. explain the significance of environmental issues,
2. specify recommended practices for the conservation of the environment,
3. identify the basis for practices related to the environment which may appear to be controversial,
4. analyze and evaluate environmental issues, and
5. identify and develop plans to address local environmental issues.

The *Applied Environmental Science* instructional materials consist of an introductory unit and seven advanced units. The objective the *Introduction to Environmental Science* unit is to introduce students to the concepts of environmental science, encourage students to be conscious and concerned about the environment in which we live, to recognize the need to conserve our environment and its resources, and to begin to understand the interrelationships between agriculture and the environment. The introductory unit can be taught as an independent unit or be followed with one or a combination of the seven environmental emphasis units. Each instructional plan includes the desired student outcomes, study questions for student investigation, content outline, suggested teaching procedures, student activities, and an example evaluation.

The seven environmental emphasis units are structured to encourage students to investigate areas of environmental concern. The seven environmental emphasis areas are (a) *Identification and Management of Ecosystems,* (b) *Soil Conservation,* (c) *Management of Waste,* (d) *Land Uses, Regulations, and Ordinances,* (e) *Chemicals and the Environment,* (f) *Water Quality, and* (g) *Air Quality.*

The environmental emphasis units consist of instructional plans similar to the introductory unit, however, more "Hands-on" learning activities are provided. The student learning activities have been developed so that they could be utilized independently from the instructional plans. In addition to the student learning activities, *extension learning activities* for each of the seven environmental emphasis units are provided for students to further investigate the environment and the concepts of environmental science. The *extension learning activities* are structured around exploratory experiences, management activities, and issue analysis activities.

During the development of the *Applied environmental science* instructional materials the question arose as to how teachers and students would perceive the content and usability of the instructional materials. A field test of the introductory unit was conducted. Eighteen teachers and their students representing 16 states participated in the field test.

The students who participated in the field test showed an increase of 19% in their knowledge of environmental science concepts after being taught the introductory unit (Garton & Birkenholz, 1995). The teachers responded positively to the subject matter content of the instructional materials, indicating that the materials were needed, up-to-date, effective, technically accurate, and useful. With regard to the structure and organization of the materials, the teachers reported that the materials were well organized, easy to use, and that prior knowledge in environmental science was not necessary to teach the lessons.

The environment and concerns over its conservation are major issues facing citizens as we prepare to enter the 21st century. Individuals, organizations, corporations, and government agencies are calling for educational programs to increase the awareness and knowledge of the environment and the conservation of its resources. The *Applied Environmental Science* instructional materials provide teachers with materials that will enable them to teach their students about the environment in which they live.

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A PLACE FOR THEM TO COME TOGETHER IN ARIZONA--4-H AND FFA

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Introduction

The National Council for Agricultural Education and the National FFA Foundation in a collaborative effort have initiated and supported the creation of an outstanding curriculum for instruction on issues involving Animal Welfare. Naturally, the curriculum was designed with agricultural education teachers in mind, however, in Arizona, as in many states, Extension 4-H personnel also have need for such materials.

In the May 1994 issue of The Agricultural Education Magazine, Donna Graham discussed interactions between teaching and extension programs. In her list of suggestions to facilitate cooperation two seemed to connect with Arizona: 1) *Two heads are better than one*; and 5) *Professional development*. As a new faculty member at the University of Arizona, Billye Foster was selected as the Animal Welfare Train-the-Trainer representative for the state. In an effort to coordinate presentation of materials, maximize efficiency of time allotted for workshops, and provide another opportunity for extension and agricultural education professionals to interact. Stacey Rich (agricultural education teacher) and Larry Tibbs (4-H extension agent) became involved in the project.

Obviously, Animal Welfare is one of those areas that has far reaching effects in all phases of animal agriculture. The relevancy of the curriculum combined with the broad spectrum of topics addressed made this resource valuable to all sectors of agricultural education. Allowing the material to be used through both extension and conventional agricultural education provided a link to critical thinking/problem solving activities for ages 8 through adult.

