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NOTES FROM THE EDITOR

The Southern Agricultural Education Research Conference (SAERC) celebrates its 50th anniversary in 2000. SAERC consists primarily of Agricultural Education faculty and other researchers in programs of Agricultural Education in universities throughout the Southern Region of the American Association for Agricultural Education (AAAE). The states included in the Southern Region include: Alabama, Arkansas, Florida, Georgia, Kentucky, Mississippi, North Carolina, Oklahoma, South Carolina, Texas, Tennessee, Virginia. For most of the five decades of its existence, SAERC was the research arm of the Southern Agricultural Education Conference, which consists of state supervisors and teachers educators of Agricultural Education.

SAERC has always considered itself to be an affiliate of the American Association for Agricultural Education. In 1997, the Southern Agricultural Education Research Conference affiliated with the Southern Association of Agricultural Scientists (SAAS). Thus SAERC is now an affiliate of both AAAE and SAAS.

The ***Journal of Southern Agricultural Education Research*** **(*JSAER*)** is double blind, refereed journal. All manuscripts accepted for publication in ***JSAER*** were submitted for blind review by appropriate researchers in Agricultural Education and were judged to be worthy of publication in this journal. Reviewer identification was removed from the review materials and the critiqued manuscripts were returned to the authors for revision as needed, based on the reviewers' comments. The revised manuscripts were then reviewed by the editor before publication in ***JSAER***.

In addition to the formal research meeting at which the articles were presented and discussed, a Poster Session was held. The abstracts of the poster presentations are included in ***JSAER***. The posters were also submitted for blind peer review, and were judged to be worthy of presentation at the annual meeting of SAERC.

The Southern Agricultural Education Research Conference annual meeting was held in Lexington Kentucky January 31 through February 1, 2000. The publication of JSAER is the responsibility of the host institution for the annual meeting of SAERC. For the 2000 meeting, that institution was Virginia Tech.

For questions or to obtain copies of this volume of ***JSAE***, contact the editor.

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HOW SECONDARY AGRICULUTRAL EDUCATION TEACHERS DESCRIBE THEIR WORK

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Abstract

The purpose of this study was to describe how secondary agricultural education teachers in California perceive their job responsibilities. Q Method was used to examine a theoretical structure to determine the various ways teachers' view their work. Participants in the study were 23 secondary agricultural education teachers from the Central and San Joaquin California Agricultural Teachers Association regions of California. The researcher purposefully selected the subjects used in this study. Each participant completed a 36-item Q-sort about what their actual job is like and what would their ideal job be like. The statistical software package PQ Method 2.0 was used to analyze the data. Data analysis involved the sequential application of three sets of statistical procedures including correlation, factor analysis, and computation of factor scores.

Introduction

Agricultural education at the secondary level, when compared to other vocational education programs, is a unique part of the total vocational education program. Agricultural education teachers have additional teacher responsibilities such as Supervised Agricultural Experience (SAE) programs, and the National Future Farmers of America (FFA) Organization. Added teacher responsibilities, along with the community leadership role secondary agricultural education teachers play, make agricultural education program responsibilities challenging. However, three components of the agricultural education program have remained consistent since the 1920s: classroom/laboratory instruction, SAE programs, and the FFA organization (National Research Council, 1988; Phipps & Osborne, 1988).

Over the years secondary agricultural education programs have been modified to meet changing school environments and societal demands. Additionally, agriculture's emphasis shift away from production to processing and marketing has played a role in changing agricultural education programs. The result has been a demand for more agricultural education instructors with a wider variety of skills.

Theoretical Framework

During the 1980s the national reports, Nation At Risk (National Commission on Excellence in Education, 1983) and Understanding Agriculture: New Directions for Education (National Research Council [NRC] Committee on Agriculture in Secondary Schools, 1988) called for major revisions to educational programs. Aspects of those revisions included ability of educators to solve problems, adapt new technology, demonstrate effective leadership skills, and posses solid command of core skills. Other aspects related to more flexibility in curriculum and program design, and the requirements and activities of programs and more responsibilities. Education (National Research Council's Committee on Agriculture in Secondary Schools, (NRC) 1988) called for major revisions to educational programs. Aspects of those revisions included ability of educators to solve problems, adapt new technology, demonstrate effective leadership skills, and posses solid command of core skills. Other aspects related to more flexibility in curriculum and program design, and the requirements and activities of programs and more responsibilities.

In response, state departments of education and local school systems implemented innovative programs such as School-to-Career, Tech Prep and Craftsmanship 2000. The National FFA Organization created additional programs such as Computers in Agriculture, Agricultural Sales contest, and the Agriscience Student Recognition program. State FFA associations developed more specific programs adding complexity and opportunity to the range of agricultural education teacher responsibilities. The state of Washington FFA Association administered an Agriscience Team contest and Natural Resources skills contest to enhance program offerings. The state of Pennsylvania Department of Education promoted aquaculture as an agricultural production option. Job Interview contests were added to the career development events in California.

Lockwood (1976) concluded that the list of teacher responsibilities grew to the point that there are more activities than time to do them. Goode and Stewart (1981) noted during the last 18 years at least eight time-consuming activities were added to the list of agricultural education teacher responsibilities in Iowa. "The growth of agricultural education program offerings are a mixed blessing; on one hand, students benefit by having more choices, and on the other hand, teachers must constantly incorporate more responsibilities while developing new skills to keep technically updated" (Ennis, 1991 p. 3).

The NRC committee (1988) concluded that some vocational agriculture teachers spent inordinate time preparing students for FFA activities. According to the NRC, these teachers tended to place less emphasis on delivering agricultural instruction in the classroom, updating curricula, or involving the business community in the vocational

agriculture program. "In many vocational programs, a principal focus of class time and extracurricular activity is preparing students to compete in traditional, production-oriented FFA contests and award programs" (NRC, p. 43).

The job duties of secondary agricultural educators have similarly evolved and increased. As the job duties have generally changed over time, other professional issues have arisen as well. Crucial issues face the field of agricultural education today, such as job satisfaction, burnout rates, and retention of secondary agricultural education teachers. Agricultural education programs have consistently changed over the last decade, yet minimal research existed on the impact to teacher job responsibilities since Juergenson's (1965) survey of agriculture teacher job duties.

The teacher's roles and responsibilities, including entry-level requirements, should be delineated in a job description or similar document at the time of employment by the school. Professional roles and responsibilities include such areas as knowledge of subject matter; earning and maintaining current teaching credentials; reviewing and selecting curriculum materials; designing instruction and planning lessons; monitoring and assessing student learning; communicating with parents; maintaining records of student learning; fulfilling applicable laws and government regulations; and participating in professional service and staff development activities (Scrivens, 1997). The requirements for managing those professional skills and responsibilities within the context of the three agricultural education areas may be overwhelming, potentially leading to problems of recruitment and retention of secondary agricultural education teachers. Teachers of secondary agricultural education must possess or develop the abilities required to perform the many duties involved in conducting a successful program of agricultural education.

The agriculture teachers' job responsibilities, as articulated by Phipps and Osborne, (1988) and the professional development requirements for teachers in general, as described by Scrivens, (1997) form the theoretical structure for job responsibilities defined as the foundation for this study.

It seems apparent that an important aspect for discovery is the perception of secondary agricultural education teachers toward their job duties, especially in terms of relationship to the secondary agricultural education program.

Background of Methodology

Q methodology was first developed in the 1930's by William Stephenson (1953) and was described as an instrumental and philosophical approach to the study of subjectivity. Teacher subjectivity was considered synonymous with personal viewpoint, beliefs, experience, and background. Performing a Q-sort was an evaluation for which right answers did not exist. Stimuli were placed in significant order from the standpoint of the person completing the sort. In this study, understanding of teacher beliefs and judgments was derived from use of statements about job responsibilities. The ordering of statements by the individuals reflected differences in importance each statement had for that person. Thus, a picture of the viewpoint toward job responsibilities of each individual was revealed. The data resulting from the statements arranged by each teacher were analyzed to yield useful statistics for the interpretation of meaning.

In Q methodology, the research variable becomes the people performing the Q-sorts, not the various Q-sort statements. Factor analysis conducted with Q methodology was considered to be appropriate in determining what people perceive related to the subject being studied. Teachers associated with a certain factor were assumed to have a common perspective, or to form clusters of persons, according to the similarity in their rank ordering of the statements or items (Stephenson, 1953).

Recognizing the factor analytic model in Q methodology represented the sorts of people, increasing the number of persons on any factor had little impact on the results. Thus, the results were expected to be valid for other persons of the same potential type (Brown, 1980). Persons of a particular outlook would be expected to load highly on the same factor. For example, in this research, the results applied only to teachers participating in the study. However, one might conjecture that secondary agricultural education teachers of similar age, gender, and years of teaching experience from other states held similar beliefs about their job responsibilities.

The concourse comprises the raw materials for Q methodology. The flow of communicability surrounding any topic is referred to as a "concourse". A concourse can be collected in a number of ways. The two most typical methods were reviewing literature and/or interviewing people and jotting down or recording what they say. A study of public opinions, would necessitate interviewing representatives of those segments of the society apt to have something to say about the issue. The concourse is where the sample statements were developed to be administered in a Q sort (Brown, 1993). The number of statements used in a Q sort may be as large as the investigator pleases (Stephenson, 1953) with most researchers concerned with statements that put variability of meaning among the items so that extreme positions do not dominate the sort. Kerlinger, (1986) wrote that sorters can handle up to 90 or 100 statements and recommended between 50 and 100. The more complex, the fewer statements should be used, according to Kerlinger.

In Q methodology, the research variable becomes the people performing the Q-sorts, not the various Q-sort statements. Factor analysis conducted with Q methodology was, therefore, considered appropriate to determine what people perceive related to the subject being studied. Subjects associated with a certain factor were assumed to

have a common perspective, or to form clusters of subjects, according to the similarity in their rank ordering of the statements (Stephenson, 1953).

Q methodology (McKeown & Thomas, 1988) enabled respondents to communicate a point of view from an internal frame of reference. Following data analysis, the statements composing each of the Q-data factor arrays described the meaning of likeness or unlikeness to the subjects loading on that factor. Interpretations of factors extends beyond statistical analysis to theoretical criteria. This includes using interview data, previous literature, and researcher interpretations (Brown, 1980).

Problem Statement

The National Research Council's (1988) study on agricultural education in the secondary schools reported finding that secondary agricultural education teachers were spending too much time on FFA and not enough on classroom instruction. Additionally, state education departments and local school systems implementation of more programs based on the national reports, A Nation At Risk and Understanding Agriculture have increased job responsibilities for teachers in agricultural education programs. A study was needed because little is known about how secondary agricultural education teachers perceive their job responsibilities.

Purpose

The purpose of this research was to describe perceptions of selected California secondary agricultural education teachers in the Central and San Joaquin regions concerning their job responsibilities.

Research Question

How do selected agricultural education teachers describe their work?

Methodology/Procedures

Twenty-three secondary agricultural education teachers were invited by the researcher to represent regional areas in California based on gender, age, years of teaching experience and agriculture department size. Thirteen respondents represented the Central region and ten respondents represented the San Joaquin region. The two selected regions employed the highest number of secondary agricultural education teachers within the state of California.

Respondents were selected from the California agricultural education directory. In each region, diversity in terms of gender, age, years of teaching experience, and agriculture department size were considered for each invitation. Upon selection, the researcher contacted each subject by telephone to request participation in the study. Appointments were scheduled with teachers agreeing to participate. All 23 invitations were accepted. Before taking part in the research, each respondent completed a consent form. The individuals were informed of the study's purpose and assured confidentiality, anonymity and the right to withdraw at any time.

Q method adapted well to studying perceptions of secondary agricultural education teachers' job duties and responsibilities. "Q method is an important and unique approach to the study of psychological, sociological, and educational phenomena" (Kerlinger, 1973, p. 58 - 59). This study used Q methodology to measure teachers' point of view regarding their job responsibilities.

A Q sort was designed using a triarchic theoretical structure constructed by combining Phipps and Osborne (1988) and Scrivens (1997). Twenty California and Oklahoma secondary agricultural education teachers were interviewed. Each individual was asked to list their duties as a classroom/lab teacher, FFA advisor, SAE supervisor, and any other job duties.

The population of potential statements regarding the topic of interest was called a concourse in Q methodology (Brown, 1980). Because the concourse was drawn from several sources and in-depth interviews, it was considered a hybrid, utilizing a naturalistic and theoretical framework (McKeown & Thomas, 1988). The theory depicted was a combination of Scriven's (1997) teacher's professional responsibility descriptions, and Phipps and Osborne's (1988) description of agricultural education teacher's job responsibilities. Using interview data from secondary agricultural education teachers and the literature descriptions, a theoretical structure was determined to represent secondary agricultural education teacher duties. The three areas of classroom/lab instruction, SAE & FFA, and administrative/professionalism represent this triarchic structure.

A total of 156 statements were pooled together from interviews, the research, and literary sources. The researcher categorized the statements into the three areas based on the theoretical structure. A panel of secondary agricultural education teachers reviewed all 156 statements for the following criteria: (1) representation of the construct; (2) non-redundant statements; (3) full range of opinions or ideas represented in the construct; and (4) use of language familiar among agricultural education teachers. Content analysis of all statements produced twelve statements for each category in classroom/lab instruction, FFA/SAE, and administration/professionalism.

Table 1
Q-sort Statements

1. Develop unique educational opportunities for special population students.
2. Develop good working relationships with other teachers, staff, and administrators.
3. Infuse employability skills/workplace applications throughout the curriculum.
4. Utilize curriculum, materials, and resources that are culturally sensitive and free from gender bias.
5. Create and manage an attractive and functional learning environment.
6. Incorporate a variety of teaching methods into instruction.
7. Integrate more computer/technology based materials into the curriculum.
8. Identify each student's learning style and individualize instruction accordingly.
9. Collaborate with other academic and vocational teachers.
10. Connect classroom lesson plans with work-site learning & on-the-job experiences.
11. Assist students to use available resources in solving problems, decision-making and critical thinking.
12. Utilize quality student assessment strategies.
13. Plan and assist with the chapter FFA program of activities.
14. Coach a variety of Career Development Event teams (judging teams).
15. Direct all FFA community service projects and activities.
16. Supervise all student SAE projects.
17. Participate in FFA activities at sectional, regional, and state levels.
18. Coordinate annual FFA chapter banquet.
19. Assist students with their recordbooks.
20. Infuse school-to-work concepts into student organization activities.
21. Assist students with their projects at livestock show.
22. Direct livestock selection for students' projects.
23. Encourage students to participate in FFA activities.
24. Showcase student achievements.
25. Expand recruitment strategies to reach all student populations.
26. Modify programs to meet local job opportunities.
27. Conduct follow-up studies to track former students.
28. Maintain effective advisory committee meetings throughout the year.
29. Attend school board meetings on a regular basis.
30. Search for grants and funding for program enhancement.
31. Continue formal education and other professional development opportunities.
32. Complete self-assessment processes and plan for modification.
33. Participate periodically in business and industry experiences.
34. Provide leadership in professional organizations.
35. Write articles for professional publications.
36. Network at every possible opportunity about the program.

A panel of secondary agricultural education teachers pilot tested the Q-sort. As a result of the pilot study, modifications were made to enhance clarity and simplify statements to improve the instrument's readability. The statements were placed on cards to be sorted according to the Q-sort form board, which was constructed with a range of nine columns with frequencies of 2 – 4 – 4 – 5 – 6 – 5 – 4 – 4 – 2.

The researcher administered the Q-sort to individual teachers during August and September 1998. After consent forms were secured, the researcher proceeded with an oral presentation. Conditions of Instruction/Record Sheets were distributed and each subject was instructed to complete the six demographic questions before proceeding to the next part. The subjects were instructed to sort the statements based on two conditions of instruction: 1) "What is your actual job like?" and, (2) "What would you want your ideal job to be like?" Teachers began by forming a three pile general sort for the first condition of instruction.

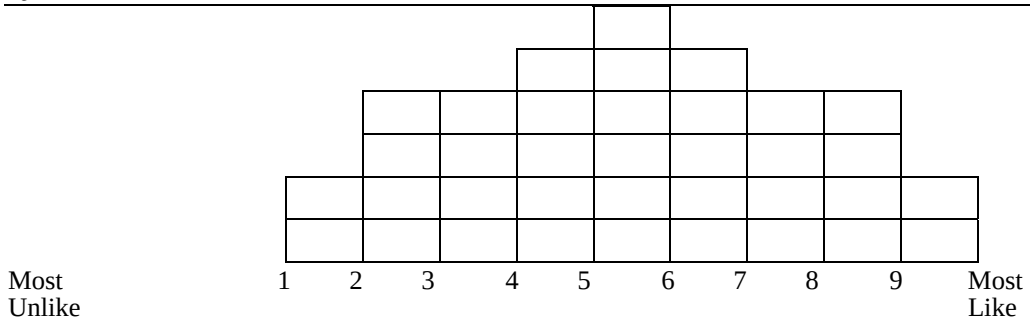
Statements most like their job were placed in a pile on the right. Statements most unlike their job were placed in a pile on the left. Statements that fell in between or had no particular meaning to the subject were placed in a center pile. When this process was completed, teachers moved the statements from the three piles onto the Q-sort form board were given oral directions based on a particular order. The order to the statements chosen from each pile was based on the distribution of spaces on the Q sort form board, starting with the most like and then the most unlike. Alternating Q-sort statements from each pile working towards the center column of the Q-sort form board.

Once teachers placed each statement on the Q-sort form board, the statement numbers were recorded onto the condition of instruction/record sheet. Subjects were instructed to clear the boards in preparation for the second condition of instruction – "What would you want your ideal job to be like?" Instructions were repeated as for the first condition of instruction.

After the second condition of instruction was completed, the subjects recorded their answers for the post Q-sort summary question on their condition of instruction/record sheet. Upon completion of answering the post Q-sort summary question, the researcher also collected field notes during the interview. Initially, a cassette tape recorder

was used to collect responses, however its use inhibited teacher response, so it was discarded. Instead, the researcher recorded handwritten field notes, with quotations to directly relate to the factor interpretation.

Table 2
Q-sort Form Board



Data analysis involved the sequential application of three sets of statistical procedures including correlation, factor analysis, and computation of factor scores. This was followed by interpretation of the factors. "Correlation coefficients are employed to determine the extent to which statement patterns in two Q-sorts are similar" (Brown, 1980, p. 267). It is believed that teachers who rank-order items in approximately the same manner have similar attitudes towards the topic in question. Using PQ Method 2.0 (Atkinson, 1992), correlation coefficients were utilized to determine the extent to which rank order patterns in Q-sorts were similar. Each sort was compared to all other sorts. Pearson correlation coefficients provided this measure of association. Higher positive correlations indicated similar Q-sorts. Higher negative correlations indicated an inverse relationship between Q-sorts. The Q-sorts in this study were correlated producing a 46X46-correlation matrix. The correlation matrix was used to extract factors in which teachers grouped themselves as like-minded.

The factoring routine chosen from the PQMethod 2.0 software package (Atkinson, 1992) was a principal component factor analysis. The principal component method was the solution that maximized variance of each succeeding factor. PQMethod 2.0 calculated eignenvalues for each subject. The program extracted eight factors that had eignenvalues greater than 1.00. The varimax method was used to rotate the factors to achieve orthogonal solutions analyzing a three, four, and five factor solution. It enabled procurement of a simple vantage point from which to describe the data. A three-factor solution was chosen and calculated with *z* scores forming a single array of scores for each factor based on an inspection criteria outlined by Brown (1993). The *z* score was used to determine the arrangement of statements on each factor array. Factor arrays were used to interpret factor scores, and consensus items between and among factors, and to describe the interview data from the participants.

Findings

Three predominant beliefs emerged from the secondary agricultural education teachers when describing perceptions of their work. The three beliefs interpreted as intracurricular-oriented, academic-centered, and community-based represented the literature. Based on the theoretical structure (Phipps & Osborne, 1988 and Scrivens, 1997), the three beliefs reflected the theory.

Each of the three factors was interpreted to represent the respondent's beliefs. Factor 1 focused on items mainly related to SAE and FFA activities and was identified as Intracurricular-oriented. Factor 2 was labeled Academic-centered because most items dealt with student learning and classroom instruction. Factor 3 was named Vocational-based as the items included relationships with business and industry, and meeting community needs. Field notes and answers to the post Q-sort summary question were used to support the descriptions of beliefs.

The Q sort statement items distinguishing the Intracurricular-oriented respondents indicated the position of the Q-sort statements was different from the position of these statements on any of the other theoretical factor arrays. Intracurricular-oriented teachers believed job responsibilities focused on involvement with FFA chapter activities and including building an interest in students to become more active in the FFA. They also believed that teacher involvement with a student's SAE project was important. This factor clustered around statements dealing with responsibilities directly related to intracurricular components of the secondary agricultural education program.

Most-like Q-sort statements representing the respondents' beliefs included: (23) Encourage students to participate in FFA activities; (17) Participate in FFA activities at the sectional, regional, and state levels; (16) Supervise all student SAE projects; (19) Assist students with their recordbooks; (13) Plan & assist with the chapter FFA program of activities; and (18) Coordinate annual FFA chapter banquet. Their beliefs focused on the FFA and SAE components of the program.

Table 3
Factor 1: Intracurricular-oriented Q-sort Grid

				31					
			36	3	11				
		1	33	8	34	30	6	16	
		7	4	26	25	2	22	19	
	24	27	10	20	12	15	14	13	23
	35	29	32	9	28	5	21	18	17
Most Unlike	(-4)	(-3)	(-2)	(-1)	(0)	(+1)	(+2)	(+3)	(+4) Most Like

The Q-sort statement items distinguishing the Academic-centered indicated the position of the Q-sort statements was quite different from the position of the statements on any of the other theoretical factor arrays. This factor clustered around statements dealing with responsibilities related to classroom instruction, student learning styles, and student achievement.

Most-like statements representing respondents' beliefs included: (6) Incorporate a variety of teaching methods into instruction; (8) Identify student learning styles & individual instruction; (17) Participate in FFA activities at sectional, regional, & state levels; (30) Showcase student achievements; (31) Continue formal education and other professional development opportunities; and (23) Encourage students to participate in FFA activities.

Table 4
Factor 2: Academic-centered Q-sort Grid

				9					
			20	25	36				
		35	16	34	19	2	3	17	
		4	12	33	13	14	11	30	
	29	27	18	28	7	1	24	31	6
	22	21	32	15	10	24	5	23	8
Most Unlike	(-4)	(-3)	(-2)	(-1)	(0)	(+1)	(+2)	(+3)	(+4) Most Like

The Q sort statement items distinguishing the vocational-based indicated the position of the Q-sort statements was quite different from the position of the statements on any of the other theoretical factor arrays. This factor clustered around statements dealing with responsibilities related to community activities, involvement with local businesses and industries, work place skills, and learning experiences.

Most like statements representing the respondents beliefs included: (10) Coordinate meaningful work-site learning/job shadowing/on-the-job training/practicum experience; (2) Develop good working relationships with other teachers, staff, and administrators; (26) Modify program to meet local job opportunities; (17) Assist students with their recordbooks; and (33) Participate periodically in business & industry experiences.

Table 5
Factor: 3 Vocational-based Q-sort Grid

				7					
			1	28	11				
		4	31	30	27	3	23	2	
		29	15	24	17	20	16	26	
	34	14	18	25	9	32	13	19	10
	35	36	5	8	22	12	6	33	21
Most Unlike	(-4)	(-3)	(-2)	(-1)	(0)	(+1)	(+2)	(+3)	(+4) Most Like

The NRC report revealed that teachers placed less emphasis on delivering agricultural instruction in the classroom, updating curricula, or involving the business community in the vocational agriculture program (NRC, 1988). Also, the FFA component tended to dominate the entire secondary agricultural education program.

Secondary agricultural education teachers have changed their perspective from the focus of the FFA to other aspects of the program since 1988. Based on the findings of this study, teachers were concerned about being better

classroom teachers and being involved with business, industry and community needs. They believed their real job was intracurricular-oriented (SAE/FFA) but, they revealed that their ideal job was to be more academic-centered and strive to be a better classroom teacher. Some teachers stated they lacked time to be an effective classroom teacher or they viewed themselves as a poor classroom teacher because of the demands from FFA and SAE activities.

Implications/Discussion

This study revealed secondary agricultural education teachers hold varying perceptions of what is important regarding their job responsibilities. Types of opinions at issue for teachers varied on items associated with classroom/lab instruction, FFA & SAE activities, and professional/administrative duties. Three theoretical factor arrays were generated and each illustrated a teacher profile.

Phipps and Osborne (1988) and Scrivens (1997) described job responsibilities defined as the theoretical foundation for this study. Q method was used to determine respondents' opinions about their job responsibilities. The triarchic structure represented three areas of a secondary agricultural education program, which include: classroom/lab instruction, SAE & FFA, and administrative/professionalism. The results of the findings yielded three profiles: intracurricular-oriented, academic-centered, and vocational-based.

Factor 1: Intracurricular-oriented

Most female teachers from the Central region believed their real job focused on being intracurricular-oriented, but viewed their ideal job to be academic-centered. Female teachers viewing their real job as intracurricular-oriented had between three and six years of teaching experience and ranged in age from 28 to 41 years. Some male teachers viewed both their real job and their ideal job to be the same and typically were employed in large teacher sized departments.

Other teachers felt that the FFA and SAE activities were overly demanding of their time and consumed a majority of classroom instruction time. Most were concerned about being or becoming better classroom teachers.

Some teachers believed the FFA and SAE components of the program were based on meeting the criteria for the California Agriculture Incentive Grant. They needed to meet the criteria which alloted money to the program. Teachers viewed incentive grant money driving the program and believed they had no choice in determining how much time should be spent on FFA and SAE activities. Furthermore, some teachers believed the measure of success, as viewed by their peers, was the number of FFA/SAE competitive events their students were involved in and/or won. Those reactions indicated teachers felt the need to compete in many FFA activities and SAE, but they would prefer to have their own choice.

Factor 2: Academic-centered

Most female San Joaquin region teachers viewed their real job to be academic-centered and most female Central region teacher viewed their ideal job to be academic-centered. Most female teachers in the study were under 40 years of age. This indicated that that there are philosophical differences between female teachers in the Central and San Joaquin regions. Overall, most of the female agriculture teachers viewed their real and ideal jobs to be more academically focused with less emphasis in the SAE and FFA components of the program. They believed academics to be more important to students than the intracurricular activities.

The teachers tended to put emphasis and concern on being a better classroom teacher. They seemed to strive for a balanced program incorporating FFA and SAE experiences to enhance classroom instruction, rather than the intracurricular activities dominating the program.

Factor 3: Vocational-based

Typically, male teachers from multiple teacher departments in the Central region having more than 20 years of teaching experience viewed their real job to be vocational-based. Male teachers in the San Joaquin region with 27 to 32 years of teaching experience and employed in large teacher departments viewed their ideal job to be vocational-based. This indicated that older male teachers perceived the focus of the program to incorporate community service, meet local business needs and provide students with job skills. In comparing these teachers' viewpoint to agricultural education of the 1990's it could be concluded that older teachers still hold the 1970's and 1980's perception of their programs. The changes that have occurred to secondary agricultural education in the 1990's seem to draw away from the vocational aspect of the 1980's and 1970's era. Teachers felt that being involved in the community was important, but there has been less emphasis on community service activities which these older teachers still felt was an important aspect of their job.

The secondary agricultural education teachers agreed their job responsibilities existed in the three profiles. They shared common job responsibilities among the triarchic structure, but held a different viewpoint about the realm of their profession.

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HIGHER-ORDER THINKING VERSUS LOWER-ORDER THINKINING SKILLS: DOES SCHOOL-DAY SCHEDULING PATTERN INFLUENCE ACHIEVEMENT AT DIFFERENT LEVELS OF LEARNING?

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Abstract

Historically, one of the most constant features of America's high schools is the structure of the school day. However, in the 1990s, "The most visible and perhaps significant change in the organization of the high school is the block schedule" (Cawelti, 1997, p. 41). There have been conflicting results regarding the effects of block scheduling on student achievement. Researchers in agricultural education have supported instructional practices that improve student learning at higher levels of cognition. Yet, little is known about the effects of scheduling on agricultural education and its influence on student cognition. This study compared higher- and lower-order thinking skills (HOTS and LOTS) achievement of students enrolled in animal science on a Traditional schedule to the achievement of students on a Block schedule. The responding sample included 45 teachers representing 23 Traditional scheduled schools with 341 students and 22 Block scheduled schools with 325 students. Student achievement was measured by two examinations/scales based on an extension of Newcomb and Trefz' (1987) "levels of learning" model. The scales consisted of 33 HOTS and 23 LOTS items. Teachers answered a questionnaire describing themselves and their schools. Student achievement was slightly more than half of the "conventional" 70 % passing standard. T-tests revealed that neither HOTS nor LOTS performance of students on a Traditional schedule was significantly different than that of the Block scheduled students. Multiple regression analyses with hierarchical order of entry were performed. The moderator variables student length of FFA membership and teacher tenure significantly explained student variability for both levels of achievement (longer FFA membership and longer teacher tenure resulted in greater achievement); the scheduling variable Traditional versus Block did not explain additional student variability in achievement. One could not conclude that one schedule was superior to the other in improving student achievement.

Introduction/Theoretical Framework

Elmore (1995) stated, "Over the past decade the United States has been engaged in the most sustained period of educational reform since the Progressive Era" (p. 356). Evidence of impetus for reform has been well documented by reports such as *Prisoners of Time* (National Education Commission on Time and Learning, 1994) and *Breaking Ranks: Changing an American Institution* (NASSP, 1996). These reports called for a restructuring of the American educational system, and frequently targeted "time" and its use in school-day scheduling patterns as a basic element to be altered**.** Moreover**,** learning theorists (Bloom, 1974; Carroll, 1989) have stated that time and its use is a significant and essential component of student learning. Karweit and Slavin (1981) maintained "the ambiguity of the research studies to date, make the continuation of studies of time and learning important" (p. 158).

Researchers (Carroll, 1990; Kirby, Moore, & Becton, 1996) have maintained that one of the most constant features of America's high schools is the structure of the school day. In support, Carroll (1990) contended, "For three-quarters of a century–a period characterized by immense social, political, economic, and technological changes–the high school has not changed its basic form of organization" (p. 360). Moreover, investigators have said, "The way time is organized in schools may have contributed to the educational deficiencies in American education identified in such reports as A Nation at Risk" (Wortman, Moore, & Flowers, 1997, p. 440). This "basic" or "traditional" school-day schedule is one in which students attend between six and eight classes each school day, with a class lasting approximately 50 or so minutes (York, 1997).

However, Cawelti (1997) concluded, "The most visible and perhaps significant change in the organization of the high school is the block schedule" (p. 41). DiRocco (1998/1999) asserted, "Intensive schedules [i.e., block scheduling] can be a powerful catalyst for change and for improved instruction in our secondary schools when implemented properly" (p. 83). Although many "variations" of block scheduling exist (Canady & Rettig, 1995), two of the more common are the Modified A/B (Alternating Day) Block Schedule and the Nine-Week Accelerated (4X4) Semester Block Schedule. On the Modified A/B Block Schedule, the school day is divided into four instructional blocks of approximately 90 minutes each. Students alternate class attendance between "A" day classes and "B" day classes, and may be simultaneously enrolled for as many as eight different courses. On this schedule, most courses meet every other day for an 18-week semester. On the Nine-Week (4X4) Block Schedule, the school day is also divided into four instructional blocks of about 90 minutes each, but students attend the same four classes each day for the nine-week period.

Watson (1998) asserted, "In a block schedule, the [learning] tasks can be designed to take more time, be of greater depth, [and] require more inductive or higher-order thinking skills" (p. 97). Torres and Cano (1995) stated, "The use of thinking skills in problem situations is universally recognized as a prominent objective for all educational academies" (p. 46), including agriculture. Moreover, researchers Cano and Newcomb (1990) concluded that

agriculture teachers "should purposefully create learning situations which assist in the development of higher cognitive abilities in students" (p. 51).

Bloom, Engelhart, Furst, Hill, and Krathwohl (1956) described six levels of cognition, that is, levels of thinking often referred to as Bloom's Taxonomy. This approach to describing thinking behaviors delineated cognition into lower- and higher-order thinking skills and conceptualized them in a hierarchical fashion (Bloom et al., 1956; Newcomb & Trefz, 1987; Torres & Cano, 1995; Whittington, Stup, Bish, & Allen, 1997). Using Bloom's model as a framework, Newcomb and Trefz (1987) developed a similar model for classifying cognitive behaviors into "four levels of learning": remembering, processing, creating, and evaluating (Figure 1). Whittington et al. (1997) stated, "Research supports the theory that thinking at higher levels of cognition (thinking critically) is an indispensable skill and must be reinforced in schools" (p. 47). Cano and Martinez (1989) recommended, "Students of vocational agriculture should be challenged to develop stronger cognitive abilities and critical thinking abilities at higher levels through the instruction they receive" (p. 364). However, Cano (1990) stated that there was "a paucity of findings regarding vocational education students' level of cognitive performance. Specifically, research in determining the level of cognitive performance of vocational agriculture students was lacking" (p. 74). Whittington (1995) recommended that additional research was needed to investigate non-teacher variables that may be influencing the level of cognition obtained during instruction.

Block scheduling has been accompanied by conflicting results regarding its effect on student thinking skills and achievement (Wortman et al., 1997). Kirby et al. (1996) found agriculture teachers to be "neutral or undecided" (p. 357) when responding to the statement "Student achievement has improved with block scheduling" (p. 358). However, Brannon, Baker, Morgan, Bowman, and Schmidt (1999) concluded, "Agriculture teachers agreed that as a result of block scheduling learning is more meaningful for all students" (p. 197). Yet, little is known about the effects of scheduling on secondary-level agricultural education and its potential for influencing the cognitive development of students (Kirby et al., 1996; Wortman et al., 1997). Is there a difference in achievement for students enrolled in an agriscience course, depending on the school-day scheduling pattern?

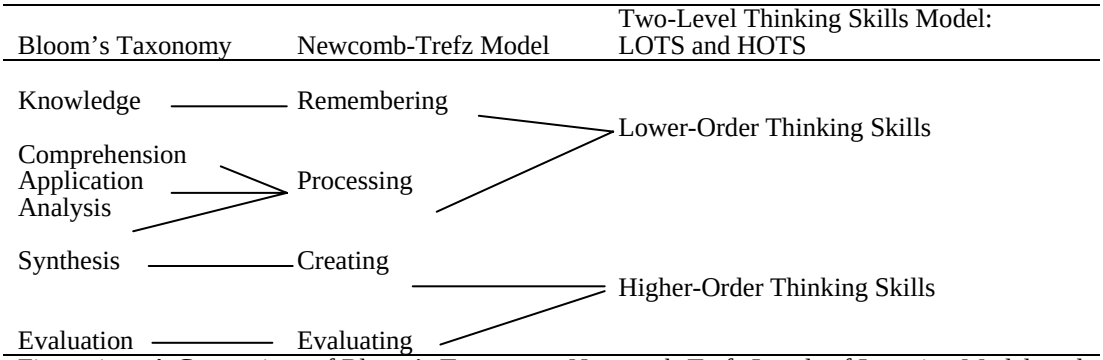

Figure 1. A Comparison of Bloom's Taxonomy, Newcomb-Trefz Levels of Learning Model, and a Two-Level Thinking Skills Model: LOTS and HOTS (Extended from a comparison of Bloom's Taxonomy and the Newcomb-Trefz Model (Whittington, 1995), *Journal of Agricultural Education*)

Purpose/Research Questions

The purpose of this study was to compare the higher- and lower-order thinking skills achievement of students enrolled for a secondary-level course in animal science on a Traditional school-day schedule to the achievement of students enrolled for the course on a Block schedule basis (i.e., Modified A/B (Alternating Day) and Nine-Week Accelerated (4X4) Semester Block schedules). These research questions guided this study:

1. What are selected characteristics of students enrolled in and instructors teaching a secondary-level course in animal science?
2. What is the level of achievement for HOTS, as described by Newcomb and Trefz (1987), for students enrolled in animal science? a) Does level of achievement for HOTS of students on a Traditional schedule differ from that of students on a Block schedule?
3. What is the level of achievement for LOTS, as described by Newcomb and Trefz (1987), of students enrolled in animal science? a) Does level of achievement for LOTS of students on a Traditional schedule differ from that of students on a Block schedule?
4. Do moderator variables, e.g., student and teacher variables, explain variation in student achievement, and does scheduling pattern significantly explain variation in student achievement after effects of moderator variables have been removed?

Methods/Procedures

This was a descriptive study that employed the causal-comparative method to describe and explore possible cause-and-effect relationships between school-day schedules and the achievement of intact groups. Gall, Borg, and Gall (1996) stated that "the major advantage of the causal comparative method is that it allows us to study cause-and-effect relationships under conditions where experimental manipulation is difficult or impossible" (p. 383).

The target population (Gall et al., 1996) consisted of students enrolled in and the instructors teaching the agriscience course Animal Science (AGSC 332) in Texas public schools during the fall of 1998. Schools that had offered/taught this course for the school years 1996-97 and 1997-98 (n = 388) were obtained from the Texas Education Agency and served as the sampling frame. The "experimental units" for this study were individual agriscience classes and teachers, but individual students were the sampling units within an agriscience class. This was a form of cluster sampling, which, according to Gall et al. (1996), "is used when it is more feasible to select groups of individuals rather than individuals from a defined population" (p. 227). The responding sample consisted of 45 "volunteer" teachers and schools, representing 23 Traditional scheduled schools with 341 students and 22 Block scheduled schools with 325 students. Because the data for this study were provided by a volunteer sample, the results are generalizable only to subsequent similar volunteer samples.

The students completed a two-part instrument. Part one consisted of selected demographic items, e.g., length of FFA membership. The second part of the instrument was an end-of-course achievement examination. Glaser (1963) maintained that achievement tests were appropriate for determining "the degree to which the student has attained criterion performance" (p. 519). The examination was developed from recommended curriculum materials for the agriscience course Animal Science (AGSC 332) (Instructional Materials Service, n.d.; Instructional Materials Service, 1998). It included 56 multiple-choice items selected for content validity in the areas of nutrition, reproduction, health, and management of domestic animals. Three agricultural educators—a curriculum specialist, a classroom teacher, and a measurement specialist—reviewed the items for clarity and content.

The examination was divided into two scales based on an extension of Newcomb and Trefz' (1987) "levels of learning" model (Figure 1). The two scales consisted of 33 higher- and 23 lower-order thinking skills items, respectively. The LOTS portion of the examination was made up of remembering and processing items; the HOTS scale contained items at the creating and evaluating levels of learning (Newcomb & Trefz, 1987). The Cronbach's coefficient alpha reliability estimate for the LOTS scale was .79, while the HOTS scale had a reliability estimate of .78. Finally, teachers responded to a questionnaire that included selected multiple-choice items describing themselves and their schools.

A researcher-developed packet consisting of student questionnaires/examinations, teacher questionnaires, pre-coded scan sheets, and postage-paid return envelopes were mailed to the participating teachers. Due to varying end-of-course dates, two mailings were necessary. Teachers administered the student questionnaires/examinations and completed their questionnaires at or about the same time. The student scan sheets were coded so that they could be identified with their teacher and school-day schedule. The returned scan sheets were inspected to ensure the number codes were still intact. Following scanning, the data were entered into a Microsoft Excel 97 spreadsheet file and then imported into an SPSS 7.5 data file. T-tests were performed to compare means and explore differences for research questions two and three, with an a priori alpha of .05. Multiple regression analyses with hierarchical order of entry of predictor variables were performed to answer question four.

Results/Findings

As seen in Table 1, slightly more than one-half of the participating students were male and nearly 44 percent were female. Almost 70 percent of the students were Anglo, while three-in-ten identified themselves as "People of Color." Slightly more than three-in-ten had never been an FFA member, and approximately seven-in-ten had been members for one or more years. Nearly three-fourths indicated at least "some experience" with domesticated animals, while slightly more than one-fourth said they had "little" or no experience (Table 1).

Nearly 90 percent of the teachers were male while slightly more than one-in-ten were female (Table 1). Concerning their education, the teachers were nearly evenly divided, that is, slightly less than half held only a bachelor's degree while a slight majority had earned a master's degree. Years of experience as an agriscience teacher was also nearly evenly split with slightly less than half of the teachers having taught 12 or fewer years, and slightly more than half indicating 13 or more years of service. When asked about years of service at their current school, a slight majority replied that they had taught at their current school for 10 or fewer years, while slightly less than half indicated 11 or more years of service (Table 1).

Table 1.

Selected Characteristics of Students (N=666) Enrolled in and Instructors (N=45) Teaching Animal Science

Characteristic	N	Percent
Students		
Gender[a]	369	55.4%
Male	292	43.8%
Female		
Ethnicity[b]	459	68.9%
Anglo (White Non Hispanic)	197	29.7%
People of Color		
FFA Membership[c]	207	31.1%
Never	126	18.9%
Less than one year	140	21.0%
Two years	140	21.0%
Three years	51	7.7%
Four years		
Experience with Domestic Animals[d]	43	6.5%
None	140	21.0%
Little experience	175	26.3%
Some experience	116	17.4%
Much experience	191	28.7%
Great experience		
Instructors		
Gender	39	86.7%
Male	6	13.3%
Female		
Highest Level of Education	21	46.7%
Bachelor's degree	24	53.3%
Master's degree		
Years of Experience as an Agriscience Teacher	21	46.6%
1 – 12 years	24	53.3%
13 or more years		
Years of Service at Current School	23	51.2%
1 – 10 years	22	48.9%
11 or more years		

[a] Five students did not answer this question.
[b] Ten students did not answer this question.
[c] Two students did not answer this question.
[d] One student did not answer this question.

The HOTS achievement mean for all students was M=35.50, SD=12.34 (Table 2) or only very slightly more than half of the "conventional" 70 % passing standard. Students on a Traditional schedule scored higher (M=37.24, SD=15.22) than students on a Block schedule (M=33.69, SD=8.34) (Table 2). Further, the LOTS achievement mean for all students was M=37.78, SD=13.55 (Table 2) or slightly more than half of the "conventional" 70 % passing standard. Students on a Traditional schedule scored higher (M=39.08, SD=15.73) than students on a Block schedule (M=36.42, SD=11.03).

Table 2.
Means and Standard Deviations for End-of-Course Thinking Skills Achievement by Scheduling Pattern, (N=45)

School-Day Scheduling Pattern	N	Mean	SD
Higher-Order Thinking Skills (HOTS)			
Traditional	23	37.24	15.22
Block[a]	22	33.69	8.34
Overall	45	35.50	12.34
Lower-Order Thinking Skills (LOTS)			
Traditional	23	39.08	15.73
Block[a]	22	36.42	11.03
Overall	45	37.78	13.55

[a] Includes Modified A/B and Nine-Week (4X4) Block groups combined.