How It Works

Informal committee meetings were held via telephone and electronic mail. An initial workshop date was set up for February 23 at the Maricopa Extension Office in Phoenix. Two additional workshops were scheduled for March 30 at Gilbert High School, Gilbert and May 11 at Flowing Wells High School, Tucson. Invitational letters were sent to all the agricultural education teachers in the state. Electronic mail was the predominant method used to inform the extension agents.

A long standing interest in animal issues combined with continuing research in agricultural ethics allows Billye Foster the opportunity to provide a variety of information tailored to Arizona's needs. Stacey Rich and Larry Tibbs are actively involved in their respective peer groups and therefore instrumental in contacting potential workshop participants, as well as, providing the physical facilities needed in Arizona's two largest population areas, Phoenix and Tucson.

In order to make this workshop readily available to both agricultural education teachers and extension agents, all three members of this informal committee serve as contacts for establishing possible workshop locations.

Results to Date

The initial workshop in Phoenix proved very successful. Four agricultural education teachers, three extension agents, two adult volunteers and a visiting extension agent from Finland attended the two and one half hour workshop. By utilizing pair-share cooperative techniques and the extensive wealth of teacher activities provided through the curriculum, agents and teachers not only became more aware of the issues at hand, but shared many similar experiences in the casual discussion that was a part of the experience.

Perhaps most gratifying was the openness to suggestion and willingness to help each other that sprang from both groups. Agents were offering to send information to teachers. Teachers were suggesting that each group purchase additional information and then share their wealth. Both entities represented seemed aware of the many similarities of their respective situations.

The Next Step

In addition to future workshops, plans are evolving for an electronic list serve to be developed to update workshop participants on new and innovative curriculum or other information pertinent to Arizona. Naturally, a mailing could be provided for those without access to electronic mail. As all the extension offices in the state are equipped with the necessary hardware currently, it was suggested that those schools that were still not connected could utilize the extension facilities.

It has also been suggested that as new curricula emerge from the National Council and FFA Foundation similar combined efforts to disperse it could be used. In reference again to Graham's article, "There is a limit to the public and private dollars that can be generated to support agricultural education in any community. Why not share educational materials, equipment, and facilities?"

Costs/Resources

Perhaps the best part of this project was the minimal funds needed to initiate and sustain it. The National Council absorbs the cost of training the initial trainer and also subsidizes travel expenses for the first ten workshops. By utilizing schools and extension offices, the expense of facilities for the workshops is minimal. Cost of the curriculum is $20 for each participant, a sum which covers the printing and postage of it. The largest expense for the project is probably found in the time used for planning and preparing for the workshop. At that it is an experience worth the expense.

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A MODEL PROGRAM FOR STAFF AND FACULTY TRAINING IN AGRICULTURAL DISTANCE LEARNING

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Introduction

Providing formal and informal educational opportunities to learners at distant sites presents staff and faculty with many challenges related to planning, organizing, and delivering instruction. Applying the traditional classroom teaching model to distance education generally yields disappointing results. Batey and Cowell (1986) noted that advances in educational and communications technology had outpaced the advance of educational ideas and procedures. This phenomenon continues to be true as colleges and universities direct disproportionate amounts of effort and resources to technology when compared to staff and faculty development. The USDA-Cooperative States Research Education and Extension Service supported this project to develop a model training program for staff and faculty in agricultural distance learning.

Methods

Promotion and application materials were sent to all academic deans and agricultural education department heads in colleges of agriculture at Land-grant universities. All applications to participate in the program were evaluated using predefined selection criteria. Thirteen universities were selected to participate in the program including Alabama A&M, Cornell, Iowa State, State, North Carolina State, Ohio State, Oklahoma State, Pennsylvania State, Southern, Texas A&M, Virginia Tech, and Washington State.

Four two-hour programs were delivered face-to-face to Iowa State University College of Agriculture Staff and faculty while simultaneously broadcasting via satellite to the other 12 participating institutions. One program was delivered for each of the following content areas: (1) technological issues; (2) understanding the distant learner; (3) instructional design issues; and (4) evaluation, copyright, and program management. Interaction during the programs was supported by telephone, Fax and E-mail.