A t-test was used to compare the end-of-course achievement for HOTS for the Traditional scheduled students versus those who were Block scheduled (Table 3). This procedure produced a mean difference of 3.55, t (43) = .963 p = .341 (Table 3). The difference was not significant at an alpha level of .05. That is, the HOTS performance of students on a Traditional schedule was not statistically significantly superior to that of the Block schedule students. Further, a t-test was used to compare the end-of-course achievement for LOTS (Table 3). This procedure produced a mean difference of 2.66, t (43) = .652, p = .518 (Table 3). The difference was not significant at an alpha level of .05. That is, the LOTS performance of students on a Traditional schedule was not statistically significantly superior to that of the Block schedule students.

Table 3.
End-of-Course Thinking Skills Achievement: Contrast of Traditional versus Block Scheduling

Source	Mean	Mean Difference	S.E.	t	df	sig.
Higher-Order Thinking Skills (HOTS)						
Contrast[a]						
Traditional	37.24	3.55	3.68	.963	43	.341[c]
Block[b]	33.69					
Lower-Order Thinking Skills (LOTS)						
Contrast[a]						
Traditional	39.08	2.66	4.07	.652	43	.518[c]
Block[b]	36.42					

[a] Contrast assumes equal variances.
[b] Includes Modified A/B and Nine-Week (4X4) Block groups combined.
[c] Not Significant.

To determine if school-day scheduling patterns significantly explain variability in student achievement after the effects of selected student and teacher variables were removed, multiple regression analyses with hierarchical order of entry of variables were performed. These procedures were done to control initial non-equivalence in the two research groups. Correlation analysis revealed that there was a statistically significant relationship between the student variable length of FFA membership and end-of-course higher- and lower-order thinking skills achievement, r = .53 and r = 46 ($p < .01$), respectively. That is, the greater the length of time the student had been a member of the FFA, the better they performed on the higher- and lower-order thinking skills achievement examination items.

Moreover, similar analysis demonstrated that there was a statistically significant relationship between the teacher variable teacher tenure and HOTS achievement ($r = .34$, $p < .05$). As a teacher's length of tenure increased, the HOTS achievement of their students increased. (The variable "teacher tenure" combined an instructor's years of experience as an agriscience teacher and their tenure at their current school. The resulting scale had a reliability coefficient estimate of .86.) Therefore, because of positive associations with student achievement, these two moderator variables were entered into a multiple regression analysis equation as step one in a hierarchical order of entry procedure. Then, to determine if school-day schedules significantly explained additional student variability for end-of-course achievement, the scheduling pattern variable was entered in step two of the procedure. Thus, step two included the variable Traditional versus Block.

In Table 4, step one portrays regression of the variable HOTS achievement on the variables student FFA membership and teacher tenure. A statistically significant amount of student variability for HOTS achievement was explained by this entry: $R^2 = .324$, $F = 10.046$, $p = .000$. But, when the variable Traditional versus Block schedule was entered, there was not a significant contribution to the explanation of variance, R^2 Change = .000, $F = .020$, $p = .888$. Further, when the dependent variable LOTS achievement was regressed on the independent variables entered in step one, i.e., student FFA membership and teacher tenure, the amount of variance explained was $R^2 = .231$, $F = 6.324$, $p = .004$ (Table 4), which was significant at an alpha level of .05. The variable Traditional versus Block schedule was entered into the regression equation in step two; it did not explain additional student variability for LOTS achievement, R^2 Change = .002,

$F = .103$, $p = .750$ (Table 4).

Table 4.
Hierarchical Regression of Thinking Skills Achievement on Selected Student and Teacher Variables and School-Day Scheduling Pattern

Variable(s) Entered	R Square	R Square Change	F Change	Sig. Of Change
Higher-Order Thinking Skills (HOTS)				
Step 1				
Student FFA Membership and Teacher Tenure	.324	.324	10.046	.000
Step 2				
Traditional versus Block	.324	.000	.020	.888
Lower-Order Thinking Skills (LOTS)				
Step 1				
Student FFA Membership and Teacher Tenure	.231	.231	6.324	.004
Step 2				
Traditional versus Block	.233	.002	.103	.750

Conclusions/Implications/Recommendations

Glaser (1963) contended "achievement tests are employed to discriminate among treatments, that is, among different instructional procedures [e.g., scheduling patterns] by an analysis of *group* differences" (p. 520). This study compared the higher- and lower-order thinking skills achievement of students enrolled for a secondary-level course in animal science on a Traditional school-day schedule to the achievement of students enrolled on a Block schedule. The end-of-course HOTS achievement for all students was only very slightly more than half of the "conventional" 70 % passing standard, while their LOTS achievement was only slightly better (Table 2). Webster and Miller (1998) found similar results for an animal science examination administered to high school seniors in 12 Midwestern States. They concluded that the students were not strongly intrinsically motivated to excel on the test, and that "this factor most likely explains why the students did not perform better on the exam" (p. 318). Moreover, was there a significant lack of "alignment" or "congruence" between the curriculum these students were taught and the course content on which they were assessed? Hoyle, Steffy, and English (1994) suggested, "the result of incongruence is normally lower test performance on the part of the students, particularly if the test has been selected because it was congruent with the written curriculum" (p. 98). The examination used in this study was based solely on the recommended curriculum materials for the course Animal Science (AGSC 332). Was this a valid procedure if the requisite "alignment" did not exist?

The higher- and lower-order thinking skill performance of students on a Traditional schedule was not statistically significantly greater than that of the Block schedule students (Table 3). Moreover, when multiple regression analyses with hierarchical order of entry were performed, and the moderator variables student length of FFA membership and teacher tenure were entered in step one, variability in HOTS achievement was significantly explained (Table 4). However, in step two, when the scheduling pattern variable Traditional versus Block was entered, there was no additional significant explanation of student variability (Table 4). Further, in the case of LOTS achievement, when the moderator variables student length of FFA membership and teacher tenure were entered in step one, variability in LOTS achievement was significantly explained (Table 4). Similar to HOTS achievement, in step two, when the scheduling pattern variable Traditional versus Block was entered, there was no additional significant explanation of student variability in LOTS achievement (Table 4). Based on these findings, one could not conclude that one school-day schedule was significantly superior to the other for the purpose of improving end-of-course achievement of students. Recommendations for future practice and research include the following:

1. This study suggests that there may be an "incongruence" between the actual curriculum materials that teachers used to teach animal science and the recommended instructional materials. Hoyle et al. (1994) stated, "curriculum mapping can reveal what was taught, in what order, and for how long . . ." (p. 90). So, a form of "curriculum mapping" should be used to identify the curriculum materials used by the instructors for this course. It might also be useful to examine the relationship between this study's teachers' use of the recommended materials and the performance of their students.
2. This study should be "replicated" using quasi- or experimental design procedures that will control potential extraneous variables (i.e., student length of FFA membership and teacher tenure), and thereby improve the generalizability of future results.
3. This study did not find a significant difference in the performance of learners depending on which school-day schedule pattern they received instruction. Would this result have been similar for other agriscience courses? Mindful of this, it is recommended that this study be replicated for other agriscience courses.
4. Are there other moderator variables that significantly explain student variability in end-of-course achievement for the secondary-level course Animal Science? Further research should be performed to determine if additional variables do exist.
5. As a component to the study that yielded these findings, Edwards and Briers (in press) found that there was a significant difference in the achievement of students, when two different "block" scheduling patterns (i.e., Modified A/B and Nine-Week (4X4) Semester) were compared. In addition to the two patterns investigated by that study, it appears that there are numerous "variations" of block scheduling regimens (Canady & Rettig, 1995). Therefore, it is recommended that a two-part study be conducted. The purpose of the first part would be to identify and describe these varied block-scheduling patterns. Then, in part two one might conduct additional comparative studies to determine if there are significant differences in student achievement depending on the learner's school-day schedule.
6. Although the relationship between the use of school-day time (i.e., scheduling patterns) and student performance remains ambiguous, researchers (Canady & Rettig, 1995; Carroll, 1994) have suggested that there is a causal relationship between the use of block scheduling and an improvement in school climate (i.e., classroom environment), and further, the important role that "climate" can play in the behaviors of students and teachers (Bloom, 1974; Hoyle et al.,1994; Kruse & Kruse, 1995). So, research should be undertaken to investigate how changes in school-day scheduling patterns may positively influence factors that comprise a school's "climate," and, subsequently, create learning environments that are more conducive to improved student achievement. For example, instructors teaching on different scheduling patterns may be exhibiting different teaching behaviors that are related to their students' performance. Case studies or other qualitative techniques could be conducted profiling the teaching behaviors of these instructors.

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AN ASSESSMENT OF AGRICULTURAL MECHANICS COURSE REQUIREMENTS IN AGRICULTURE TEACHER EDUCATION PROGRAMS IN THE UNITED STATES

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Abstract

Agricultural mechanics classes remain a popular choice for agricultural education students. These courses often comprise up to one-third of classes taught by agriculture teachers and continue to include traditional curricula despite growing discussion for utilizing more physical science-based curricula. Research has shown those teachers new to or preparing for the agriculture teaching profession often express anxiety for and a lack of preparedness to teach agricultural mechanics subject matter. The purpose of this study was to evaluate the preservice agricultural mechanics components of agriculture teacher education programs in the United States. States.

Fifty-nine agriculture teacher education programs were identified to accomplish the objectives of this descriptive study. These programs accounted five or more newly certified agriculture teachers annually during the academic years 1992-1994. Forty-six (78%) of the 59 programs responded to a mail questionnaire seeking to identify courses offered to support agricultural mechanics teacher preparation.

Results and Conclusions: Approximately two (2) three semester-credit-hour courses were generally required in agricultural mechanics to meet teacher certification requirements. In addition, 1.3 semester-credit-hours in agricultural mechanics teaching methods were required. From course syllabi collected, content offered in required agricultural mechanics courses reflected traditional agricultural mechanics subject matter. Most agriculture teacher education programs utilized instructors who have substantial knowledge in the areas of both agricultural education and agricultural mechanics to teach required agricultural mechanics courses. The departments in which these instructors teach reflected the changes in the agricultural industry as evidenced by the integrated titles of these departments. This may indicate a willingness to expand the content of required agricultural mechanics preservice courses to reflect these changes in agriculture.

Introduction / Theoretical Framework

Do students preparing to teach secondary agricultural education in the next millennium need agricultural mechanics teaching competencies? According to Phipps (1983) agricultural mechanics is an important component of the total secondary agricultural education program. Buriak (1992) found, however, that there were critics who perceived agricultural mechanics to be a non-essential area with the transformation of secondary agriculture programs to a truer science based curricula. These courses continue to be offered in secondary agricultural education programs despite discussions considering content changes towards a more science focused curricula (Harper, 1990; Dillard, 1991; Slocombe, 1987; National Research Council, 1988; Buriak, 1992; Osborne, 1992; Laird and Kahler, 1995).

Though still using traditional technology, agricultural mechanics lab classes remain popular. In 1998, for example, agricultural mechanics was offered in some form in 925 Texas schools with total enrollment in agricultural mechanics classes reaching nearly 28,000 (B.F. Shaw, personal communication August 3, 1999). Hoerner and Bekkum (1990) reported that agriculture teachers from seven selected states taught an average of two agricultural mechanics classes per semester. Shinn (1987) similarly found the amount of time devoted to laboratory instruction may comprise one-third to two-thirds of the total instructional time in many agriculture programs. However, preservice education may not necessarily provide new teachers with the proper experience to manage a dynamic learning environment such as an agricultural mechanics laboratory. The large percentage of instructional time spent in laboratory settings suggests a need for sound preservice laboratory and shop management practices.

Student teachers reported high levels of anxiety associated with teaching agricultural mechanics prior to and during their student teaching (Foster, 1986). For agriculture teachers to do the best job possible teaching agricultural mechanics, they need to receive current and reliable preservice agricultural mechanics instruction. However, Borne and Moss (1988) indicated that “on-the-job/self study” made the greatest overall contribution to preparation as first year agriculture teachers. Observant of the complexities for teaching in a laboratory environment, Johnson, Schumacher, and Stewart (1990) also suggested pre-service training of new teachers in laboratory management. They suggested it include timely, relevant instruction in the area of agricultural mechanics laboratory management practices.

Numerous studies indicated that teacher knowledge of agricultural mechanics was in need of improvement both prior to and after accepting teaching positions (Birkenholz, 1986; Schlautman and Siletto, 1992). Foster (1986) recommended that agricultural education majors participate in an early experience program designed to address those factors of highest anxiety, one being teaching agricultural mechanics.

Agricultural mechanics instruction is an important component of secondary agricultural education programs in the U.S. Therefore, a need exists to assess how teachers are being prepared to teach agricultural mechanics. Based on these findings agriculture teacher education programs will have a knowledge base for initiating curricular change.

Purpose / Objectives

The purpose of this study was to assess the agricultural mechanics course requirements necessary to achieve agriculture teacher certification at selected colleges and universities in the United States. Seven objectives were developed to guide this study.

1. Identify the number of newly certified agricultural teachers for the 1994-95 academic year within the study population.
2. Determine the total number of agricultural mechanics or related courses required for agriculture teacher certification.
3. Determine the number of semester credit-hours required in agricultural mechanics (or related) courses for agriculture teacher certification.
4. Ascertain the number of semester credit-hours in agricultural mechanics teaching methods required for agriculture teacher certification.
5. Determine minimum qualifications required/preferred of the instructors in agricultural mechanics courses required for agriculture teacher certification.
6. Develop an inventory of titles for those administrative units offering the agricultural mechanics required courses for agriculture teacher certification.
6. Identify the major topics of required agricultural mechanics or related courses for agriculture teacher certification.

Methods / Procedure

Population

The population for this study included university agricultural teacher certification programs that certified five or more agriculture teachers during the 1992-93 and 1993-94 school years, respectively, as reported in A National Study of the Supply and Demand For Teachers of Agricultural Education. The lower limit of five teachers certified was determined as the cutoff point due to budgetary restrictions of the researcher. A total of fifty-nine university agricultural education teacher certification programs were identified. For this two-year period, forty-eight of the fifty-nine identified programs certified five or more new agriculture teachers during both years. The remaining eleven universities certified five or more new agriculture teachers in only one of the two years. Consequently, a total of fifty-nine programs met the criterion for this study during this two-year period.

Instrumentation

This was a descriptive study that used a one-page, mail questionnaire. A panel of experts in agricultural mechanics curricula from several universities was used to insure content validity. To insure a high level of reliability, the instrument was administered to several groups of individuals at Oklahoma State University in the spring of 1996. These individuals included agricultural education teacher educators, former agricultural mechanics instructors and students of a research design course. The qualitative nature of the instrument did not lend itself to a formal test of reliability. Following review, the instrument was revised and distributed to the target population.

Data Collection

Data were collected over an eight-week period during the spring of 1996. Department heads of university programs were initially contacted via email to determine willingness to participate in this study. All universities agreeing to participate were mailed the instrument and a cover letter detailing the purpose of this study. A self-addressed, envelope was included for return of both the survey instrument and the requested syllabi of each respective university's required agricultural mechanics courses needed for teacher certification. Follow-up contacts of non-respondents were completed via electronic mail, conventional mail, or telephone. All non-respondents were contacted by telephone and/or email in an attempt to gather their completed survey and syllabi. The questionnaire was originally distributed to fifty-eight programs but it was determined through responses that one university issues two different types of credentials and the decision was made to count each as a separate program. Therefore, the total number of programs participating in the study was determined to be fifty-nine (N=59). A total of 46 of the 59 programs completed the survey resulting in a 78 percent response rate. Figure 1 provides a graphic representation of the responding institutions defined by AAAE region.

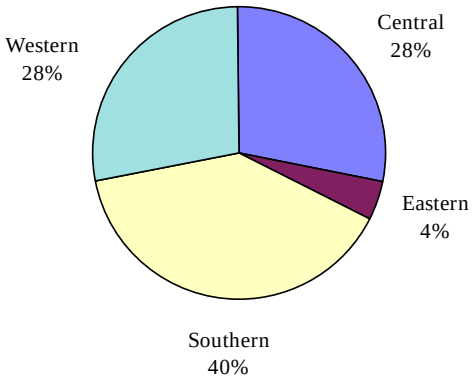

Figure 1. Percentage of responding teacher education programs by AAAE region.

Analysis of Data

Quantitative data were analyzed using descriptive statistics including means, frequency distributions, and percentages. All findings were reported in the aggregate with no individual institutions being singly identified.

Results / Findings

Objective 1: Identify the number of new agriculture teachers certified by responding programs in 1994-95. It was found that only six university agricultural education programs certified more than 16 new teachers during 1994-95. The remaining forty programs certified 87 percent of the new teachers. The mean number of new teachers certified per responding program was 9.5. Figure 2 was developed to summarize Objective 1.

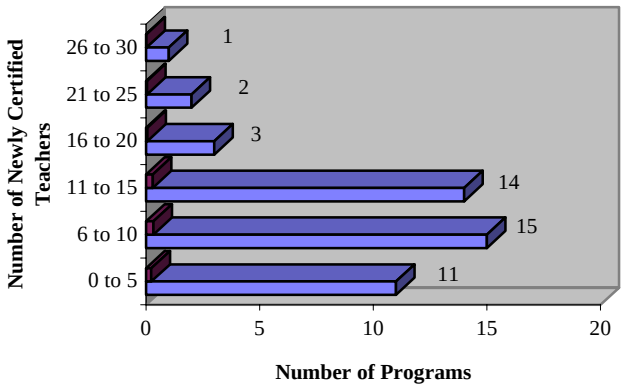

Figure 2. Number of Newly Certified Teachers by Programs.

Objective 2: Determine the number of courses required in agricultural mechanics for agriculture teacher certification. It was found that the number of required courses ranged from zero in three teacher education programs to as many as six or more courses in six programs. Almost two-thirds of the programs surveyed (65.2%) required two to four agricultural mechanics courses. The mean number of courses required per program was 2.8. These results are expressed in Figure 3.

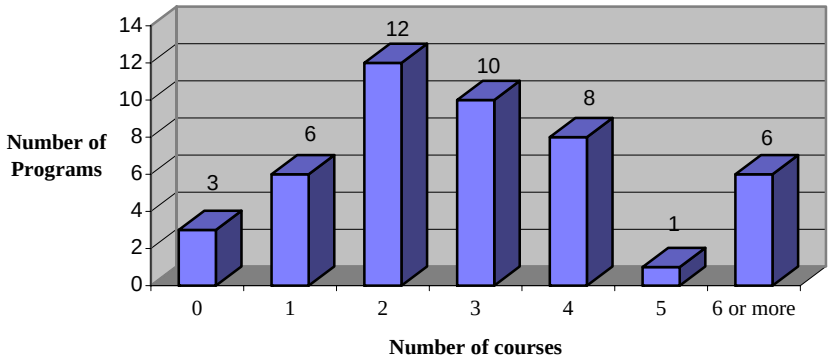

Figure 3. Number of courses required in agricultural mechanics by number of teacher education programs.

Objective 3: Determine the number of semester credit-hours required in agricultural mechanics (or related) courses required for agriculture teacher certification. Required semester credit-hours ranged from zero to 17.5 credit-hours. Almost 35 percent (34.7) of the programs responding required 2.6 to 5.5 credit-hours, while nearly half (47.8%) required 5.6 to 11.5 semester credit-hours in agricultural mechanics. The mean number of required semester credit-hours per program was 6.7. Figure 4 presents data for the number of semester credit-hours required in agricultural mechanics for agriculture teacher certification.

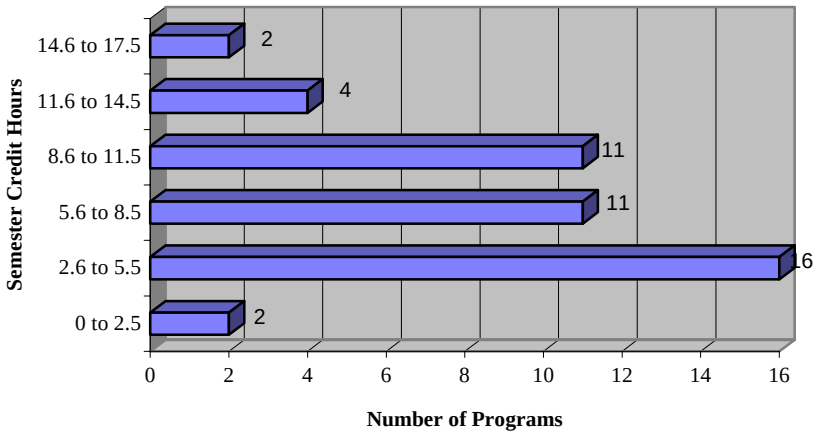

Figure 4. Number of semester credit-hours required in agricultural mechanics for agriculture teacher certification.

Objective 4: Determine the number of semester credit-hours required in agricultural mechanics teaching methods. Figure 5 graphically demonstrates the results of this objective. Data indicated that one-half (50%) of the programs responding had no course requirements for agricultural mechanics teaching methods. Almost 20 percent (19.4) of the programs required from 2 to 2.9 credit-hours. Three programs (7%) each required from 1 to 1.9 and 4 to 4.9, respectively while six programs (13%) required 3 to 3.9. The remaining 2 programs (4%) required greater than six credits. The mean number of methods credit-hours per program was 1.3.

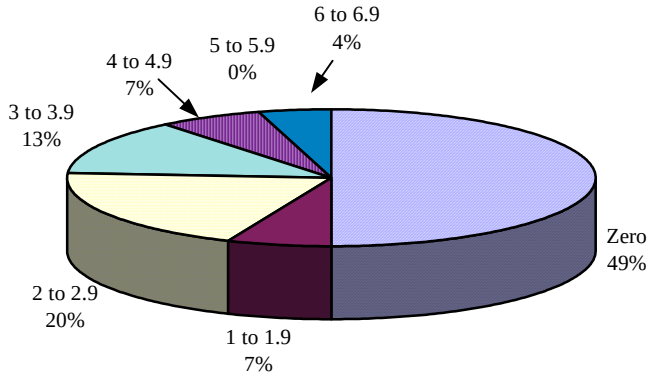

Figure 5. Semester credit-hours in agricultural mechanics teaching methods required for teacher certification.