Distance learning experts were recruited to deliver the four programs. Project directors coordinated materials development with the experts and were liaisons between participants and all those who provided project related services. Site facilitators attended to all coordination issues at the local site. The site facilitators were encouraged to engage faculty and staff in activities that supplemented the content of the satellite programs. We were not inclined simply to broadcast satellite programs without any opportunity for interaction and discussion of the content.

Other project related services included a LISTSERV to facilitate discussion among staff and faculty participants and also for interaction between the project directors and participants. In addition, five audio conferences were held. A prebroadcast audio conference allowed site facilitators to discuss creative ideas for activities to be conducted at the downlink sites. A follow-up audio conference was conducted after each broadcast to facilitate discussion of issues raised during the satellite programs and to provide input to project staff on program quality.

This material is based upon work supported by the Cooperative State Research, Education and Extension Service, U.S. Department of Agriculture, under special project number 94-EATP-1-0045.

Results to Date

The project generated a tremendous amount of interest from agricultural and non-agricultural groups. We were surprised by the number of requests for participation. We continue to receive inquiries from various groups interested in purchasing copies of the videotapes and the reference notebook.

In all, 227 staff and faculty participated in the program and 118 completed the program evaluation instrument. This multidisciplinary group of participants came from departments such as agricultural education, agricultural economics, agricultural engineering, agronomy, animal science, entomology, food science, forestry, horticulture, sociology, and veterinary medicine. Of those completing the program evaluation instrument, 69% were faculty, 14% were staff and the remaining 17% were graduate students and other persons interested in distance education. Also, 37% of the respondents indicated that they would be involved in developing and/or delivering a distance education course during the academic year.

Overall, participants provided favorable evaluations of the program. Participants indicated that the distance learning experts provided current, accurate, and relevant information. Site facilitators noted that the project served as a catalyst for the development of new ideas and approaches to agricultural distance education. Seventy-two percent of the participants indicated that they were satisfied with the program and 89% noted that they would be willing to participate in additional programs of this nature.

Future Plans

Although the project was a success, problems were encountered and lessons were learned about how future training programs might be improved. The major complaint was that presenters adopted the "do as I say, not as I do approach." One participant wrote that "the instructors did not practice what they preached about interaction with students." In future programs more time should be allowed for development and presenters should be given an honorarium beyond reimbursement for project related expense. Project directors must insist that presenters show how media may be used to the greatest educational advantage and provide for sufficient interaction with the participants.

Clearly, a need continues to exist for faculty development opportunities in distance education. Considering this fact, a joint proposal involving Iowa State University,, Alabama A&M University, and Arkansas State University was written for the 1995 USDA Higher Education Challenge Grant program. The proposal entitled "Advancing a Model for Faculty Development in Agricultural Distance Learning" was funded for $152,000. This new project will allow more faculty in more departments and colleges of agriculture to benefit from this successful faculty development model.

Costs

The USDA-Cooperative States Research Education and Extension Service through the 1994 agriculture telecommunication program funded this project for $65,136. Funds were used to hire a one-half time graduate student assistant, to purchase a multimedia development station and software, and to support program development costs including travel, media resources, and other materials and supplies. Participating universities shared costs associated with satellite uplink and downlink services.

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EXPERIENTIAL LEARNING FOR STUDENTS IN BIOSYSTEMS AND AGRICULTURAL ENGINEERING

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Introduction

A fundamental concern of agricultural education, in general and specifically in agricultural mechanization, is innovation within the teaching process (Strickland and Poe, 1991). Students are often lulled to sleep by the classic lecture format style of some high school and most college courses. Student interest and motivation can be lost in part due to the lack of participation by the students. Many times with students, frustration and confusion will result when consistently presented complex material, as is found in the physical sciences, using strictly a lecture-only style of teaching. Olivas and Newstrom (1981) pointed out that student motivation and involvement is increased when stimulation is used in instruction. Agnew and Shinn (1988) added that the teacher should incorporate opportunities for students to learn through different techniques.

Power is an important aspect of modern agriculture. Most production enterprises depend highly on many forms of power for existence of its day to day operations. To successfully manage agricultural enterprises, a student must learn to understand the sources of power and the different ways in which it is measured.