Objective 5: Determine minimum qualifications required/preferred of the instructors in agricultural mechanics courses required for agriculture teacher certification. A total of 75 responses were received for this response item. This indicated more than one response from some programs as there was varying qualifications for teaching agricultural mechanics.

It was found that almost one-quarter of the agriculture teacher education programs required or preferred a professor to have a terminal degree in Agricultural Education to adequately teach required agricultural mechanics courses. One-fifth of the programs required or preferred course instructors to be agricultural engineers. Just over 10 percent indicated a master's degree in Agricultural Education as a satisfactory qualification, while almost 15 percent preferred a doctorate in Agricultural Mechanics. Other qualifications deemed acceptable included a master's degree in agricultural mechanics, a professional engineer certificate, doctorates in similar technological fields, and lastly, graduate student status with agricultural mechanics experience. Figure 6 provides a summarization of responses for these qualifications.

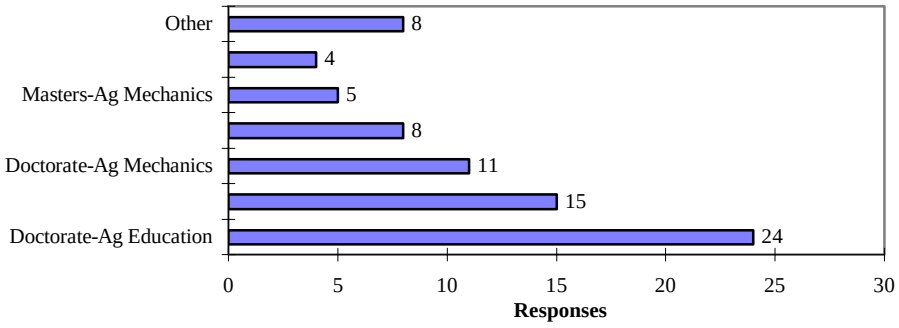

Figure 6. Required/Preferred Instructor Qualification to Teach Required Agricultural Mechanics Courses

Objective 6: Develop an inventory of titles for those administrative units offering the agricultural mechanics required courses for agriculture teacher certification. Figure 7 provides a summary of the results for this objective. Almost one-third (31.6%) of the administrative units responsible for teaching preservice agricultural mechanics courses contained "education" in the title. Additionally, nearly 37 percent (36.8) of the titles contained "agricultural engineering" either wholly or in part.

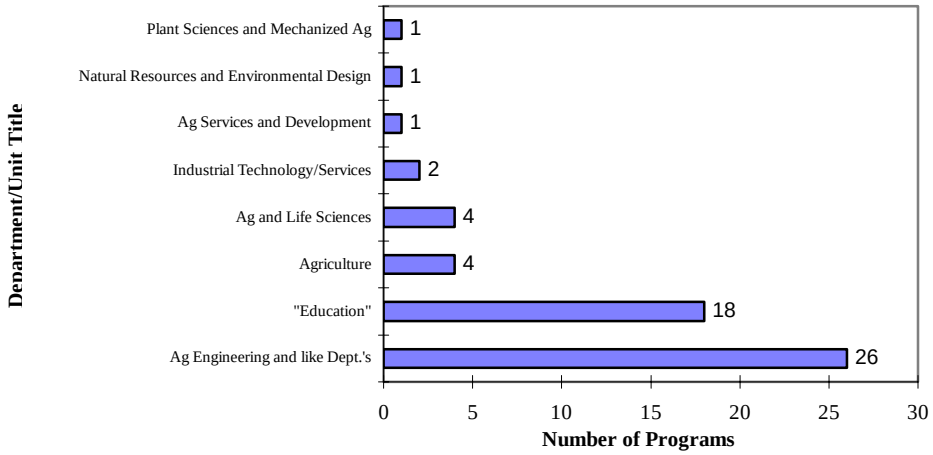

Figure 7. Administrative units offering courses in agricultural mechanics required for teacher certification.

Objective 7: Identify the major topics of required agricultural mechanics or related courses for agriculture teacher certification. The researcher reviewed 107 syllabi of required agricultural mechanics courses that were returned by respondents. Almost one-fifth of the central topics were in the aggregate field of "general agricultural mechanics skills." There was no singular topic covered in these courses, but rather a broad overview of general agricultural mechanics skills. Other topics that were most frequently listed in syllabi included: teaching methods (17 percent), metals and welding (13.9 percent), agricultural building and construction (13 percent), agricultural power and machinery (13.0 percent), small engines (6.5 percent), electricity (5.6 percent), shop safety (2.8 percent), and introduction to agricultural systems (2.8 percent).. The "other" category included the topics "computer applications," "facilities for agricultural and greenhouse production" and "woodworking" to "fundamentals of agricultural mechanization," "irrigation water management," and "applications in urban agromechanization." Figure 8 provides a summary of these central topics of required courses in agricultural mechanics courses as determined from collected syllabi.

Profile of Agricultural Mechanics Preparation in Teacher Education Programs

When the data from teacher education program were studied, an agricultural mechanics profile of a "typical" agriculture teacher education program emerged. The agricultural mechanics component of an agriculture teacher education program can be described as requiring three courses in agricultural mechanics, or seven semester hours. In addition, a one credit-hour teaching methods course is also required. The university professor has a doctorate in agricultural education or agricultural engineering, the curricula include general topics on metals and welding, building and construction, agricultural power and machinery, small engines, electricity, shop safety, and agricultural systems. Agricultural engineering departments most commonly offer these courses with input from university agricultural education programs.

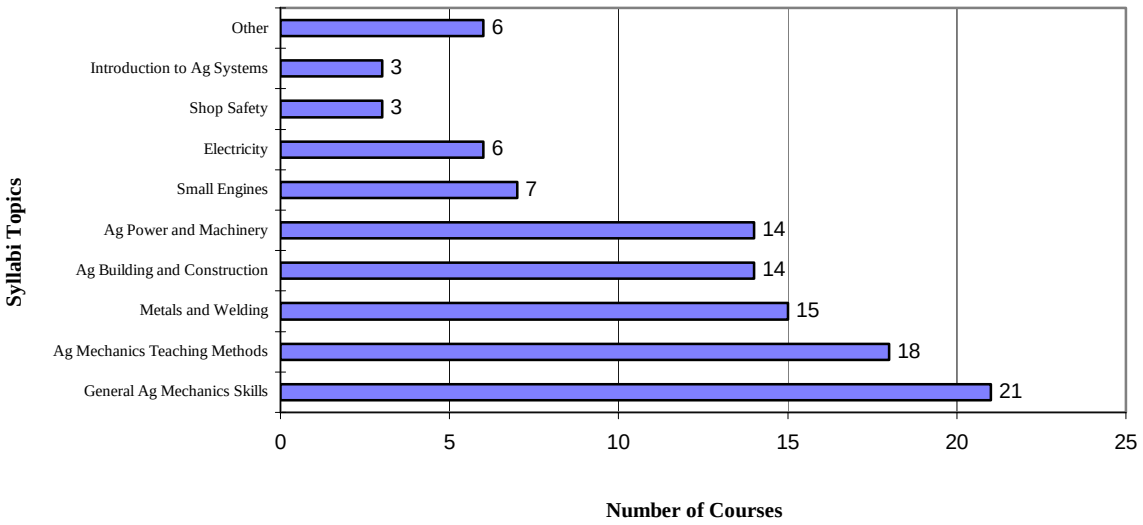

Figure 8. Central topics of required agricultural mechanics courses as determined from collected syllabi.

Conclusions

Based on the findings of this study, the following conclusions were made.

1. The number of newly certified agriculture teachers did not change substantially from 1992-1994 to 1994-1995. University teacher education programs preparing 15 or fewer graduates per year prepared the majority of the newly certified teachers in the U.S. from 1992 to 1995.
2. Approximately two (2) three semester credit-hour courses are generally required in agricultural mechanics to meet teacher certification requirements. In addition, 1.3 semester credit-hours of agricultural mechanics methods course work is required.
3. From course syllabi collected, content presented in required agricultural mechanics courses reflected traditional agricultural mechanics subject matter areas.
4. Most agriculture teacher education programs utilize instructors who have substantial knowledge in the areas of agricultural education and agricultural mechanics to teach required agricultural mechanics courses. The departments in which these instructors teach reflect the changes in the agricultural industry as evidenced by the integrated titles of these departments. This may indicate a willingness to expand the content of required agricultural mechanics preservice courses to reflect these changes in agriculture.

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made.

1. Agricultural mechanics is an important component of secondary agricultural education programs in the U.S. It appears that most agriculture teachers have 6-8 semester credit-hours of preparation in agricultural mechanics. Further study is needed to ascertain what agricultural mechanics competencies agriculture teachers are expected to teach in secondary programs and to determine if the content of preservice education matches these competencies. A cursory review of agricultural education major degree requirements indicated that universities generally require more credit-hours in other agricultural subjects than agricultural mechanics.
2. Due to the major technological advances that have taken place in agriculture over the past two decades, agricultural educators, producers, government leaders, and industry experts must collaborate to develop a collective vision for agricultural mechanics/technology education. This vision is needed to guide the content of secondary and post-secondary agricultural education programs.
3. Teacher education programs that prepare 15 or fewer teachers annually certify the majority of agriculture teachers. Due to small university class sizes, innovative approaches need to be developed to deliver agricultural mechanics preparation and instruction to preservice teachers since small class sizes may limit courses that can be offered.

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COGNITIVE INNOVATIVENESS AS A PREDICTOR OF STUDENT ATTITUDES AND INTENT: AN APPLICATION OF THE THEORY OF PLANNED BEHAVIOR TO TECHNOLOGY DELIVERED INSTRUCTION

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Abstract

This study, using the Theory of Planned Behavior as a framework, investigated the effect of internal and external cognitive innovativeness on attitudes, beliefs and behavioral intentions related to intent to experience an online technology delivered course. Results indicated that respondents who scored high in levels of cognitive innovativeness had more positive attitudes toward taking an online course than did those who scored low. Analysis suggested that attitude was most predictive of intentions for high internal cognitive innovators, while for high external cognitive innovators, attitude and norms were most predictive.

Introduction

Although it has been addressed conceptually, limited research has been done on the influence of innate personality traits on students' attitudes and beliefs with respect to technology delivered instruction. Technology delivered instruction, or TDI, encompasses the range of technology-based instructional tools and techniques commonly used in modern distance education and hyper-mediated instruction, including video, interactive television, Internet hypermedia (the World Wide Web, e-mail, discussion forums) and CD-ROM based multimedia. Many of these technologies were initially used to facilitate instruction for adult learners, but are now being targeted at traditional aged students (Universities Target Distance Ed, 1998).

Although technology delivered instruction is becoming more common in agriculture, primarily through implementation of distance education programs at the land grant institutions (Miller, 1999), little work has been done to explore how innate traits affect attitudes and intentions of students toward TDI courses. Most of the limited research which has been done in the area of attitudes and intentions has been conducted with adult learners, who do not necessarily share some of the prior experiences, motivations, and beliefs which are known to affect attitudes and intentions.

In the studies that have been conducted, findings suggest that individual differences can exert a significant effect on attitudes and preferences toward technology. For example, Hiltz (1987), in a study of adult learners, found that individual differences, primarily differences in learning style, affected preference for online education vs. traditional teaching modes. Miller (1999) in a study of students enrolled in a professional agriculture degree program, found that respondents' cognitive learning style had a significant effect on their attitude toward instruction delivered by distance education technologies. Trede and Whitaker (1998) found that beginning farmers rated "cutting edge" instructional technologies much lower than traditional instructional techniques, perhaps owing to lack of familiarity and prior experience with these technologies. Moore (1990) commenting on the need for more work in this area, noted that research is "not yet sufficient to draw conclusions about the extent of variations in preference for on-line education among the adult population at large" (p.15).

One of the motivating forces which underlies formation of attitudes and beliefs with respect to adoption of new technologies in general is innovativeness, an innate personality characteristic which has been explored extensively in the consumer behavior literature. Innovativeness, a construct that evolved out of diffusion theory, was originally associated with the adoption and use of new technological innovations (Rogers and Shoemaker, 1971). Many subsequent consumer behavior studies have used the concept of consumer innovativeness to examine purchase behavior related to adoption of new products.

Given the parallels between consumer adoption and use of new products and students' similar ability to "adopt" and "use" (i.e., " take") an online course, the purpose of this study was to attempt to extend the concept of consumer innovativeness to the instructional setting and to determine whether students' levels of innovativeness can be used to predict attitude and intent to enroll in a technology delivered course. Given the investment agricultural schools and colleges are currently making in technology driven education, it is important to have a better understanding of the factors which influence students' attitudes and behavior towards acceptance of new instructional technologies, with a view towards developing a model that can be used to enhance technological delivered instruction in agricultural settings.

Conceptual and Theoretical Framework

Innovativeness as a Characteristic of Personality

In its original conception, Rogers' defined innovativeness as "the degree to which an individual is relatively earlier in adopting an innovation than other members of his social system," (Rogers & Shoemaker, 1971, p. 27). Hirschman (1980) defined innovativeness as the desire for new experience, and traced the development of the construct to its

roots in the diffusion and personality literature. According to a study by Venkatraman and Price (1990), consumer innovativeness can be defined as a latent personality trait that predisposes people to buy new products.

Although innovativeness was measured as a singular trait in the original diffusion formulation, consumer innovativeness has also been viewed as having more than one dimension. An example of this is Price and Ridgeway's (1983) conceptualization of a three tiered hierarchy of innovativeness, which differentiates between innovativeness as an innate trait and as an observed behavior. Drawing on Allport's (1937, 1961) notion of the hierarchical nature of traits (cardinal, central, secondary) Price and Ridgeway's model viewed innovativeness as an inherent central trait, and proposed a set of innate secondary traits or tendencies which underlie observable behaviors. Goldsmith and Hofacker (1991)) also argued that innovativeness might be multidimensional, as some facets are not able to be captured by a single scale. Others have followed this idea and have expanded it to include factors which tap into associated constructs, such as cognitive/effective predisposition and its effect on consumer information processing (Venkatraman and Price, 1990).

Drawing on the work of cognitive response researchers Petty and Caccioppo (1982) and Hirschman (1984) as well as the novelty seeking literature, exemplified by Pearson (1970) Zuckerman (1979) and Faison (1977), Venkatraman and Price (1990) attempted to differentiate cognitive and sensory traits that predispose individuals to seek stimulation of the mind, which they defined as cognitive innovativeness, vs. the senses (sensory innovativeness).

In the researchers' model, cognitive and sensory dimensions form higher-order factors, and each of these is comprised of internal and external dimensions. Conceptual definitions of these lower order factors, adapted from Pearson's 1970 study, differentiated internal cognitive innovativeness as the "tendency to like unusual cognitive processes that are focused on explanatory principles and cognitive schemes"; while external cognitive innovativeness is the "tendency to like finding out facts, how things work and learning to do new things". Internal sensory innovativeness, on the other hand, is the "tendency to like experiencing unusual dreams, fantasy or feelings that are internally generated"; while external sensory innovativeness is the "tendency to like active physical participation in thrilling activities".

The Theory of Planned Behavior

A seminal work in attempting to understand and predict behavior and behavioral intentions which has been used extensively in educational research is the Theory of Planned Behavior (Ajzen,1991). The Theory of Planned Behavior, or TOPB, is an extension of the Theory of Reasoned Action, or TORA (Fishbein & Ajzen, 1975).

The basic proposition of both models is that in order to predict a behavior ***B*** (such as enrolling in an online course), one must try to measure an individual's intent to behave, or ***BI*** (such as intent to take an online course), itself a function of attitudes toward the target behavior and subjective norms. In both the TORA model and the later theory of planned behavior (TOPB), attitudes are a function of beliefs about and assessments of perceived consequences of acting in a certain way, such as beliefs about the advantages or disadvantages of technology delivered instruction. Subjective norms refer to an individual's interpretation of what important referents think about the desirability of a behavior, combined with the individual's desire and motivation to comply with what significant others may think or believe should be done.

In an attempt to answer critics of the TORA, who argued that most behaviors are neither volitional (as in the initial model formulation) nor involutional, Ajzen added an additional variable to the TOPB called perceived behavioral control, which measures perceptions of individual control over the target behavior. The resulting predictive equation can be written as follows:

$$B \approx BI \approx (AB+SN+PBC) = w1AB+w2SN+w3PBC$$

where ***AB*** is attitude towards the behavior, ***SN*** is subjective norms, and ***PBC*** is the degree of perceived behavioral control a subject feels over the behavior. The TOPB has been employed extensively by educational researchers in studies designed to predict students' attitude and behavioral intentions toward enrolling in various types of courses. Prislin and Kovarlija (1992) in a study of low and high self-monitoring and student behavioral intent, found that respondents' intentions to attend a class lecture were best predicted by attitude of the low and subjective norms of the high self-monitoring groups. Crawley and Black (1992) used the model to test causal linkages between attitudes, subjective norms and perceived behavioral control with respect to secondary science students' intentions to enroll in physics classes. The model has also been used to predict intention of tenth graders to enroll in subsequent mathematics courses (Choe, 1992) as well as to predict success in an undergraduate computer science course (Shaffer, 1990).

Message Congruity

Cognitive consistency theorists have argued that we tend to be more attracted toward messages which are consistent with our attitudes, beliefs and personality traits (Festinger, 1957; Heider, 1958). Once exposed to information which is congruent with their personal make-up, their attitudes or belief systems, individuals may be more motivated to process the message (Petty, Haugvedt & Smith, 1995) and their subsequent evaluations may be more favorable.

In a marketing communication application, Baker (1993) proposed the Relevance Accessibility Model, or RAM, for determining effectiveness of advertising. In this model, relevance can be explicit, as in consumers actively seeking out specific information they find important, or implicit, implying a subtle influence of information that can automatically drive behavior, such as familiarity or classical conditioning. In this context, message congruity is related to both relevance of the message and involvement, which is the degree to which an individual finds a message important, and worthy of being processed (Petty & Caccioppo, 1979b).

Message congruity, in terms of its influence on attitude and subsequent behavioral action, is also related to the TORA and the TOPB. According to Ajzen & Fishbein's (1980) principle of correspondence, attitudes can be expected to predict behavior depending on the degree of correspondence between action, target, context and time. In the context of this study, it can be assumed that a message containing information about technologically delivered instruction that is more or less congruent in terms of its appeal to cognitive or sensory innovators should have an influence on attitude and corresponding behavior toward taking a TDI course.

Rationale for the Study and Hypotheses

The rationale for this study is based on looking at the demand economy currently driving adoption of technology delivered instruction in agricultural schools and colleges around the country as having some similarities with the consumer marketplace. Students in this environment, much like consumer prospects, have the ability to choose to take courses, and in some cases, entire degree programs, that are characterized by a wide variety of course technologies and delivery mechanisms. Extending this "student as consumer" concept to measures of consumer behavior, it is possible to hypothesize that some of the same variables that influence consumer behavior in the marketplace may also impact student attitudes and behavioral intent with respect to taking online courses. Further, it is possible that an adaptation of Venkatraman and Price's (1990) model of innovativeness might be used to predict differences between internal and external cognitive innovators with respect to attitudes and behavioral intent toward taking a TDI course.

Given the volitional nature of the target behavior and students' expectation and experience that taking a class is a cognitively oriented process, it can be argued that there should be a relationship between levels of cognitive innovativeness and attitude and behavioral intention. Rationale for this approach is based on Vankatraman and Price's own work, which showed a highly significant relationship between higher education and cognitive innovativeness, but not sensory innovativeness (Venkatraman & Price, 1991, p. 309).

The model for this study assumes that high cognitive/low sensory innovators, exposed to a message about a TDI course that is congruent in terms of its appeal, should have a more favorable attitude toward taking a TDI course than those who scored low in cognitive innovativeness (low cognitive/high sensory innovators). Further, there should also be differences between internal and external high cognitive/low sensory innovators.

When the information contained in a description of a TDI course is congruent with cognitive innovative tendencies, it can be argued that those subjects who are high in internal cognitive innovativeness should have the most positive attitude toward taking the course, based on their tendency to enjoy the intellectual challenge of unusual cognitive processes utilizing explanatory principles and cognitive schemes. (See Fig. 1).

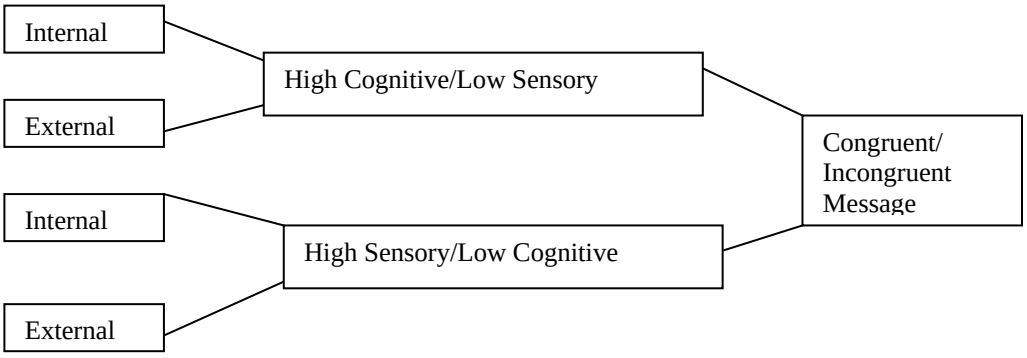

Figure. 1. Internal and External Cognitive/Sensory Innovativeness and Message Congruence

Based on the above, the following hypotheses were generated:

H1: Subjects who score high in cognitive innovativeness should have a more favorable attitude toward taking a TDI course than those who score low.