In the English system of measurement, the unit of measure for power is horsepower. To measure electrical horsepower, a person must determine volts and amperage. Both of these relationships can be demonstrated, recorded, and understood more thoroughly by students through the use of a scale tractor.

A model tractor is used in our introductory class to explore the relationship of force, distance, time, and power. The tractor lab activity provides experiences for students to record the variables and to determine the corresponding power and horsepower "produced" by the tractor. For example, by allowing students to manipulate the amount of force the tractor pulls and then discovering a corresponding change in time needed by the tractor to cover a set distance brings to the forefront the relationships between variables. This demonstration activity also provides an opportunity to explain electrical power. By comparing mechanical and electrical power for the same situation, the effects of converting energy can also be explained.

How It Works

A miniature scale tractor was outfitted with a worm drive gearbox and a 6-volt DC motor. Electrical power for the tractor is routed through a model train control panel and electrical meters. The current used by the tractor is measured by a volt and milliamp meter. The amount of force the tractor is required to pull is determined by the amount of weight applied to a rack attached by a string to the hitch of the tractor. The weight rack and string are run over a pulley with the rack allowed to hang over the edge of a track. Time data are gathered using a stop-watch. A measuring device such as a tape measure or yardstick is needed to determine a set distance for tractor travel. Determining the distance of travel will be based on the length of string which attaches the weight rack to the hitch.

The gathering of data is best accomplished when students work in teams of two. Working side by side, one student operates the control panel and observes electrical output (volts and milliamps) while the second student records time of travel (seconds) over the distance (inches).

Students are given a data collection sheet to complete as the activity proceeds. Three replications of the activity are completed at four different force (weight) levels and two different power levels. The time, volt, and milliamp outputs are averaged over the three runs. This introduces to or reinforces the students understanding of scientific testing and replications. Proper conversions must then be calculated by the students to determine the correct units for power and horsepower. Units conversion can also be taught by requiring the students to determine the correct conversion value for horsepower using units of inches, ounces, and seconds for power.

Implications

Soon after most individuals start driving, he or she attains a certain degree of understanding of fuel consumption. The faster one drives their car, the more fuel is consumed. But why? Students do not often understand this is physics terminology, but the increased number of visits to the gas station has brought this relationship to one's attention. Whether it is in their car or in the classroom, if we can bridge the gap between observations and understanding, ultimately more learning and better decisions can be made by an individual. "The greatest degree of understanding is developed when the individual sees the parts of the problem situation in relation to the whole problem situation" (Crunkilton and Krebs, 1982). When students are given the opportunity to investigate through manipulation of a problem or an activity, they ultimately understand the parts of the problem more thoroughly. The problem solving activity presented allows for better understanding of a complex relationship of the variables of mechanical and electrical power and horsepower.

Plans Description/Costs

The itemized list below contains the equipment and supplies necessary for this project. Most of the items are available through local outlets. It should be noted that the worm-drive gearbox was specially designed for this project.

Gear box	$200
6-volt DC motor	10
Electric train control panel	60
Electric meters	40
Model tractor	20
Wiring	10
Pulley and clamp	10
Banana connectors	2

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OCCUPATIONAL SKILL STANDARDS FOR AGRICULTURAL BIOTECHNOLOGY TECHNICIANS: IMPLICATIONS FOR SECONDARY AND POSTSECONDARY AGRICULTURAL EDUCATION PROGRAMS

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Introduction

Agricultural biotechnology technicians is an emerging occupation that is expected to have tremendous growth potential over the next decade and beyond. It is an occupation that requires academic preparation in fields of science and agriculture that are not currently included in the curricula of many secondary and technical schools in the United States. In 1993, the United States Department of Education funded a project to develop National Voluntary Occupational Skill Standards for Agricultural Biotechnology Technicians. Through the project, conducted as a joint effort of industry and education, technical skills were identified and support materials produced for implementing appropriate courses of study in agricultural biotechnology. The purpose of this poster presentation is to share samples of the support materials which were developed for high school, community college, and university programs of agricultural education.