H2: High internal cognitive innovators should have amore favorable attitude toward the target behavior than high external cognitive innovators.

H3: There should be a three-way interaction between message congruence, high and low cognitive innovativeness and internal/external focus such that:

H3a: High internal cognitive innovators will have a more favorable attitude toward taking a TDI course then low internal cognitive innovators;

H3b: High external cognitive innovators will have a more favorable attitude toward taking a TDI course than low external cognitive innovators.

H4: Attitude will prove to be the most significant predictor of behavioral intent for both high internal and high external cognitive innovators.

Methods

Research Design

Subjects were drawn from a sample of college students (*n*=373) enrolled at a large land grant institution. The mean age was 20.9; average class standing was sophomore year. The study consisted of a 2x2x2 factorial design measuring innovativeness (two levels), internal/external focus (two levels) and message congruence (two levels).

A questionnaire was developed which utilized a series of 16 seven point bipolar semantic differential scales derived from the cognitive/sensory innovativeness scale (Venkatraman & Price, 1990) to measure levels of innovativeness as well as well as the subscale internal and external focus factors. Message congruence was manipulated on the basis of exposure to one of two different versions of a TDI course description. Although both versions of the stimulus described the course similarly in terms of its content, the message congruent version also included an opening paragraph designed to appeal to cognitively innovative tendencies, while the non-congruent version included an opening paragraph with a sensory orientation. Both versions were pretested using a panel of 15 judges who were asked to match each course description to descriptions of hypothetical high cognitive/low sensory and high sensory/low cognitive student respondents.

Procedure

At the beginning of the experiment, subjects were randomly assigned to one of the two message congruence conditions, which were incorporated into the copy of the questionnaire each subject received. In addition to the variables of cognitive innovativeness, internal/external focus and message congruence, the questionnaire included items that were used to construct indices for the dependent variables attitude, subjective norms, perceived behavioral control and behavioral intent. All items on the questionnaire were constructed using seven point semantic differential scales, recoded to range from 1 as being most likely or most favorably to 7 as being least likely or most unfavorable.

Results

Exploratory factor analysis was conducted on all of the variable indices in the study, resulting in a one-factor solution for all of the indices used in the analysis. For hypotheses one through four, subjects' level of cognitive innovativeness was calculated, as in the original instrument's formulation, by developing an average mean score on the cognitive/sensory innovativeness scale and then using mean splits to recode subjects into high and low cognitive and internal/external focus categories. Reliability analyses for all of the indices used in the study were subsequently run using Chronbach's alpha statistic. The resulting standardized item alpha for the cognitive innovativeness scale was .72. Standardized item alpha for the attitude index was .91; for subjective norms .98; and for behavioral intention .91. Perceived behavioral control was a one-item measure for each of its components.

Hypothesis 1, which predicted that subjects who scored high in cognitive innovativeness would have a more favorable attitude toward taking a TDI course than those who scored low was supported. To test this hypothesis, a 2 x 2 ANOVA model was run, utilizing innovativeness (two levels) by message congruence (two levels) as between subjects factors. A main effect was found for innovativeness, $F(1, 368) = 7.07$, $p < .01$, which indicated that high cognitive/low sensory innovators ($M = 4.57$) had a more favorable attitude toward the target behavior than low cognitive/high sensory innovators ($M = 4.10$).

For hypothesis 2, which predicted a main effect for internal cognitive innovativeness, a 2 internal/external focus) x 2 (message congruence) ANOIVA was run. Results revealed a two way interaction between internal/external focus and message congruence, $F(1, 368) = 5.39$, $p < .02$, as well as a main effect for internal/external focus, $F(1, 368) = 6.59$, $p < .01$. Comparison of means showed that subjects high in internal cognitive innovativeness who received a congruent message had the most favorable attitudes toward taking a TDI course. (See Fig. 2).

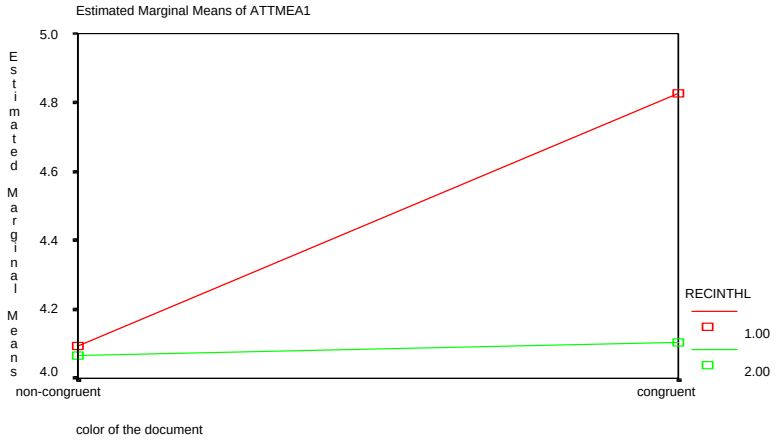

Fig. 2. Effect of Internal/External Focus on Attitude Toward taking a TDI Course.

Hypothesis 3 predicted a three-way interaction on the dependent measure of attitude toward taking a TDI course. To test this hypothesis, an ANOVA was run utilizing cognitive innovativeness (two levels), internal/external focus (two levels) and message congruence (two levels) as between subjects factors. Although the three way interaction was not significant, $F(1, 368) = 1.45$, $p < .23$, a simple simple main effect was found for external cognitive innovativeness, $F(1, 368) = 7.38$, $p < .01$, indicating that subjects high in external cognitive innovativeness who received a congruent message stimulus had more favorable attitudes than those who received a non-congruent message.

Further analysis of the simple simple main effects in H3a and H3b were supported. ANOVA results indicated a significant difference between the means for high and low internal cognitive innovators, $F(1, 186) = 4.70$, $p < .03$, and for high and low external cognitive innovators, $F(1, 186) = 5.04$, $p < .03$. Table 1 displays the resulting means table for the effect of internal/external focus and message congruence on attitude toward taking a TDI course. (See Table 1).

Table 1.
Attitude Means for Effect of Message Congruence on High and Low Internal and External Cognitive Innovators.

	Congruent Message		Non-congruent Message	
	High	Low	High	Low
Internal Cognitive Innovators	4.83 (80)	4.11 (107)	4.09 (76)	4.06 (106)
External Cognitive Innovators	4.71 (102)	4.06 (85)	4.20 (83)	3.97 (99)

To examine the relative contribution of attitudes, subjective norms and perceived behavioral control (H4) to the prediction of behavioral intentions for high and low internal and external cognitive innovators, linear regression analysis was performed using SPSS. Results revealed that, for all subjects, all factors made significant contributions to behavioral intent, but attitudes and perceived behavioral control were most significant. (See Table 2).

Table 2.
Prediction of Behavioral Intent to take a TDI Course.

Variables			
All Subjects	r	Beta	R^2
Attitudes	.81	.72**	
Subjective Norms	.54	.08*	
PBC	.41	.09**	.667

*P<. 05, **p<. 01

Regression analysis was subsequently performed for the high and low internal and external cognitive innovator cells. Results indicated that for both low internal and low external cognitive innovators, attitude and perceived behavioral control were the most significant predictors. For high external cognitive innovators, attitudes and subjective norms were significant, while for high internal cognitive innovators, attitude was the only significant predictor variable of behavioral intent. (See Table 3).

Table 3.
Prediction of Behavioral Intent for High and Low Internal and ExternalCognitive Innovators

Variables			
Low Internal	r	Beta	R^2
Attitude	.75	.64**	
Subjective Norms	.50	.07	
Perceived Behavioral Control	.51	.21**	.63
High Internal			
Attitude	.84	.78**	
Subjective Norms	.57	.07	
Perceived Behavioral Control	.33	.02	.70
Low External			
Attitude	.80	.73**	
Subjective Norms	.50	.02	
Perceived Behavioral Control	.44	.15**	.70
High External			
Attitude	.81	.71**	
Subjective Norms	.58	.12*	
Perceived Behavioral Control	.36	.05	.67

*p<.05, **p<.01

For all groups, attitude remained the strongest predictor of intent to take an online course. Interestingly, for high internal cognitive innovators, attitude alone was highly significant in contributing to the TOPB model, while both attitude and subjective norms were contributory for high external cognitive innovators.

Discussion and Conclusions

This study provides support for the argument that technologically delivered instruction is an innovation that would seem most likely to appeal to highly innovative personalities who are at least somewhat disposed toward cognitively oriented new experiences. When information provided in a TDI course is consistent with these expectations and innate tendencies, cognitively innovative personalities will most likely be attracted, and it is likely that the cognitively innovative personalities will have the most favorable attitudes and correspondingly strong behavioral intent toward TDI courses.

It may be that high cognitive innovators come best equipped to deal with a novel experience that represents a major change from the highly structured classroom environment in which the instructor serves as an anchor and a source capable of providing amplification and context for a linear sequence of activities. Students high in cognitive innovativeness may find themselves drawn to the intellectual challenge of this particular new experience much more so than either those who are more affectively or sensory oriented.

One of the key findings of the current study involves the implications suggested by the observed differences between the internal and external dimensions of cognitive innovativeness in terms of attitude and behavioral intent toward the target behavior. From the study results, internal cognitive innovators would seem most influenced by their attitudes and sense of control over the technology related to online environments, such as familiarity with and access to computers.

External cognitive innovators, on the other hand, would seem to be more influenced by situational subjective norms, in addition to attitude. For this group, the evaluation of peers and academic advisors might come into play more so than for other groups, since these individuals are externally oriented. On the other hand, for both low internal and external cognitive innovators, attitude and perceived behavioral control seem to be important predictors. Since these groups are less attracted to new and potentially unfamiliar situations, this may affect their feelings of control over both the technology and their own ability to function and perform well in a TDI course environment.

From a theoretical standpoint, this study supports the contention that innovativeness is not a homogenous construct, but one that can be defined according to predispositions that represent aspects of the innovativeness trait. This may be an important distinction, since, as results of this study show, internal and external cognitive innovators differ,

both in terms of their relative levels of innovativeness (high vs. low) and also in how the internal or external aspects of the trait may influence evaluations of behavior and intent to behave. Educators utilizing TDI may be able to address these differences in the course design process, or consider utilizing a trait-based survey technique at the beginning of a course to ascertain the level and dimensions of the innovativeness construct present in the represented student population.

In the context of agricultural education, these differences may have important implications for constructing agriculture courses that try to tap into dimensions of innate personality traits, in an attempt to enhance outcomes of the TDI course experience.

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A CASE STUDY OF STUDENT SATISFACTION AND INTERACTION IN A DISTANCE EDUCATION COURSE[1]

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Abstract

The growth of distance education course offerings is an indication of its importance to students; however, criticisms have centered on its lack of ability to provide interaction among participants. This case study utilized a mixed methods approach to examine the assumption that an increase in interaction increases student satisfaction among distance learners in an applied animal genetics course delivered by interactive compressed video (ICV) technology to five far-end sites from a major land-grant university in the Northeast. A standardized questionnaire, interviews, and observations were utilized to assess interaction and student satisfaction among students. Students at all sites were satisfied with the course, although not overwhelming so due to technical limitations and failures. Students were very satisfied with the number and variety of opportunities for interaction provided in the course. The most frequent and enjoyable type of interaction was face-to-face communications with site facilitators. Recommendations for improving the course included providing advanced organizers to students, more time for questions and answers during the lecture, and resolving technology limitations and failures. Future research should examine social accountability as a factor for increasing interaction in ICV courses as well as a rationale for providing synchronous courses.

Introduction

Distance education, where the student and instructor are separated by place or time or both (Cyrs, 1996), has a long history in the United States tracing back to 1728 (Holmberg, 1983). With the advent of two-way audio and video technologies distance education course offerings have increased significantly in the United States over the past few years. Students can earn Bachelor's, Master's, and Doctor of Philosophy degrees without ever stepping foot on campus. An emerging use for distance education is resource sharing among campuses. As federal and state funding disappear in higher education many departments are exploring avenues for offering students a quality curriculum while reducing costs. Such is the situation in the Northeast where members of a regional consortium teamed up to offer a course in applied animal genetics to students at five campuses synchronously via interactive compressed video (ICV) technology and one campus asynchronously (videotaped).

As colleges and universities gear up to meet the needs of distance education students, faculty and administrators have questioned educational effectiveness of distance technologies. Can students learn when they are physically separated from their instructor? This question has been addressed by a plethora of literature that shows no significant difference between learning outcomes when grades are used to measure performance between near- and far-end students (Russell, 1992), therefore faculty are turning toward student satisfaction issues as measures of distance education success. Student satisfaction criterion can be used to judge the effectiveness of a course and is an important element for providing feedback to faculty for improving future distance education courses (Biner, 1993). Yet a research base for this significant variable has not been well established, particularly in animal science courses.

Theoretical Framework

Interpersonal interaction has been cited as the crux of significant learning for nearly a century, so much so that success in the educational environment is positively correlated to interaction (Garrison, 1993; Stanford & Roark, 1974). Learning theory indicates that students perform better and remember more when they interact within the learning environment (Oliver & McLoughlin, 1997; Wagner, 1993). With the advent of interactive compressed video (ICV) technology, which allows for two-way audio and video transmission, distance educators are able to incorporate fully interactive design techniques into the teaching and learning environment. Researchers have hypothesized that fully interactive classrooms will lead to increased learning outcomes in terms of quantity and quality of questions asked and answered (Bauer & Rezabek, 1992; Boverie, et al. 1997; Sholdt, Zhang, & Fulford, 1995).

Moore (1989) held that interaction is the key theoretical construct in distance education and distinguished between learner-content, learner-instructor, and learner-learner interactions. Reciprocity is necessarily built into Moore’s theory in that interaction is both unidirectional and bi-directional. Learner-content interaction occurs when a student reads a book, views pre-recorded videotape, or in some way interacts with inanimate learning resources. Learners engage in an internal didactic conversation (Holmberg, 1983) in order to master the content. Learner-instructor interaction is what differentiates self-study from distance education. The instructor provides learners with a curriculum for mastering content and communicates with learners throughout the course. Learner-learner interaction

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takes the form of group projects and Internet-based discussion boards.

Hillman, Willis, and Gunawardena (1994) added learner-interface interaction, the concept of interaction that occurs between the learner and technologies used to deliver instruction to Moore's (1989) framework. Hillman et al. (1994) argued that a student's skill with the communication medium necessary to participate in a distance education course is positively correlated with success in that course. In order to gain any meaning from the course content the student must be literate in the communication medium's rules of interaction. This study investigated interaction from Moore's (1989) and Hillman's et al. (1994) theoretical base.

Purpose and Research Questions

The major purpose of this study was to examine the assumption that an increase in interaction increases student satisfaction among distance learners. The study was guided by three research questions:

1. Were students satisfied with the distance education course?
2. How did the level and quality of interaction impact student satisfaction with the distance education course?
3. What was the relationship between student satisfaction and synchronous interaction in the distance education course?

Methods

Data Collection and Analyses Procedures

The study used a mixed methods approach, incorporating both qualitative and quantitative data collection and analyses methodologies. A standardized questionnaire, interviews, and observations were utilized to assess interaction and student satisfaction among students. Simply defined, a case study is "an empirical inquiry that: Investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1984, p. 23). Case studies are intended to catch the intricacies of a particular event, program, individual, or place. One of the most important uses of the case study is to "*explain* the casual links in real-life interventions that are too complex for the survey or experimental strategies". A second goal of the case study is to *describe* the context in which interventions occur (Yin, 1984, p. 25, emphasis in original).

Student satisfaction was measured with the Telecourse Evaluation Questionnaire (TEQ), a 43-item Likert-type sale (Biner, 1993). This instrument was developed with test construction standards consistent with test development in the field of educational and industrial psychology (Biner, 1993). The instrument was organized into three dimensions: 1) instruction/instructor characteristics, 2) technological characteristics, and 3) course management and coordination.

Qualitative and quantitative data collected for analyzing interaction were based on researcher-participant observations, in-depth semi-structured interviews with students (N=47) and faculty (N=5), and postings to the course discussion board. Videotaped recordings of all course sessions were captured and analyzed for quantity of interaction between students and instructors, and students and students. Measures for interaction between groups consisted of quantifying the number of questions posed by individuals during the live lecture and the number of times a student posted a comment to the discussion board.

All students were invited for interviews via e-mail. Students who responded to the invitation were interviewed between mid-October and mid-December, 1998. An interview schedule was developed and used during face-to-face interviews. Further questions evolved during the interview process as the researcher attempted to understand why students did not fully engage in the various types of interaction provided in the course. Interviews lasted no longer than one hour each and were audiotaped, transcribed, and coded following Miles and Huberman's (1994) suggestions for qualitative data analysis. Because of their focus on a particular situation case studies do not seek to make statistical generalizations, rather they rely on analytical techniques and are limited in their ability to generalize to a greater population (Yin, 1984).

Course Context

Applied Animal Genetics was designed as a capstone seminar for animal science majors. The purpose of the course was to expose students to the genetics industry through 12 seminars, which presented current research being conducted in the field. Seminar topics included genetic definition and control of qualitative and quantitative traits, genetic conservation, and new developments in molecular genetics. Speakers from across the United States and Canada were practicing geneticists who presented their research projects as compelling examples of science in action. Opportunities for interaction within the course context were provided in five forms. 1) Ten minutes were allotted at the end of each lecture to pose a question directly to the speaker from all sites. 2) A discussion board was linked to the course web site where students and guest speakers were invited to participate. 3) Most students had access to e-mail and were advised to communicate with site facilitators regarding content related questions. 4) Luncheons with guest speakers were provided at the near-end site. 5) Face-to-face interactions with site facilitators

occurred within the context of normal interactions between students and professors at traditional campus-based universities.

The course was also supported by an extensive Internet web site that contained links to a student photo gallery, course outline, course rules and abstract information, journal articles (accessed through Adobe Acrobat reader), contact information for all site facilitators, and a link to the discussion board. Near-end students could also access their current standing in the class through the web site.

The near-end class was held in a newly constructed building designed specifically for offering courses at a distance with ICV technology. Classrooms at far-end sites were equipped with ICV conferencing equipment that ran at 384 kilobytes per second (kbps). One site used ICV conferencing equipment at 128 kbps. Far-end sites employed some technical help in connecting to the bridging service each week, but site facilitators were primarily responsible for managing communications between sites.

Findings

Participants

Participants in this multi-site study included all students (N=81) and site facilitators (N=5) receiving the course fall 1998. Seventy-three students (90%) (of whom 20% were male and 80% were female) and five site facilitators agreed to participate in the study. The average age of the cohort was 21.7 years and the average number of years in college was 3.6 years. None of the students had participated in a distance education course prior to this one.

Interaction

Students were satisfied with the level and quality of interaction that they received in this course and found it to be consistent with other on-campus courses. Their expectations for interaction were generally met through four types of interaction offered in this course (live broadcast, discussion board, e-mail, and face-to-face interaction with site facilitators). Students were most satisfied with the time that they spent observing and participating in the broadcast. Students valued content experts' knowledge and responses to questions posed during the live broadcast as well as on the discussion board. Students sited the quality of interaction as excellent.

Participating in a synchronous (live) distance education environment was far superior in students' minds than receiving the same course videotaped. The effect of receiving the course synchronously served to heighten students' overall sensory awareness of their environment and motivated students to pay attention to the speaker. Students reported that the value of synchronous interaction with the guest speakers was high and that receiving the course live increased their satisfaction. Other students contributed to the learning environment by posing interesting questions for all to hear.

Several factors contributed to student dissatisfaction with interaction in the course. They included technology failures at far-end sites (which occurred during 36% of the broadcasts), the short amount of time allotted for questions and answers at the end of the period (a total of 10 minutes), lack of participation by other students, and the fact that the 40-minute presentation could not be interrupted for questions.

Student Satisfaction

Descriptive statistical analysis of the TEQ administered to students at the conclusion of the course provided quantitative data regarding students' level of satisfaction. Of the 81 students who completed the course 61 (75%) completed and returned the TEQ. The TEQ asked students to respond to each question using a 1-5 Likert-type scale, 1 being very poor and 5 being very good. Had the student rated each question as 5 (very good) the total score would be 175. For ease of interpreting results a letter grade was assigned for each dimension of the TEQ based on total points possible. Grades assigned followed the traditional format for a five point grading system using 90% and above as A, and so forth. The results of the data analysis for the TEQ are presented in Table 1.

The TEQ was broken down into three distinct facets: instruction/instructor characteristics, technological characteristics, and course/program management and coordination. Of these three facets, students were most satisfied with the instruction/instructor characteristics, followed by course/program management and coordination. Students were least satisfied with technological characteristics of the course. These findings were verified through face-to-face interviews. Students reported that the variety of guest speakers was what they liked most and technological failures were what they liked least about the course.

When asked to compare this course with a conventional non-distance course, students rated applied animal genetics as average to good (3.44 on a five-point Likert-type scale). Overall they reported that the course merited a C grade, or earned 75% of the total possible points for excellence with a standard deviation of 20.16 points. A strong measure of student satisfaction can be determined by asking students if they would enroll in another distance education course after having experienced the course under study (Biner, 1993; Leverenz, 1979; St. Pierre & Olsen, 1991; Tallman, 1994). Eighty-eight percent of students said that they would enroll in another distance learning course.

Table 1.
Total cohort data for student satisfaction as measured by the TEQ.

Facet of Telecourse Satisfaction	N	Score	St. Dev.	Possible Score	Grade %
Instruction/Instructor Characteristics	61	63.49	9.87	80	79-C
Technological Characteristics	61	22.67	5.28	35	65-D
Course/Program Mgt. and Coordination	61	37.29	7.72	50	75-C
Overall the course was: [1]	58	4.07	0.83	5	80-B
Compared to a conventional course this course was:[1]	61	3.44	0.80	5	70-C
Workload: [2]	61	3.23	0.64	3	100-A
Would you enroll in another DE course?	60	0.88	0.32	1	88-B
Total TEQ	61	130.75	20.16	175	75-C

[1] 1=Very Poor, 2=Poor, 3=Average, 4=Good, 5=Very Good
[2] Workload: 1=too light, 2=moderately light, 3=just right, 4=rigorous, 5=too great

According to data collected during student interviews (N=47) students at both near- and far-end sites were satisfied with the course, although not overwhelming so due to technical difficulties and failures. Students enjoyed the content of the course and were pleased with the opportunity to participate in a learning community that reached beyond their respective institutional boundaries. The most significant satisfier was the breadth and variety of topics presented by guest speakers followed by the opportunity to ask questions immediately following the broadcast. The most important dissatisfiers were ICV technology limitations and failures.

Offering the course simultaneously to near- and far-end sites did not reduce near-end student satisfaction, in fact, many near-end students reported that hearing other students' questions during the question and answer session was an added value to the course. Near-end students reported that they felt sympathetic toward far-end students because of the number of technical difficulties that were encountered during the semester. One area if dissatisfaction for near-end students was knowing that the far-end sites did not receive the same experience as they did in terms of quality or entirety of the broadcast when there were technology failures as well as time wasted during technology failures.

Students were very satisfied with the number and variety of opportunities for interactions provided in the course. The most important interactions occurred during the broadcast and the 10-minute question and answer session each week. The most frequent type of interaction was face-to-face communications with site facilitators at near- and far-end sites. The discussion board proved to be important for providing content to a minority of students and an obligation for the majority who did participate on it. E-mail was regularly used at the near-end site for submitting abstracts to site facilitators, who in turn provided meaningful feedback to students through this medium.

The student-professor relationship experienced by the majority of students was reported to be a critical factor in overall satisfaction with the course. As was expected and encouraged by course owners, each site functioned essentially as a mini-class, which was supported by an animal science professor. Course credit was awarded by each host institution, thus students were entirely accountable to local site facilitators for assignments, interaction, and evaluation.

Institutionalization of applied animal genetics at host universities resulted from site facilitators' taking ownership of the course where the course was utilized to suite a variety of institutional needs. The near-end site used the course as a capstone seminar in animal genetics, which required an introductory genetics course as a prerequisite. Plans are in place to adopt the seminars as a one-credit component of a three-credit introductory animal genetics course at two far-end sites. One far-end site will use the seminars as an enrichment experience for an honors section of a genetics course.

Recommendations For Improving Interaction

Recommendations for improving interaction in the course are categorized into six domains that relate to course design and technology improvements. They are:

1. Advanced organizers: Site facilitators should provide students with material that covers a base line understanding of concepts that will be presented during the course. Students should be given a glossary of terms so that they can become familiar with terminology prior to the course. Providing students with the journal articles and Power Point slide presentations at the beginning of the course is also recommended. This information can be delivered via the Internet course web site and downloaded by students and site facilitators at near- and far-end sites.
2. The discussion board: A minimum number of postings on the discussion board should be required for all students who enroll in the course. Site facilitators should work with students to ensure discussion board competency as a pre-requisite for enrolling in the course.

Students and site facilitators should engage in more didactic interactions by discussing issues that have no absolute answers. Students should be encouraged to take intellectual risks when posting questions and comments on the discussion board and to explore more creative dialogue with peers and site facilitators. Content experts should attempt to engage students in debates rather then providing direct answers to questions posed. Students should fill out the biographical information requested by the discussion board program when registering so peers can learn more about each other's interests. This may serve to stimulate student-to-student interaction.

3. More time for questions and answers during the live lecture: There should be more time provided for question and answers at the conclusion of the lecture. The 10 minutes for questions and answers provided fall 1998 was inadequate for all sites to pose meaningful questions. The time slot should be expanded to 60 minutes, where 40 minutes are dedicated to the presentation of new content and 20 minutes are dedicated to student questions and answers.

4. Speaking protocol: A time generous interaction protocol should be established and maintained for ICV tele-courses. Near-end site facilitators should give more time to each site for asking and answering questions due to the nature of ICV mediated interactions. More than one round of questions should be implemented to ensure that all students have an opportunity to pose questions. Often a student's question would stimulate another question from a site that had already been called on; thus the opportunity for asking that question was lost. Near-end site facilitators should require near-end students to use the microphone when posing questions so that all sites can hear the questions. The order of schools called on for questions should remain consistent each week versus a rotating order. The predictability of knowing that your site is always second may serve to increase the level of questions as students won't be caught by surprise when their site is called on.

5. Guest speakers: Near-end hosts should coach guest speakers in delivering pedagogically appropriate content at a distance. Many of the speakers were not university instructors; thus they have had little experience delivering lectures to undergraduate students. Some lectures were delivered at a content level that was above the comprehensible knowledge base of the audience. The Power Point presentation created by guest speakers should be reviewed in advance by hosts for clarity and comprehensibly of concepts presented. Guest speakers should also be coached on distance teaching techniques and etiquette, such as presenting graphical information that is clear and plainly displayed, as well as acknowledging far-end students as part of the learning community, not simply spectators. Guest speakers should be given a tip sheet for presenting over ICV systems.

6. Technology issues: Technology glitches should be resolved prior to offering courses at a distance. Fifty percent of the technology failures were caused by human error at the bridge site. A professional bridging service should be hired to facilitate ICV courses. Site facilitators and control room operators should master the ICV system to the extent necessary for smooth operations prior to the start of the course.

Implications and Discussion

Recent research in distance education has focused on the attributes of ICV technology that allows for synchronous two-way audio and visual interaction. However, the results of this study indicate that ICV technology is not fully interactive. This study showed that using ICV technology to deliver the course resulted in near-end site facilitators restricting interaction during the live broadcast because of inherent technology limitations. During successful broadcasts participants experienced delays in communications, visibility problems and a low quality image of graphical displays used by speakers. Technology failures caused by bad weather and human error at the bridging service accounted for loss of interaction 36% of the time. ICV technology advocates need to address these limitations, as results of this study clearly indicate that ICV technology served to inhibit interactions rather than promote them.

One of the purposes of this study was to examine the assumption that an increase in interaction increases student satisfaction among distance learners. The variety of opportunities for interaction provided in this course did serve to increase student satisfaction, if not actual interaction. Key constructs that surfaced in the present study for explaining the relationship between interaction and student satisfaction were *vicarious interaction* (Fulford & Zhang, 1993; Zhang & Fulford, 1994) and *anticipated interaction* (Yarkin-Levin, 1983). Students reported that listening to the lectures and other students ask questions increased their satisfaction with the course. Direct participation in the question and answer session and the discussion board was not necessary for learning, nor was it as satisfying as watching and listening to others participate. If students are satisfied by learning vicariously and through anticipated interactions (imagined), then who will ask questions during the question and answer session as well as post questions to the discussion board? Future research on interaction and student satisfaction should focus on the factors that motivate and stimulate students to openly participate in the learning environment.

Distance education students learn equally well using asynchronous learning modalities at a fraction of the cost of satellite or ICV technologies (Leverenz, 1979; St. Pierre & Olsen, 1991; Tallman, 1994). As course providers strive to increase interaction in the distance education classroom, consideration should be given to institutional costs as well as perceived student benefits when students are content to adopt a voyeuristic posture in the course. Colleges and universities must determine if they are investing wisely in synchronous, fully interactive technologies (satellite and ICV) to the extent that students are willing to participate in real-time interaction. The perceived educative value

of receiving the course synchronously was high for far-end students, as were the real costs to participating institutions in this study. Students who received the course live at far-end sites speculated that they would not have enjoyed the course had they received it videotaped. However, students who did receive the course videotaped were as satisfied with the content and the level of interaction as were synchronous sites. More empirical evidence should be gathered to demonstrate the superiority of synchronous delivery over asynchronous delivery in terms of quality of interaction and student satisfaction in the classroom, especially those courses that are supported with site facilitators who are also content experts.

In this study far-end students reported feeling socially accountable to guest speakers, knowing that they could be seen through the ICV system. Students reported that receiving the course live heightened their sensory awareness and they were more apt to pay attention and model appropriate behavior during the live lecture than if the course was provided videotaped. The social accountability phenomenon has not been reported in the distance education literature as a factor for student satisfaction or as a rationale for providing live, interactive courses. This factor alone may justify the costs of providing live, fully interactive courses to students who are able to participate in them (i.e. students who are not time- or place-bound). As a rationale for providing synchronous courses future research should examine empirical evidence that social accountability is indeed a factor for increasing interaction in the distance education environment.

Another rationale for provided live, interactive courses is resource sharing among partnering institutions. This particular course served to expand the animal genetics curriculum that was not available to the five far-end sites and served over 80 students in the Northeast region, with plans in place to expand offerings to the western United States. In time, the number of students served will increase as participating universities continue to adopt modules of the course as additional curriculum material in introductory genetics courses. Although ICV technology failures and limitations limited interaction, this modality of course delivery should be considered successful for providing an invaluable resource to students who would not have access to this material otherwise.

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A CASE STUDY OF BARRIERS TO INTERACTION IN DISTANCE EDUCATION[2]

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Abstract

The growth of distance education course offerings is an indication of its importance to students; however, criticisms have centered on its lack of ability to provide interaction among participants. This case study qualitatively examined barriers to interaction in an animal genetics course delivered through interactive compressed video (ICV) technology from a major land grant university to five universities in the Northeast. The purpose of the study was to analyze and describe student perceived barriers to interaction in a distance learning course. Qualitative data collection methodology included face-to-face interviews with students and site facilitators and participant observations to assess interaction among students at all sites. Barriers to interaction centered on social concerns, ICV technical limitations, lack of time, content related issues, camera shyness, site facilitators' behavior in facilitating interactions, needing more time for processing content, lack of non-verbal clues, distance, and having to press the microphone mute control knob. All ten barriers served as dissatisfiers for students. Recommendations for improving interaction within the course include resolving technical limitations and failures. Course providers should also consider delivering courses using low-cost options such as web-based courses in light of the limited interaction observed in this course. Future research should examine social accountability as a factor for increasing interaction in ICV courses as well as a rationale for providing synchronous courses.

Introduction/Theoretical Framework

Distance education, where the student and instructor are separated by place, time or both has a long history in the United States tracing back to 1728 when Caleb Phillipps advertised a shorthand course in the March 20th edition of the Boston Gazette. Phillipps sent weekly lessons to adult students using U.S. mail services (Holmberg, 1995). With the advent of two-way audio and video technologies, distance education course offerings have increased significantly. Students can earn bachelor's, master's, and doctor of philosophy degrees without ever stepping foot on campus. The growth of this educational medium over the past 20 years is an indication of its importance in meeting the needs of students who either cannot or choose not to attend traditional campus-based courses. Yet we do not fully understand how interactions mediated through technology facilitate student learning outcomes. This evaluation study examined one aspect of the distance learning environment: student perceived barriers to interaction in a course that was offered simultaneously to five land-grant universities in the Northeast.

An emerging use for distance education is resource sharing among campuses. As federal and state funding sources disappear, many departments are exploring avenues for offering students a quality curriculum while reducing costs. One option has been to exchange course offerings between campuses using interactive compressed video (ICV) technology. With the advent of ICV technology, which allows for two-way audio and video communication between the teacher and student, distance educators are able to incorporate fully interactive design techniques into the teaching and learning environment. Researchers have hypothesized that increasing opportunities for interaction will lead to an increase in actual interaction because students will ask more questions (Bauer & Rezabek, 1992; Boverie, et al., 1997; Sholdt, Zhang & Fulford, 1995).

Interpersonal interaction has been cited as the crux of significant learning for nearly a century (Garrison, 1993; Stanford & Roark, 1974). Learning theory indicates that students perform better and remember more when they interact within the learning environment (Wagner, 1993). Moore (1989) held that interaction is the key theoretical construct in distance education and distinguished between learner-content, learner-instructor, and learner-learner interaction. Reciprocity is necessarily built into Moore’s theory in that interaction is both unidirectional and bidirectional. Learner-content interaction occurs when a student reads a book, views a prerecorded videotape, or in some way interacts with inanimate learning resources. Learners engage in an internal didactic conversation (Holmberg, 1983) in order to master the content. Learner-instructor interaction is what differentiates self-study from distance education. The instructor provides the learner with a curriculum for mastering content and communicates with the learner throughout the process. Learner-learner interactions take the form of group projects and Internet-based discussion board activities.

Learner-interface interaction, the concept of interaction that occurs between the learner and technologies used to deliver instruction (Hillman, Willis & Gunawardena, 1994), was also examined in this study. A student's skill with the communication medium necessary to participate in a distance education course is positively correlated with

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success in that course. Students must be literate in the communication medium's rules of interaction to gain meaning from the course content. This study used Moore's (1989) and Hillman's et al. (1994), framework for interaction by examining how students interacted with guest speakers, site facilitators, content, and each other through an electronic medium.

Purpose and Objectives

The purpose of this case study was to identify and describe student perceived barriers to interaction in an applied animal genetics course delivered through interactive compressed video technology from a major land-grant university (near-end site) to five distance sites (far-end).

Specific objectives for the study were:

1. To describe the context and setting of the course, including opportunities for interaction provided to students using the case study approach.
2. To describe student perceived barriers to interaction qualitatively through face-to-face interviews with students and observed interactions.
3. To analyze interview responses thematically that detail student perceived barriers to interaction.

Methods and Procedures

Data Collection and Analyses Procedures

Qualitative case study methodology (Merriam, 1998; Stake, 1995; Yin, 1984) was utilized to draw conclusions based on findings. A case study is "an empirical inquiry that: Investigates a contemporary phenomenon within its real-life context; when the boundaries between phenomenon and context are not clearly evident; and in which multiple sources of evidence are used" (Yin, 1984, p. 23). Case studies are intended to catch the intricacies of a particular event, program, individual, or place. One of the most important uses of the case study is to "*explain* the casual links in real-life interventions that are too complex for the survey or experimental strategies". A second goal of the case study is to *describe* the context in which interventions occur (Yin, 1984, p. 25, emphasis in original).

Qualitative data were collected and analyzed based on participant observations of lectures at both far- and near-end sites and in-depth semi-structured interviews with students (N=47) and site facilitators (N=5). A structured interview schedule was adhered to for all 47 student interviews as well as for engaging students in probing questions, which evolved during the interview process. The researcher attempted to understand why students did not fully engage in the various types of interaction provided in the course. Site facilitators were interviewed for methodological triangulation.

Interviews lasted no longer than one hour each and were audiotaped, transcribed, and coded following Miles and Huberman’s (1994) suggestions for qualitative data analysis. Videotaped recordings of all lectures were analyzed for interaction context and content among participants. Because of their focus on a particular situation, case studies do not seek to make statistical generalizations; rather, they rely on analytical techniques and are limited in their ability to generalize to a greater population (Yin 1984).

Course Context

Applied Animal Genetics was designed as a capstone seminar for animal science majors. The purpose of the course was to expose students to the genetics industry through 11 guest speakers from across the United States and Canada who presented current research being conducted in the field. Opportunities for interaction within the course context were provided in five forms. 1) Ten minutes were allotted at the end of each lecture to pose a question directly to the speaker from all sites. 2) A discussion board was linked to the course web site where students and guest speakers were invited to participate. 3) Most students had access to e-mail and were advised to communicate with site facilitators regarding content related questions. 4) Luncheons with guest speakers were provided at the near-end site. 5) Face-to-face interactions with site facilitators occurred within the context of normal interactions between students and professors at traditional campus-based universities.

The course was also supported by an extensive Internet web site that contained links to a student photo gallery, course outline, course rules and abstract information, journal articles (accessed through Adobe Acrobat reader), contact information for all site facilitators, and a link to the discussion board. Near-end students could also access their current standing in the class through the web site.

The near-end class was held in a newly constructed building designed specifically for offering courses at a distance with ICV technology. Classrooms at far-end sites were equipped with ICV conferencing equipment that ran at 384 kilobytes per second (kbps). One site used ICV conferencing equipment at 128 kbps. Far-end sites had technical assistance in connecting to the bridge service each week, but site facilitators were primarily responsible for managing communications between sites.

Population

The population was self-selected by enrollment in an animal genetics course. Participants in this multi-site study included all students (N=81) and site facilitators (N=5) receiving the course fall 1998. Seventy-three students (90%) (of whom 20% were male and 80% were female) and five site facilitators agreed to participate in the study. The average age of the cohort was 21.7 years and the average number of years in college was 3.6 years. None of the students had participated in a distance education course prior to this one.

Findings

Barriers to interactions were divided into 10 separate but not independent categories and served as dissatisfiers for students. Table 1 displays the categories along with the number of responses coded for each category from the interview transcripts and observation notes. Student responses are included in the findings.

The volume of codes indicates the density of the construct and their relative importance to the other categories. For example, social concerns were mentioned 67 times within the interview transcripts and classroom observation notes, whereas the microphone mute control knob was mentioned five times. Therefore, the relative importance of social concerns as a barrier to interaction is approximately 13 times greater than the mute control knob for students.

Table 1
Barriers to Interaction Category Titles and Number of Codes per Category

Barrier Category	Number of Codes
Social concerns	67
Technical failures	65
Time	48
Content related	38
Camera shyness	34
Site facilitator's role	28
Time for processing content	19
Non-verbal clues missing	9
Distance	6
Microphone mute control knob	5

Social Concerns

The majority of comments from students regarding barriers to interaction centered on social concerns. Students who were not inhibited by situational characteristics feared appearing insipid in front of peers and professors. Students were not only concerned about appearing unintelligent in front of the larger group, they also reported questions during the broadcast should be valuable to more than just themselves. Far-end students perceived that this class was more formal than other on-campus courses. The expert status of guest speakers and a broadcast site from a prestigious university served to inhibit questions from far-end students as well.

> I don't want to ask something and (the others say), "go back to grade school". If I have a question that I feel isn't too embarrassing I'll ask it.

> I'm afraid to be wrong, and feel stupid or something, or like that's a ridiculous question. I feel more comfortable just speaking to the teacher or professor afterwards. I don't feel uncomfortable asking them if no one else is around, like my fellow peers. Because I'm constantly thinking, what will my peers think of me, the whole society thing.

Technical Failures

The second most significant and effective barrier to interaction was ICV technical limitations and failures. Echoing and squealing noises as well as time delays and being cut-off inhibited interaction between guest speakers and students. Speech that was mediated through ICV technology lacked spontaneity and a lucid flow that is expected during face-to-face conversation, thus normal operations of the ICV system may have been interpreted by students as technical failures. ICV technology requires a highly structured and controlled learning environment. Because ICV technology has not reached the ideal paradigm for interactivity, near-end site facilitators implemented a speaking protocol by requesting that all questions and comments be held until the 10-minute question and answer session. Once students were asked not to interact for 40 minutes; some reported that when the question and answer session began they had to "get the motor running" again. Therefore, the ICV technology may not have failed technologically; however, it did fail to perform at a level that would facilitate human interaction rather than detract from it.

> If right off the bat there's problems with the video or the sound, then you tune out because you either can't hear or you can't see it or it's not there at all. So then you start to drift away, well then it comes back and you have to kind of snap back so that really is the only thing for me that has kind of been a drawback. It's

> very hard to get your attention centered on something when it keeps coming in, going out, coming in, and going out.
>
> The last class with the echoes, I wouldn't want to talk. I don't think I could have said anything with that echo coming back at me.

Time

Time limited or prevented students from interacting both synchronously (occurring at the same time) and served as a significant barrier to interactions both in and out of the classroom. Students reported that the 10-minute question and answer session was an insufficient amount of time for adequate interaction. Students reported feeling rushed during the final 10 minutes of class to get their questions answered, especially when the speaker went over the 40 minutes allotted for the lecture.

> I feel like the time is too limited for asking questions. Two weeks ago we had 4 visitors come in, and one was a professor, he hesitated to ask a question also, like he was ready to, but then we were cut off. It might be better to have more time for questions.
>
> If they wanted it to be something where we interacted with students more, they definitely have to leave us time to interact, and give us more of a chance.

Time could be considered a compounding factor with the other barriers to interaction. In an over-dramatized example, once a student decided to ask a question, they would have to be confident that their question would be viewed positively and that it would make a contribution to the group as a whole, then reach to push the microphone mute control knob and overcome any level of camera shyness, ignore any technical difficulties present (squealing and echoing noises) and finally ask their question. Given the fact that each site had approximately 2 minutes for asking questions, it is phenomenal that any questions were posed at all.

Content Related

Each week a new guest speaker delivered an original lecture to the class, creating content related barriers to interaction. Students' lack of understanding of the new material presented prevented them from asking questions. Some students lacked confidence in asking questions publicly because they were not sure if they understood the concepts and did not want to appear ignorant. Site facilitators were present at each site during the lectures so that if students had questions they perceived as trite, they would ask site facilitators rather than the guest speaker. Ironically, students asked public questions that they already knew the answers to because they had confidence in presenting themselves to the larger animal science community.

> Going in and listening to a lecture on poultry, I really didn’t have any connection with that. I enjoyed the lecture but I couldn’t think of any questions to ask.
>
> The fact that I’m coming in ill-prepared is not a help. I mean I cannot ask questions when I don’t know how to ask the question about the material.
>
> I would just say that the biggest barrier would be me not feeling comfortable enough with the material.