Methodology

The National FFA Foundation, recipient of the U.S. Department of Education Skill Standards grant, established a Grant Management Committee who worked under contract to oversee the development of the standards for an agricultural biotechnology technician. A committee of agricultural industry executives and educational representatives met three times during the course of the project to advise grant staff and review progress toward goals. This executive committee appointed technical and human resources personnel from their companies or universities to serve on a subcommittee charged with developing a skill set for agricultural biotechnology technicians. After several multi-day workshops the biotechnology subcommittee reached consensus on a technical skill set, related academic skills needed for the job, and important general employability skills for obtaining and retaining the job. The committee also identified hours of instruction needed by the student, Suggested qualifications for their instructors, and a list of tools and equipment commonly used on the job. A questionnaire was developed from the committee's work which was sent to technicians working in agricultural biotechnology throughout the U.S. for verification. The resulting skill set was published in 1994. The skill standards provide a foundation for developing training programs which begin with progressive high school agriscience programs.

Implications

The skill standards may one day result in a voluntary national testing and certification program for the occupation of agricultural biotechnology technician. A more immediate need recognized by the executive committee was to initiate educational programs which prepare technicians. Consequently, the second phase of the U.S. Department of Education grant focused on developing support materials for high school agriculture programs, high school guidance counselors, secondary and post secondary administrators, and teacher education programs of agricultural education. Specifically, an implementation guide planned as a handbook for implementing an agricultural biotechnology training program was produced. One component of the guide is instructional materials for high school agriculture and science programs which will be disseminated through workshops to all high school agriculture programs. Teacher education programs will also receive materials for undergraduate students preparing to teach agriculture. An agricultural biotechnology careers video was produced through the project and is available at this poster presentation. The material will be a valuable resource for teachers wanting to include biotechnology in their agriculture program.

Future Plans

The final activities of the U.S. Department of Education grant which ends this year will be to conduct dissemination workshops across the country. Six regional workshops hosted by agricultural biotechnology companies were conducted in the summer, 1996. Additional state workshops will be held to distribute the instructional materials to high school and community college teachers in 1996 and 1997. A one year follow-up project was funded by the National Skill Standards Board to align occupational skill standards in the biosciences with the agricultural biotechnology standards. Special assistance will be available in 1996 and 1997 to community colleges wanting to implement a biotechnology technician training program. Innovative materials developed through the project are available on the table. Please take one copy.

Costs

All materials developed through the U.S. Department of Education grant, including the standards document, instructional materials, Circle of Life publication, and the World of Opportunity careers video will be provided to workshop and conference participants in 1996 at no charge. The purpose of the project is to facilitate development of agricultural biotechnology educational programs and copies of the grant products will be readily available to high school, community college, and university programs of agricultural education. For more information contact Project Director, Jeff Moss. Phone: 309-862-3837, Fax: 309-862-3838. E-mail: JEFFWMOSS@aol.com

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UTAH MIDDLE AND JUNIOR HIGH SCHOOL AGRISCIENCE AND TECHNOLOGY INSTRUCTIONAL GUIDE DEVELOPMENT PROJECT

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Introduction

In *Building the Future and Serving Today: A Strategic Plan for Agricultural Education* (1996) leaders in Agricultural Education state that we must make a "concerted effort to bring meaningful programs of instruction about agriculture" to all U.S. citizens. The profession further supports the need for lifelong learning "about" agriculture as less than 2% of our population resides on farms and ranches. Consistent with the need to develop agricultural literacy is the need for education "in" agriculture. Regardless if students are learning "in" or "about" agriculture, they need the opportunity to explore career opportunities. The National Research Council (1988) noted that few Americans have an accurate view of career opportunities in agriculture. A primary goal of Utah's middle and junior high school agriscience and technology units, that are a part of the mandated Technology, Life and Careers curriculum, is to develop awareness about the food, fiber, and natural resource industries as well as explore the broad scope of available career opportunities.

Utah incorporated an assortment of hands-on agricultural science and technology activities into the Technology, Life and Careers (TLC) curriculum in the early '90's. The TLC curriculum currently requires instruction at the middle school or junior high school instruction in three areas: (1) agriscience and technology and technology education; (2) business and marketing; and (3) health and home economics. The agriscience and technology component of the curriculum is taught by industrial technology educators throughout the state. As a part of the continual revision process, and in the spirit that the "focus of agricultural education must change" and that "the subject matter of instruction about agriculture and instruction in agriculture must be broadened" (National Research Council, 1988, pp. 2 & 6), the Utah State Office of Education requested that we update and develop new agriscience and technology instructional units.

Purpose and Objectives

The purpose of this project was to design, develop, pilot test, and publish self-paced instructional units that contain "hands on" activities for use by middle and junior high school industrial technology educators. Each unit was designed to integrate contemporary technology and appropriate instructional technologies to learn about careers and selected concepts of the food, fiber, and natural resources industries. The objectives that guided the development process were to: (a) use recommendations of the Utah Agricultural Education Advisory Council, develop core agriscience and technology standards and objectives for junior high and middle school students; (b) review contemporary curriculum and instructional guides for innovative activities; (c) select and develop core individualized instructional units for selected subject matter of the food, fiber and natural resource industries; (d) pilot test selected units with industrial educators who teach middle and junior high students; (e) provide inservice instruction to industrial technology educators; and (f) distribute completed instructional guides to Utah middle and junior high school industrial technology educators.

Procedures

The Utah Agricultural Education Advisory Committee in cooperation with the Utah Agricultural Education Specialist asked that we produce self-paced exploratory instructional units for careers in agricultural science, horticulture, natural resources, and agricultural business management. Using ideas from instructional materials from across the United States, we developed one to six instructional units for each career area as noted below.

Agricultural Sciences

- Once Upon an Egg
- Do You Seed What I Seed?
- What, No Soil? An Introduction into Hydroponics
- Soil: Why We Can't Live Without It
- Small Animal Care!
- Soil Testing 1-2-3

Plant Sciences

- What is in a Landscape Plan?
- What is in a Landscape Model?
- Terrarium Building

Natural Resources

- "Water" You Doing?
- Oh Deer!
- Making Plastics From Corn? I'm All Ears
- Soil Erosion: A Moving Experience!
- Aquaculture

Agricultural Business Management

- Simple Secrets for Running Your Business

A standardized format was adopted for the color-coded teacher's and student guides. The student guide contains several instructional components. There are the instructions, objectives, related careers, case scenario information, background information, new terms, materials you need to complete the activity, procedures and observations, student activity review sheets, pretest, and post-test. Instruction and management components of the teacher's guide include the subject areas, time-requirements, special techniques and tips, materials, background information, procedures and observations, additional exercises, glossary, references and a complete materials ordering list.

Instructional units were pilot-tested and evaluated by students and instructors. Suggested changes were reflected in revised versions of each unit. Industrial technology educators attended district inservice activities that incorporated hands-on unit activities during the summer of 1995 and winter of 1996.

Project Outcomes

The following outcomes were developed as we reflected upon the process of developing the instructional materials: (a) Participation and formative evaluations by all audiences contributed to the acceptance and anticipated use of materials. (b) The instructional design process resulted in fifteen unique self-paced instructional units. (c) Anecdotal and recorded evaluations provided by students and educators validated the age-appropriateness and ease-of-use of the units. (d) Effective inservice of industrial and technology educators with selected units promoted subsequent adoption of units. (e) Administrative support for the curriculum was demonstrated. Efforts are underway in many Utah districts to fully adopt the units. (f) Additional exploratory units are needed to provide greater breadth of related subject matter.

CONNECTING AGGIES AND RAIDERS: LINKING UP FOR STUDENT TEACHERS

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Opportunity

Nine different institutions in the State of Texas offer programs to certify teachers of agricultural science and technology in secondary schools. East Texas State, Prairie View A&M, Sam Houston State, Southwest Texas State, Stephen F. Austin State, Tarlton State, Texas A&M, Texas A&M-Kingsville, and Texas Tech all have a history of excellence in preparing agriculture teachers. While each program has similar goals, each also has unique characteristics providing its students with special experiences and opportunities. Many of these uniquenesses are embodied in the faculty at these institutions with their various research and teaching foci.