Camera Shyness

Sixty-two percent of the students reported having anxiety about being seen on camera. When queried about camera shyness, students' answers ranged from the camera having no impact on their behavior to a strong desire to avoid being the focus of the camera. If the site facilitator did not display the picture-in-picture (PIP) feature on the ICV monitor (TV screen), students were more comfortable asking questions, as they could not see themselves doing so. Students at the near-end site reported that camera shyness was more of an issue for them than far-end site students because their larger-than-life size image was displayed on a screen in the front of the room.

> In some way it is just because it's a Monday and you come in and you just drag yourself in after a long weekend of research or writing papers, so you are not exactly keen to have your face blown up on a huge screen.
>
> In other classes, I'm like O.K., I'm thinking about more, do I have a question, like what did he just say, but in this class, I'm like, (gasp) the camera is coming.
>
> As far as in the class, I had to ask a question last week and it was just very weird… this whole technology and lights and camera.

Site Facilitator's Role

Near-end site facilitators established the protocol for course interactions and served as moderators for asking and answering questions. They also coached guest speakers on the use of ICV technology and coping in the event of a technology failure prior to or during the broadcast. During the 10-minute question and answer session near-end site

facilitators called on each far-end site for questions. Often there were long pauses whereupon the site facilitator assumed that there were no questions from that site and would move on to the next site, effectively suppressing interaction from far-end sites. It was difficult to determine an appropriate time frame for students to respond to the call for questions.

The behavior of the guest speakers also suppressed interaction from far-end sites. For example one guest speaker indicated during an interview: "As soon as I started with the lecture, I ignored the fact that four other sites were sort-of peeking in on us." Treating the far-end sites as voyeurs was typical for guest speakers. In fact, speakers were coached to focus on near-end students as much as possible during the live broadcast and to ignore the activities on the screens that often depicted a site coming online, or dropping off-line when there were bridge failures. This behavior obviously contributed to the development of a mini-class structure at each far-end site, where students and site facilitators treated the live broadcasts as outside information being sent into their classrooms rather than as an interactive learning community.

Facilitator recognition of far-end students can enhance interaction. For example at the start of class on November 23, 1998 (13 weeks into the semester) a far-end site was projected on the screen at the near-end site. Students at the far-end were eating pizza. After the near-end site facilitator introduced the guest speaker he came online and said "first of all welcome to the foreign sites, the distance sites, it's nice to have you here. Although I'm quite upset that (far-end site) has pizza and is not passing it out to everyone else". Students at the site laughed, looking visibly surprised that they were noticed. Two of the four questions posed that day came from that particular site.

Time for Processing Content

Students needed more time for cognitively processing the content during the 10-minute question and answer session. A student likened the experience to making a sauce, in that it had to simmer for awhile before being good enough to eat. In traditional courses, students receive lectures from the same professor each session. In this course, students met a different speaker each Monday. Much of the content was new material for students.

> They need to give it time to relax. You are boiling sauce, you need to give it time to simmer, then you need to give it time to sit. Then you can eat it. You can't eat it when it's still boiling, it's no good. You have to allow for time.

To compensate for this deficiency students were asked to write abstracts, which forced them to cognitively organize information that they had received and also served to illustrate where gaps in knowledge existed. Unfortunately, guest speakers were unavailable to students after the broadcast.

> Do you feel that there are any barriers to asking questions during the live broadcast?
>
> No, not really. I just haven't come up with any questions that I want to ask right there. Usually it comes about the time I start thinking about my abstract and go back and look through my notes. Then I'm like; I really didn't understand this part. Then that's when I need the question asked.

Non-Verbal Clues

Two students reported that a lack of non-verbal clues served to inhibit interaction. These students were not positive if their questions had reached the instructor when posing questions because of ICV technical delays. One student mentioned that she could not see the speaker because of the low quality transmission and because many speakers remained behind the podium while delivering lectures.

Distance

Three far-end students stated that they were dissatisfied with the distance education environment especially for asking questions. Asking questions was seen as a "production" by one student, and effectively served to keep her from doing so.

Microphone Mute Control Knob

Students at all sites were expected to press a knob that would activate a microphone on the desk in front of them. Students at far-end sites had to press the un-mute knob on the ICV keypad before speaking and then remember to re-mute their site after speaking to prevent feedback noise from interrupting other sites. Students spoke about the "button" as being a barrier to interaction in that if they didn't remember to activate the microphone no one could hear the question. The speaker rarely repeated questions so only near-end students could hear the them.

> I think just the whole remembering to push the button and waiting for the camera. I know that you explained that at the beginning of class that you are supposed to raise your hand and push the button, or some order, and I have since forgotten exactly how to do that. You probably gave us a handout too, and I have just stashed that away. So I think it's just more of not knowing exactly how to ask the question.

Summary

There were 10 separate but not independent barrier categories that were discussed in this study. Barriers to interactions served as dissatisfiers for students. Camera shyness was an issue for students who did not want to see their image projected on a large screen or broadcast to the other sites. Content-related issues centered on students' lack of genetics knowledge. It was difficult for students to ask questions when they did not fully understand the content presented. The distance proved to be a dissatisfier for a minority of students who reported feeling disconnected from guest speakers.

Some students reported needing more time to cognitively process content covered in class before asking questions. A student likened the experience to making a sauce, in that it had to simmer for awhile before being good enough to eat. Few students reported that a lack of non-verbal clues, or body language was a barrier to interaction for them.

The site facilitators' behavior in facilitating interactions was a complicated issue to unravel. It was compounded with technical limitations and failures as well as by guest speaker behaviors and comfort levels in teaching to five sites at once.

A very important barrier to interaction for this youthful undergraduate population was social concerns. Not wanting to appear ignorant prevented many students from asking public questions. Some students commented on only wanting to ask questions that they perceived as intelligent and that would benefit many, not just themselves. They did not want to trivialize the learning environment with nit-picky or petty questions.

The most significant barriers to interactions were ICV technical limitations and failures. Echoing and squealing noises as well as time delays and being cut-off inhibited interaction between guest speakers and students. Having to press the microphone mute control knob could also be categorized as a technical limitation that inhibited interaction. Finally, time limited or prevented students from interacting both synchronously and asynchronously. The 10-minutes set aside at the end of the class was not enough to facilitate didactic interactions.

Implications, Recommendations, and Discussion

The results of this study have contributed to the distance education literature by identifying barriers to interaction, which centered on student situational and dispositional characteristics and technical limitations and failures. Student dispositional barriers such as camera shyness and a desire to appear intelligent when speaking in public naturally occur in all distance learning environments. However, there should be measures to curtail them by site facilitators. Some technological barriers can and should be overcome with improved bridging services, appropriate course design, and more practice with the technology. It is recommended that a professional bridging service be employed when delivering multiple-point ICV courses to improve technical connection quality and thus interactivity among participants.

Recent research in distance education has focused on the attributes of ICV technology for synchronous two-way audio and visual interaction. ICV technology in this study was not fully interactive. ICV technology used to deliver the course resulted in an interactive environment, but on a very limited basis. Near-end site facilitators restricted interaction during the live broadcast because of inherent technical limitations. There were delays in communications, visibility problems and a low quality image of graphical displays used by speakers. Technology failures caused by bad weather and human error at the bridging service accounted for loss of interaction 36% of the time. It is recommended that ICV technology advocates address technological limitations of this medium for delivering courses and that distance course providers consider providing asynchronous web-based courses due to ICV technical limitations.

Hillman, et al. (1994) discussed learner-interface interaction, the concept of interaction that occurs between the learner and the technologies used to deliver instruction. In this study one student complained about access to an on-campus computer in order to participate in the asynchronous elements of the course (e-mail and the discussion board). It is recommended that distance educators consider the burden placed on students when adding interaction features to the total course design. Course designers must balance media-rich and technology intensive learning environments along with student access to multi-media hardware to gains in learning achieved by using such options.

Distance education students learn equally well using asynchronous learning modalities (e-mail, discussion boards, videotapes) at a fraction of the cost of satellite and/or ICV technologies (Leverenz, 1979; St. Pierre & Olsen, 1991; Tallman, 1994). As course providers strive to increase interaction in the distance education classroom by simulating the face-to-face experience, consideration should be given to institutional costs as well as perceived student benefits. Colleges and universities must determine if they are investing wisely in synchronous technology (satellite and ICV) to the extent that learners are willing to participate in real-time interaction. In this study the perceived educative value of receiving the course synchronously was high for far-end students, as were the real costs to participating institutions. Students who received the course live at far-end sites speculated that they would not have enjoyed the course had they received it videotaped. However, students who did receive the course videotaped were as satisfied with the content and the level of interaction as were synchronous sites. It is recommended that more empirical evidence be gathered to demonstrate the superiority of synchronous delivery over asynchronous delivery in terms of

quality of interaction in the classroom, especially those courses that are supported with site facilitators who are also content experts as was the case in this study.

Finally, in this study far-end students reported feeling socially accountable to guest speakers knowing that they could be seen through the ICV system. Students reported that receiving the course live heightened their sensory awareness and they were more apt to pay attention and model appropriate behavior during the live lecture than if the course were provided videotaped. The social accountability phenomenon has not been reported in the distance education literature as a factor for student satisfaction or as a rationale for providing live, interactive courses. This factor alone may justify the costs of providing synchronous courses to students who are able to participate in them (i.e. students who are not time- or place-bound). As a rationale for providing synchronous courses, future research should examine empirical evidence that social accountability is indeed a factor for increasing interaction in the distance education environment.

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AN ASSESSMENT OF PENNSYLVANIA SECONDARY AGRICULTURE TEACHERS' PERCEPTIONS OF AND USE OF THE INTERNET

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Abstract

Perceptions of and use of the Internet by agriculture teachers in Pennsylvania were assessed. A descriptive survey was used to collect data from 205 secondary agriculture teachers. Teacher use of the Internet and perceptions of factors encouraging and discouraging the use of the Internet were measured using Likert-type scales. Findings indicated that factors discouraging Internet use were not related to teachers' actual use of the Internet. Factors encouraging Internet use included comfort with computer use, willingness to invest time learning, support, and access to computers with the Internet. Based on the findings, it was recommended that school sites seek funding or increased Internet access, in-services, and access to Internet "mentors."

Introduction/Theoretical Framework

Technologies that mold today's society are quickly entering the educational arena. A key product of the technological revolution, the Internet, is gaining momentum as a valued medium throughout all levels of education. Realizing the growing impact of the Internet in facilitating communications and information dissemination, leadership in funding and legislation from local to national levels has been widespread (Clinton, 1997).

One major event, *Net Day 97* (April 5, 1997), is an example of efforts to secure Internet access in schools across the U.S. Coordinators of Net Day brought volunteers together to retrofit K-12 institutions with donated material.

A statewide initiative promoting the adoption of the Internet is Pennsylvania's *Link to Learn Project.* Over a three-year period, Link-to-Learn will provide $121 million to the educational community to develop a "network of networks" called the Pennsylvania Educational Network (PEN). In the first year, 1997, the basic education component of Link to Learn targeted $33.3 million to K-12 schools. This effort will prepare schools to connect to the PEN through personal computers, educational software, local area networks, and professional development (Project Link to Learn, 1997).

Getting schools online is only part of the solution to promoting Internet use and integration. In a 1995 address to educators, U.S. Secretary of Education Richard Riley said, "Few educators have adequate experience with or understanding of technology to make full use of its potential" (Reinventing Schools, 1996). Presently, efforts are being initiated throughout the country to develop teachers' Internet usage skills through activities, including workshops and in-service training. However, Hall and Hord (1987) stated that, "Historically, teachers have all too often been provided with workshops, materials and other resources based on the needs of others rather than on an understanding of teachers' needs" (p. 5). The authors further emphasized that understanding teacher attitudes and skills should be the precursor to planning and providing support activities. In as much, support activities for teacher education of the Internet have increased as its values were realized.

The Internet and other telecommunication media have been found to add value to programs in K-12 schools. Terrell, Dringus, and Rendulic (1995) recognized that technology integration can alter traditional teaching methods such as the lecture format. They stated: "technology allows us to break this mold in order to allow our teachers to use their human expertise where it is most needed" (p. 3). Other studies highlight the value of the Internet in overcoming barriers in education that are caused by factors of rurality (Barker, 1997; Rogan, 1995).

Resources available through Internet use have drawn urban and rural schools closer. Barker (1997) discussed how the Internet is improving the educational opportunities of rural students. He found that the Internet provides students with access to:

- networking and collaboration through worldwide electronic mail, distribution lists, and group mail;
- numerous databases and electronic bulletin boards through which users can exchange information in the form of text, audio, and graphic formats;
- collaborative investigation allowing students to investigate problems and issues and share products across geographic and political boundaries; and
- resources ranging from curricula to exemplary classroom activities.

Furthermore, research on Internet use by math and science teachers in rural schools found reductions of isolation and increased perceptions of a global community (Rogan, 1995).

As programs benefit through improved teaching, the use of the Internet has been found to provide expanded learning opportunities in the most remote locations. In a study of telecommunications technologies in Alabama schools, Doucet (1995) concluded that due to advanced telecommunications use, rural and isolated schools are no longer at a disadvantage. "Global awareness" is becoming a relevant phrase to all students with Internet access. Use of media such as the World Wide Web (WWW) and e-mail allows current international updates and cross-cultural discussions (Wishnietsky, 1993; Harris, 1994; Internet Archaeologist, 1997).

Computer uses in agricultural education have been supported for years; additionally, use with students in agricultural education have also increased (Zidon, 1985; Raven & Welton, 1989). Researchers throughout agricultural education support the Internet as a creative tool for student activities (Murphy & Terry, 1995; Layfield & Bowen, 1995; Talbert, 1995). In an analysis of the World Wide Web, Raven and Settle (1995) discussed how interest in and use of the medium are increasing: "The implications for how agricultural education is taught and delivered are profound" (Raven & Settle, 1995, p. 11).

In light of growing interest in the Internet, recent studies have investigated teachers' perceptions and uses of the medium. In a study of agriculture teachers in the Northwest, Nordheim and Connors (1997) found that 75% of the teachers were in agreement that the Internet should be used in instruction. However, only 41.8% of the respondents reported use of the World Wide Web to access information. Similarly, Layfield and Scanlon (1998) reported in a national study of agriculture teachers, that 41% use the Internet in their curriculum. Additionally, a study of agricultural educator Internet use in Idaho determined a need for personal training and technical support (Thompson & Connors, 1998).

Purpose and Objectives

The overall purpose of the study was to determine the Internet use in secondary agricultural programs in Pennsylvania. Objectives of the study were to:

1. Describe the demographic profile of ag teachers;
2. Describe the use of the Internet in secondary agricultural education programs;
3. Determine factors that encourage and discourage the use of the Internet by ag teachers;
4. Determine differences, if any, between users and non-users of the Internet and factors that encourage or discourage use of the Internet by ag teachers; and
5. Determine differences, if any, between demographic characteristics (age, gender, highest education level, years taught, etc.) and factors that encourage or discourage use of the Internet by ag teachers.

Methods and Procedures

The design for the study was a descriptive survey research. The population for the study consisted of all secondary agriculture teachers currently teaching in Pennsylvania. The frame was obtained from the 1997-98 Directory of Agricultural Education in Pennsylvania, prepared by the Department of Agricultural and Extension Education at The Pennsylvania State University, in cooperation with the Bureau of Vocational-Technical Education, Pennsylvania Department of Education. This Directory listed a total of 251 agricultural teachers. A random sample of 205 was selected using the formula (3% sampling error and 3% margin of error) provided by Krejcie and Morgan (1970).

The researchers developed an instrument designed to accomplish the study purposes and objectives. The instrument contained three sections: 1) demographic/program characteristics, 2) Internet use by agricultural teachers, 3) 30 questions related to factors that encourage and discourage use of the Internet by ag teachers. These 30 questions were measured on a five-point, Likert scale (1=strongly disagree to 5=strongly agree). Face and content validity of the instrument was established using a five-member panel of experts from the Departments of Agricultural and Extension Education and Workforce Education. A pilot test of the instrument was also conducted using 30 vocational teachers at the Dauphin County Technical School. The reliability of the instrument was found to be acceptable (alpha=.81 for encouraging factors and .82 for discouraging factors).

Data were collected via mail to agriculture teachers selected for the study. A cover letter, number coded instruments, and a stamped self-addressed envelope were mailed to the sample. After two weeks, total of 116 teachers responded for a return rate of 57 percent. Two follow-ups in the form of post card and telephone calls yielded an additional 45 responses for a total of 161 (78.5%). The 116 early and 45 late respondents were compared on key variables (encouraging and discouraging factors) as per procedures suggested by Miller and Smith (1983). No significant differences were found between early and late respondents and as such the data were generalized to the population of agriculture teachers in Pennsylvania. Data were summarized using descriptive and inferential statistics.

Results

Objective 1: Demographic Profile of Teachers

A majority of the teachers (63%) were in the age group of 31-50 years, followed by 19% in 51-60 years category, and 16% in 21-30 years category. Seventy-eight percent of the teachers were male. Regarding educational level, 53% reported bachelor's degree, followed by master's (42%) and 5% doctorate. Thirty-nine percent of the teachers reported over 21 years of teaching secondary agriculture followed by 32% (0-10 years), and 30% (11-20 years). Agriculture was the primary curriculum taught for 31% of the teachers, followed by horticulture (22%), agri-science (19%), ag mech (10%), natural resources (6%) and animal science (3%).

Objective 2: Internet Use in Secondary Agriculture Programs

Internet use by teachers and students in secondary agriculture programs are shown in Table 1. There was an even split in teachers regarding the use of Internet in secondary agriculture programs with 50% using it and 50% not using it in their programs. For students' use, Internet use was categorized into World Wide Web (WWW) and e-mail use. As shown in Table 2, agriculture teachers reported that students used both WWW and e-mail for agricultural research information. Students used WWW for References (38%), current event awareness (34%), FFA information (30%), and global awareness (14%). Students used e-mail for visiting resource persons (14%), and FFA correspondence (12%). Overall, students used more of WWW than e-mail. An overwhelming majority of teachers (85%) indicated that their FFA chapter does not have a Homepage on WWW. Similarly, as high as 97.5% of the teachers reported that they do not teach students to develop WebPages (Table 1).

Table 1
Internet Use in Secondary Agricultural Education Programs

Internet Use	Yes		No		Total	
	F	%	f	%	f	%
Internet use by Teachers						
Use Internet in agriculture program	76	50.3	75	49.7	151	100.0
WWW Use by Students						
Agricultural research	70	43.5	91	56.5	161	100.0
References	62	38.5	99	61.5	161	100.0
Current events awareness	55	34.2	106	65.8	161	100.0
FFA information	49	30.4	112	69.6	161	100.0
Global awareness	22	13.7	139	86.3	161	100.0
Downloading educational programs	16	9.9	145	90.1	161	100.0
E-mail Use by Students						
Agricultural research	28	17.4	133	82.6	161	100.0
Visiting with resource persons	23	14.3	138	85.7	161	100.0
FFA correspondence	19	11.8	142	88.2	161	100.0
Mailing lists	11	6.8	150	93.2	161	100.0
Global awareness	11	6.8	150	93.2	161	100.0
Keypal correspondence	6	3.7	155	96.3	161	100.0
FFA Chapter has a Homepage WWW?	23	14.6	134	85.5	157	100.0
Do you teach students to develop WebPages?	4	2.5	155	97.5	159	100.0

Objectives 3 and 4: Encouraging and Discouraging Factors

Data summarized in Table 2 show the mean scores and standard deviations for factors that encourage and discourage use of the Internet by agriculture teachers. The top five encouraging factors were: "feel comfortable using computers (4.14), followed by "willing to invest time to learn the Internet" (4.00), "having technical support staff knowledge of the Internet" (3.78), "having access to colleagues who have extensive Internet training" (3.66), and "having access to a computer lab with Internet capabilities (3.39). The statements receiving the lowest mean scores were: "have more than one computer with Internet access in my classroom" (1.71) and "school district provides incentives to participate in Internet training (2.22).

Regarding discouraging factors (Table 2), none of the teachers indicated "agreement" to factors that discourage Internet use. Mean scores for all the 13 discouraging factors were below three points on a five-point scale.

Table 2
Means and Standard Deviations for Encouraging and Discouraging Factors (n=161)

Factors	Mean	SD
Encouraging Factors		
I feel comfortable using computers	4.14	1.01
I am willing to invest my time in learning to use the Internet	4.00	0.97
I have technical support staff knowledgeable of Internet at my school	3.78	1.26
I have access to colleagues who have extensive training on the Internet	3.64	1.26
I have access to a computer lab with Internet capabilities	3.47	1.57
I have administrative support to attend Internet inservices	3.39	1.22
I work with colleagues who use the Internet in their classrooms	3.12	1.43
I have had training needed to use the Internet	2.99	1.49
At home I have access to the Internet	2.96	1.88
My school district has an ongoing plan for staff development on the Internet	2.94	1.44
I have reliable Internet access	2.89	1.62
I have the equipment needed in my classroom to access the Internet	2.83	1.78
I have access to Internet training through my professional association	2.67	1.34
My school district provides incentives to participate in Internet training	2.22	1.28
I have more than one computer with Internet access in my classroom	1.71	1.39
Discouraging Factors		
My administrators do not provide time to learn about using the Internet	2.93	1.34
Well-designed curriculum resources are not available on the Internet	2.83	1.07
I have difficulties getting online	2.73	1.38
I do not have access to formal technical Internet support at my school	2.70	1.45
I don't have opportunities to attend inservices on using the Internet	2.68	1.31
My school does not have enough phone lines to use the Internet	2.66	1.51
I am concerned about damaging a computer with Internet files	2.24	1.16
I have a modem, but it is too slow to use the Internet	2.18	1.16
I do not know how to operate software needed for Internet access	2.12	1.18
I do not have the patience necessary to work with the Internet	2.04	1.14
The Internet access I have is not user friendly	2.02	1.00
I am not computer "literate" enough to use the Internet	1.94	1.12
I tried using the Internet and was unsuccessful	1.76	1.00

*Mean computed on a scale that ranged from 1" strongly disagree" to 5 "strongly agree"

Table 3 displays ANOVA results for encouraging factors by agriculture teachers who were Internet users or non-users. Nine of the 15 encouraging factors showed significant differences ($p < .05$ and $p < .001$ levels) between users and non-users (Table 3). For all the nine encouraging factors, Internet users were significantly higher in agreement than non-users. However, there were no significant differences between users and non-users of the Internet for the other six encouraging factors (Table 3).