Historically, little effort has been made to allow faculty and students from the nine programs to work together. While representatives of the programs have met during the state agriculture teacher's conference for years, rarely have these meetings resulted in any collaboration of effort. However, the application of communications technology is creating a new opportunity to work together.

The Texas A&M University System is making use of a two-way video/audio teleconferencing system. The Trans-Texas Videoconference Network (TTVN) connects sites in 23 cities throughout the State of Texas with plans for seven more sites to be added this year. The cities included on the TTVN system are El Paso, Canyon, Lubbock, Denton, Stephenville, Temple, Austin, San Antonio, Uvalde, Laredo, Dallas, Bryan, College Station, Somerville, Prairie View, Richmond, Corpus Christi, Kingsville, Weslaco, Conroe, Houston, and Galveston.

TTVN allows for synchronous audio and video conferencing with multiple sites. Instructors have access to features such as an Elmo unit, fax machine, Telephone computer, and VCR. With the system, students at one part of the state can not only watch a live presentation, but can also interact with an instructor and students at another site. Several of the agriculture teacher training institutions have a TTVN on or near campus.

After holding several conferences on TTVN for other purposes, the authors determined that this medium would provide an appropriate linkage to allow for collaboration in pre-service training of agricultural science teachers.

TTNV Sessions for Student Teachers

During the Fall Semester of 1995, the first joint session was held between student teachers from Texas Tech University and Texas A&M University. A one time, four hour session was conducted with presentations by faculty from both institutions as well as a presentation by members of the state agricultural education staff in Austin. Due to the success of this first session, plans were set for more extensive use of TTVN for the Spring Semester.

For the Spring Semester of 1996, five one-and-one-half hour sessions were developed and conducted. As with the previous session, faculty from Texas Tech, Texas A&M, and the state office presented topics. Notices were sent to the other teacher education programs soliciting their participation. For a variety of reasons, none of the seven other institutions were able to participate in the live sessions. Videotapes of the sessions were requested by the faculty from East Texas State and Southwest Texas State.

In the first session of the spring series, Rob Terry provided an overview of the TTVN system and presented information about the role of communications technology in the future of agricultural education. Other sessions included David Lawver's presentation on laboratory safety; diversity issues by Alvin Larke, Jr.; development of tests and evaluations by Gary Briers; and an overview of the services provided by the Texas Education Agency by Kirk Edney. In each case, Appropriate handouts were provided and students at each location were able to interact with the presenters and one another.

Benefits

The TTVN sessions resulted in a number of significant benefits. First, the goal of creating an exchange of information and faculty expertise between teacher education programs was realized. Student teachers were exposed to valuable information that their predecessors could not receive. In addition, the future teachers were able to use communications technology that will certainly be a part of how they teach and learn in the future. Finally, the student teachers at Texas A&M and Texas Tech were able to become familiar with one another, perhaps leading to more cooperation in their careers as agriculture teachers.

Plans for Continuation

Plans are being set for the next series of TTVN sessions this fall. It is anticipated that other programs will be able to join Texas Tech and Texas A&M in this effort because of the additional sites being placed on several of the campuses with agricultural education programs. In the future, as more faculty and students become involved in the series, it is likely that more than five sessions will be conducted over TTVN and other technologies, such as the World Wide Web will be used to enhance the pre-service development of agricultural science teachers in Texas.

TEACHING AGRISCIENCE PRINCIPLES WITH THE EQUINE SCIENCE INSTRUCTIONAL MATERIALS

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Introduction

Agriscience is used to emphasize or enhance the study of physical and biological scientific principles in the teaching and study of agriculture. Agricultural educators are constantly looking for innovative means to teach scientific principles to secondary school students. To make science as enticing as possible, the information is frequently linked to real life situations or areas of specific interest for the student. The study of horses is an area of agriculture that a number of students naturally enjoy. The Equine Science Instructional Materials were developed to capitalize on students' enthusiasm for learning about horses to teach scientific principles.

Despite the decline in the use of the horse as a working animal over the last century, the number of horses in the United States has grown dramatically. Today, horses are a multi-billion dollar industry impacting the economy of every region of the United States. This economic impact coupled with the increasing horse population (estimated to be between 5 and 10 million horses), has resulted in a growth of academic programs focused on the science of horses. Specialized programs emphasizing equine surgery and medicine can be found at nearly every college of veterinary medicine. Colleges of veterinary medicine and agriculture across the country have instituted research programs in the areas of equine nutrition, exercise physiology, reproduction and genetics.

It is not surprising that there are a large number of youth interested in horses. Many are also attracted to careers that would involve horses. Consequently, the horse is an ideal model to teach students basic principles and concepts of science as they relate to the horse. By capitalizing on students' intrinsic interest in the horse, the instructor can successfully integrate scientific concepts and principals into agricultural education classes while maintaining real world meaning for the students. The Equine Science Instructional Materials emphasis on the scientific aspects of the equine industry differs from the management approach of existing materials, such as the *Horse Industry Handbook* from the American Youth Horse Council. However, in order to help bridge the management and scientific principles units in the Equine Science Instructional Materials have references to appropriate sections of the *Horse Industry Handbook*.

Students Activities and Projects

One of the major objectives of the curriculum is to bring the day-to-day reality of science into the agriculture classroom. The instructional materials include multiple laboratories per section. These laboratories range from the hands-on evaluation of normal physiologic parameters of the horse, such as heart rate and capillary refill time as an indicator of the horse's cardiovascular status to performing fecal flotation for parasite ova to determine a horse's level of internal parasitism.

Some of the laboratories require a live horse, but many can be performed with more manageable sized objects such as horse feeds, manure, semen, or blood. The materials required for the labs are available from local horse farms, veterinarians, and/or can be purchased from a number of vendors identified in the instructional materials.

The use of computers as an instructional technology is another unique characteristic of these materials. A number of activities require students to explore the World Wide Web, which has an enormous amount of information regarding horses, in order to complete the assignment. Additionally, the use of spreadsheets is integrated into a number of labs to analyze data or store information that can be used to make decisions. The use of computers is intended to widen the horizons of students and familiarize them with basic and more advanced computing skills.

Results to Date

The Equine Instructional Materials were pilot tested in agriculture programs in California, Montana, and Kentucky in grade levels, 9, 10, 11, and 12. Based on the pilot study and feedback from the advisory committee the materials were edited and finalized.

The training of trainers was conducted March 14, 1996 to March 17, 1996 at Mississippi State University in Starkville, Mississippi. Forty-five agricultural educators from 41 states as well as Guam, Puerto Rico, and the Virgin Islands participated in the training. The trainers were shown examples of student activities and laboratories from each of the seven units. The seven units in the final document include:

Foundations of Equine Science
Equine Anatomy
Equine Exercise Physiology
Equine Nutrition
Equine Diseases
Equine Reproduction
Equine Genetics

The Equine Science Instructional Materials are currently available for agricultural educators. The trainers who participated in the 1996 training are currently training teachers and distributing the materials in their respective states or territories.

The Equine Science Instructional Materials will be available in electronic form on the World Wide Web at the beginning of 1997. The Equine Science Instructional Materials Home Page will be linked to appropriate Websites, such as the National FFA Website. The electronic form of the Equine Science Instructional Materials will be in Portable Document Format (pfd), allowing educators to download the print while retaining the original formatting of the printed materials.

The Research Committee of the
Agricultural Education Division of the
American Vocational Association
issues this

Call for Papers

to be considered for presentation at the

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December 3, 1997
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Proposed Specifications

Four copies of the ***complete research paper*** should be submitted for blind review. The paper should not exceed 12 pages (single-spaced, 12 point font). The left margin should be 1½ inches, with the remaining margins one inch. All tables, figures, etc. should be incorporated into the paper (do not append tables or figures to the paper). A computer disk containing the paper as a Microsoft Word (Version 7.0 or earlier), Word Perfect (Version 6.1 or earlier) or DOS text file should be submitted along with the paper copies.

On matters of style, authors should consult the APA *Publication Manual* (4th Edition). Components to be included in the proposal are as follows:

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