ANOVA results for discouraging factors by agriculture teachers who were Internet users or non-users are shown in Table 4. Seven of the 12 discouraging factors showed significant differences ($p < .05$ and $p < .001$) between users and non-users (Table 4). For all the eight discouraging factors, non-users of the Internet were significantly higher in agreement than users. However, there were no significant differences between users and non-users for the other five discouraging factors (Table 4).

Objective 5: Demographic Differences

ANOVA was conducted to determine difference between Internet users and non-users and their demographic characteristics (age, gender, educational level, and years of teaching experience). No significant differences were found between any of the encouraging and discouraging factors and age, gender, and years of teaching experience. However, significant differences ($p < .05$ and $p < .001$) were found between educational level and two encouraging factors (Table 5). For the two encouraging factors, teachers with masters degree were significantly higher in agreement than teachers with a bachelors degree.

Table 3
Anova Results for **Encouraging** Factors by Internet Use (n=161)

Factors	Use Internet			Do not use				
	N	Ma	SD	N	Ma	SD	Mean Diff.	F-Value
I have the equipment needed in my classroom to access the Internet	76	3.58	1.63	75	2.03	1.57	1.55	36.14**
I have reliable Internet access	76	3.60	1.49	74	2.11	1.41	1.50	40.74**
More than one computer with Internet access in my classroom	76	2.17	1.69	75	1.15	0.46	1.02	20.82**
I have had training needed to use the Internet	76	3.50	1.39	73	2.38	1.43	1.12	23.91**
My school district has an ongoing plan for staff development on the Internet	76	3.07	1.50	74	2.74	1.38	0.33	2.18
My school district provides incentives to participate in Internet training	76	2.16	1.37	74	2.23	1.19	-.07	.126
I have access to a computer lab with Internet capabilities	76	3.89	1.47	74	2.99	1.59	0.91	13.44**
I have technical support staff knowledgeable of	76	4.03	1.23	75	3.60	1.24	0.42	4.53*
I feel comfortable using computers	76	4.43	0.77	75	3.83	1.18	0.60	13.99**
I have access to Internet training through my professional association	73	2.64	1.37	74	2.57	1.33	0.07	0.18
I am willing to invest my time in learning to use the Internet	74	4.12	0.91	75	3.85	1.03	0.27	2.83
At home I have access to the Internet	76	3.26	1.90	75	2.61	1.82	0.64	4.79*
I have access to colleagues who have extensive	76	3.75	1.20	75	3.48	1.32	0.27	0.18
I have administrative support to attend Internet inservices	73	3.36	1.31	74	3.35	1.21	0.01	0.004
I work with colleagues who use the Internet	76	3.51	1.35	75	2.64	1.42	0.87	15.39**

Mean computed on a scale that ranged from 1"strongly disagree" to 5 "strongly agree"
** p <.001; * p < .05

Conclusions and Recommendations

The following conclusions and recommendations were made based on the findings of the study:

Factors encouraging and discouraging Internet use by agriculture teachers using and not using the Internet were examined in the third objective. Means for all factors proposed as discouraging Internet use were in the "not a factor" range scores. Therefore, discussion will focus on factors proposed as encouraging Internet use.

The study found that teachers using the Internet scored five statements that encouraged use with high means. The five highest mean scores of statements encouraging Internet use by agriculture teachers (indicating agreement) were:

1) "I feel comfortable using computers." Teachers who use the Internet found that they feel comfortable enough using the computer to learn additional programs, such as the Internet. This finding suggests that agriculture teachers' highest personal inhibitor is the fear of lacking substantial computer knowledge. Specifically, if teachers fear using the computer, they most likely will not begin to seek assistance for using the Internet in their teaching. It is therefore recommended that administrators identify those teachers with low computer skills and provide in-service opportunities on basic computing to ease possible apprehensions. Additionally, administrators may also foster teacher comfort of computers by assigning "mentors," as support mechanisms.

The second variable of the factors encouraging Internet use was: 2) "I am willing to invest my time in learning to use the Internet." Strategies to elicit teacher paradigms toward investment of time to learn to use the Internet should be considered by school administrators. If "company" time is provided for teachers to initiate interest in the Internet, possibly follow-up with personal time will occur. Therefore, it is recommended that school administrators provide substantial time for teachers to learn to use the Internet. Extra time may be provided in the form of specific Internet days during in-service periods, or supplemental pay for weekend in-service attendance.

Table 4
Anova Results for **Discouraging Factors** by Internet Use (n=161)

Factors	Use Internet			Do not use Internet				
	N	Ma	SD	N	Ma	SD	Mean Diff.	F-Value
I don't have opportunities to attend inservices on using the Internet	76	2.63	1.32	72	2.74	1.31	-0.11	0.23
My administrators do not provide time to learn about	76	2.87	1.43	72	3.00	1.26	-0.13	0.35
I have difficulties getting online	75	2.11	1.16	72	3.35	1.31	-1.24	37.01**
Well-designed curriculum resources are not available	75	2.83	1.12	69	2.81	1.02	0.01	0.007
I am concerned about damaging a computer with Internet files	76	2.04	1.05	71	2.45	1.25	-0.41	4.68*
I tried using the Internet and was unsuccessful	76	1.57	0.90	73	1.97	1.04	-0.41	6.53*
My school does not have enough phone lines to use the Internet	76	2.25	1.43	71	3.11	1.48	-0.86	12.89**
I have a modem, but it is too slow to use the Internet	76	2.09	1.20	68	2.26	1.13	-0.17	0.78
I am not computer "literate" enough to use the Internet	75	1.64	0.88	74	2.27	1.26	-0.63	12.51**
I do not have the patience necessary to work with the Internet	75	1.91	1.09	72	2.21	1.19	-0.30	2.57
I do not know how to operate the software needed for Internet access	76	1.70	0.88	73	2.53	1.29	-0.84	21.51**
The Internet access I have is not user friendly	75	1.85	0.99	69	2.19	0.99	-0.33	4.09*

Mean computed on a scale that ranged from 1"strongly disagree" to 5 "strongly agree" ** p <.001; * p < .05

Table 5
Anova Results for Encouraging Factors by Highest Education Level (n=161)

Factors	Bachelors			Masters			Mean	F
	N	Ma	SD	N	Ma	SD	Diff.	Value
I have the equipment needed in my classroom to access the Internet	82	2.38	1.68	73	3.34	1.77	-0.96	6.40**
I have reliable Internet access	82	2.55	1.52	73	3.27	1.66	-0.73	4.15*
I have more than one computer with Internet access in my classroom	82	1.48	1.11	74	1.97	1.60	-0.49	2.55
My school district has an ongoing plan for staff development on the Internet	82	2.70	1.41	73	3.21	1.44	-0.51	2.47

Mean computed on a scale that ranged from 1"strongly disagree" to 5 "strongly agree" ** p <.001; * p < .05

The third and fourth highest factors encouraging Internet use were grouped due to their commonality in nature. The variables were: 3) I have technical support staff knowledgeable of the Internet at my school, and 4) I have access to colleagues who have extensive training on the Internet. Both variables reflect the need for support when using the Internet. An obvious conclusion related to "support" is that if agriculture teachers have access to colleagues with extensive training on the Internet they are more likely to adopt and integrate the Internet in their programs. Specifically, if agricultural educators are to be expected to utilize the Internet, support from innovators is necessary. Hence, it is recommended that school administrators select teachers that colleagues respect to send for in-service training on the Internet and techniques for providing support.

The final variable encouraging Internet use was 5) "I have access to a computer lab with Internet capabilities." Specifically, this study found that teachers who do not have direct and easy access to the Internet in their schools will not be adopters and users of the Internet. Hence, it is recommended that school administrators seek funding through grants (E-rates), donations, and business partnerships to increase access points (including labs) to the Internet in their schools.

These findings suggest the need for continued Internet inservice activities for agriculture teachers. Pennsylvania's Center for Professional Personnel Development in Agricultural Education has been instrumental in providing support of advanced instruction of technological innovations such as the Internet through inservices and coursework. Therefore, it is recommended that the Center develop a needs assessment to determine inservice and coursework required to maintain agriculture teacher's integration of technology in the classroom. The Center should take a leading role in emphasizing the use of technologies in secondary school agriculture programs.

Findings from this study indicate that use of the World Wide Web is minimal. It is recommended that efforts to increase student use of the World Wide Web be implemented by school administrators, teacher educators, and agricultural curricula suppliers. School-based grant writers and teachers should be encouraged to submit proposals for World Wide Web access and support. Compensation time should be provided for those "innovators" seeking inservice support or time for grant writing.

This study also indicated those teachers with higher educational levels had higher agreement on having access to Internet-related equipment. Teachers with more experience or advanced degrees may have additional opportunities for access to funding or administrative support. The Pennsylvania educational system has widely supported continuing education for teachers (i.e. advanced degrees, inservices). It is recommended that the Pennsylvania Association for Agricultural Educators (PAAE) support continued lobbying for state funds regarding professional development.

Teacher educators can also impact teacher use of the World Wide Web. Inservice activities and graduate coursework involving the World Wide Web may assist teachers to become more acquainted with the medium. Departmental information related to teachers and teaching issues might be posted on the World Wide Web, urging teachers to become more familiar with the medium. It is also recommended that teacher educators use the World Wide Web throughout preservice activities with undergraduates. Additionally, teacher educators are encouraged to assign student teachers activities involving use of the World Wide Web.

This study also identified FFA chapter ownership of pages on the World Wide Web. A total of 11% of the agriculture teachers indicated that their FFA chapter has a Webpage. It can be concluded that FFA chapters are not using the World Wide Web as a communication medium. Therefore, it is recommended that use of web authoring tools become more accessible and the Center provide inservices related to Webpage development. National FFA inservice activities might also include topics related to building effective homepages. Furthermore, it is recommended that teachers use the model provided by the National FFA for effective uses of World Wide Web homepages.

The findings from this study guided the researchers to make the following recommendations for future research:

1. Future researchers should periodically replicate this study in a longitudinal format to determine if an increase in agriculture teachers' stages of concern has occurred.
2. Future studies should investigate the impact of Pennsylvania's Link-to-Learn program on student learning through the Internet.
3. Future studies should examine what level of Internet activity in agricultural education has the highest impact on student achievement.
4. Future studies should investigate the teaching/learning process as it relates to the Internet.

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SELF-PERCEIVED LEADERSHIP SKILLS OF STUDENTS IN A LEADERSHIP PROGRAMS IN AGRICULTURE COURSE

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Abstract

Self-perceived leadership skills/behaviors of students enrolled in a college of agriculture "Leadership Programs in Agriculture" course were assessed. A descriptive survey was used to collect data from 58 students enrolled in a "Leadership Programs in Agriculture" course. Findings indicated that students perceived themselves as possessing higher leadership skills. In addition, students also participated in a variety of organizations and activities. Prominent among them were athletics, intramurals, department clubs, FFA, 4-H, and church groups. Significant positive relationships were found between participation in department clubs and leadership skills. Based on the findings, it was recommended that students be provided with opportunities for involvement in community activities and college departmental organizations.

Introduction/Theoretical Framework

In recent years, colleges of agriculture across the United States have initiated different forms of leadership courses in order to meet business and industry's changing needs of the 21st century. A key factor sought by agribusinesses in students is that students have demonstrated leadership within a team environment (Oliver, 1991). In addition, Radhakrishna and Bruening (1994) reported that interpersonal skills were rated highly important for employment by agribusinesses. Numerous year "2000" reports have encouraged the development of leadership courses and related programs throughout the Land Grant System. In light of the need and numerous recommendations, more than half of the agricultural education departments in the U.S. offer undergraduate courses focusing on leadership development (Brown & Fritz, 1994). A study developed for use in one of these courses examined students' self-perceived satisfaction ratings of intended outcomes related to leadership development. Students responded favorably (3.79/5.0) to successfully achieving a set of leadership-related constructs where leadership courses exist (Gamon, Chun-Shih, & Breja, 1998). However, few studies have focused on the worth of collegiate student organizations in developing tomorrow's agriculture and natural resources professionals (Birkenholz & Schumacher, 1994).

In the past, faculty looked toward various means of developing student's interpersonal and social skills. Several researchers have noted relationships between active participation in college activities and interpersonal development (Birkenholz & Schumacher, 1994; Eklund-Leen & Young, 1996). Additionally, a study by Love and Yoder (1989) found that students indicated the development of interpersonal and leadership skills as a direct result of curricular or extracurricular activities. However, a significant number of those students were not satisfied with instruction in regards to developing leadership skills. Classroom instruction lends itself to concepts of leadership theory and practice; however, the true-life experiential laboratory through participation student organizations should be included (Fritz & Brown, 1998). Additionally, several researchers have found that exposure to varieties of out-of-classroom opportunities will provide concrete experiences and background knowledge on students as they attempt to integrate leadership theories and skills (Kouzes & Posner, 1990; Wren, 1994; Bolt, 1996).

Past studies indicated many benefits of involvement in student organizations. Eklund-Leen and Young (1996) found that students who were highly involved in campus life tended to view community involvement more positively and anticipated engaging in community activities outside the school. According to Kouzes & Posner, (1988) leadership is an observable and learnable set of practices. Individuals who possess the desire and persistence to lead, may enhance their skills and abilities required for the leadership role. Birkenholz & Schumacher, 1994, studied leadership skills of college of agriculture graduates at the University of Missouri and found positive relationships between student participation in student activities and perceived leadership skills.

Purpose and Objectives

The overall purpose of the study was to determine the self-perceived leadership skills/behaviors of students enrolled in a College Leadership course. This descriptive research included the following objectives:

1. Describe demographic characteristics of students enrolled in College of Agriculture Leadership course.
2. Determine self-perceived leadership skills held by students enrolled in College of Agriculture Leadership course.
3. Identify student levels of participation in University-level leadership activities.
4. Determine relationships, if any, between leadership skills and student levels of participation in college and departmental clubs.

Methods and Procedures

The population for this descriptive research was all 58 students enrolled in a College of Agriculture Leadership course during the Fall 1998 semester at Iowa State University.

The survey instrument used by Birkenholz and Schumacher (1994) was modified and used for the study. The instrument contained three sections. Section one contained 44 leadership behavior/skill items measured on a six-point Likert-type scale which ranged from 1=strongly disagree to 6 = strongly agree. Section two contained information relative to student levels of participation in university leadership activities. The final section contained demographic information such as age, gender, marital status, place of residence, class standing, GPA, career aspiration and living outside home (dormitory, sorority, fraternity etc.,).

Content and face validity were established by a panel of experts consisting of faculty and graduate students at Iowa State University. The instrument was administered to all 58 students in a regular class hour. Data thus collected were analyzed using the Statistical Package for the Social Sciences, Personal Computer Version (SPSS/PC+). Descriptive statistics such as frequencies, percentages, means and standard deviation were used to summarize the data. Point-biserial correlation was used to describe the relationships between leadership skills and level of participation in university activities. The alpha level was set a priori at .05 level. All correlation coefficients were interpreted using Davis (1971) scale. Only relationships that were found significant were reported in this paper.

A post-hoc reliability analysis was conducted to assess instrument reliability. The 44 leadership skill statements were grouped into five subscales based on Birkenholz and Schumacher (1994) study. The five subscales were: 1) administration, achievement, empathy, communication, and problem solving. Table 1 shows the reliability coefficients for the five subscales for this study and as Birkenhloz and Schumacher's (1994) study.

Table 1.
Reliability Coefficients for the Five Leadership Subscales

Subscale	Number of Items	Cronbach's alpha (N=58)	Birkenholz/Schumacher study (n=293)
Administration	14	.87	.90
Achievement	9	.93	.86
Empathy	7	.81	.67
Community	7	.73	.81
Problem Solving	6	.65	.68
Overall	43	.83	.93

Findings and/or Conclusions

Objective 1: Demographic Characteristics

Demographic characteristics of respondents are shown in Table 2. Approximately 59 percent of the respondents were in the age group of 21-22 years, followed by 34 percent in the age group of 19-20 years. Seventy-six percent of the respondents were male and 24% female. A majority (86.2%) were single, followed by married (12.1%), and divorced (1.7%). Approximately 76 percent of the respondents were raised on a farm, followed by rural area (9%), small town (5%), medium sized town (3%), and city (5%). Juniors comprised 63.8 percent of the respondents, followed by seniors (32.8%), and sophomore (3.4%).

Objective 2: Self-Perceived Leadership Skills

The respondents were asked to rate their self-perceived level of skill in five areas of leadership, (administration, achievement, community, empathy, and problem solving) using a six-point Likert-type scale (1=Strongly disagree to 6 =Strongly agree). Table 3 shows the means and standard deviations for each of the 44 items grouped by five leadership skill areas. Overall the mean scores ranged from a low score of 2.60 for the item, "I find it difficult to consider another person's point of view" to a high score of 5.47 for the item "I enjoy success and strive for it." The respondents rated 13 (29%) of the items 5.00 or higher while 27 (62%) of the items received mean ratings of 4.00 or higher. Only four (9%) of the items received a mean score less than 4.00.

The leadership skill area, "administration" contained 14 items with mean scores that ranged from 4.41 to 5.24 (Table 3). The item "I have a good sense of humor" was rated the highest (5.24). The "achievement" skill area contained nine items with mean scores that ranged from 4.72 to 5.47. The item " I enjoy success and strive for it" received the highest rating (5.47).

Table 2
Demographic Characteristics of Students Enrolled in College of Agriculture Leadership Courses

Characteristic	f	%
Age		
19-20 years	20	34.5
21-22 years	34	58.6
Over 23 years	4	6.9
Gender		
Female	14	24.1
Male	44	75.9
Marital Status		
Single	50	86.2
Married	7	12.1
Divorced	1	1.7
Widowed	-	-
Place of Residence		
On a farm	44	75.9
Rural area	5	8.6
Small town	3	5.2
Medium-sized town	2	3.4
City	3	5.2
Others	1	1.7
Class Standing		
Freshmen	-	-
Sophomore	2	3.4
Junior	37	63.8
Senior	19	32.8

The "empathy" skill area contained six items with mean scores that ranged from 2.60 to 5.40. The item "I like to maintain good interpersonal relations with co-workers was rated highest (5.40) by the respondents, while the item, " I find it difficult to consider another person's point of view" was rated lowest (2.60) by the respondents. The "community" skill area contained seven items with mean scores that ranged from 3.66 to 5.07. The item "I enjoy meeting new people" was rated highest (5.07), while the item "I am the type of person who is involved in community activities" was rated lowest (3.66). The final leadership skill area "problem solving" contained six items with mean scores that ranged from 4.79 to 5.38. The item "I like to see conflicts resolved" was rated highest by respondents. Overall, the respondents perceived themselves as possessing higher leadership skills.

Objective 3: Level of Participation

Respondents were asked to indicate their level of participation and/or activities in various organizations during their high school and college years. Data relative to their level of participation are shown in Table 4. As shown in Table 4, a majority (over 62%) of respondents participated in college athletics either as a member, officer or a committee person. Similarly, 26% of the respondents reported that they were members of FFA, and 24% members of a honor society. Fifteen percent of the respondents served as officers of FFA. Level of participation and activities were minimal in student council and class officer (21% each), followed by FHA (1.7%).

At the college level, the most frequently participated activity was intramurals with 52 percent of the respondents. Similarly, 40 percent of respondents participated in departmental clubs. Eleven or 19 percent of respondents had participated in more than one departmental club activities. Respondent participation was very minimal in professional/honor societies (8.6%), followed by sorority/fraternity (5.2%), student government and ROTC (1.7% each).

In the category "Other," approximately 45% of respondents were active members in church groups, followed by 4-H club (20.7%) and boy/girl scouts (13.8%). It is interesting to note that 24% of 4-H club members participated in more than one activity (Table 4).

Table 3.
Means and Standard Deviation for Self-perceived Leadership Skills Grouped by Five Subscales

Statement	f	Mean*	SD
Administration (14)			
I can motivate people	58	4.84	0.72
I am able to inspire people	58	4.41	0.77
Other people accept me as a leader	58	4.55	0.84
People look to me for advice	58	4.66	0.91
People seek guidance from me when they have difficult times	58	4.59	0.80
I am an effective decision maker	58	4.60	0.72
I have a good sense of humor	58	5.24	0.76
People confide in me because they consider me to be trustworthy	58	5.19	0.63
I am willing to take charge of and lead a group	58	4.84	0.93
I can persuade others to respect my point of view	58	4.69	0.80
Other people accept my ideas	58	4.72	0.67
Making friends and getting along with others is easy for me	58	4.93	0.99
I am able to convince others of my ideas	58	4.60	0.72
People often allow me to lead group discussion	58	4.31	1.08
Achievement (9)			
I persevere on a project until it is complete	58	5.00	0.94
I consider myself to be a flexible person	58	4.72	0.93
I enjoy success and strive for it	58	5.47	0.79
Once I begin a project, I feel I must see it through to completion	58	5.19	1.00
I view myself as a professional	58	4.79	1.10
I strive to achieve my professional goals	58	5.28	0.74
I consider myself to be an achiever in life	58	5.10	1.57
I am enthused about my work	58	5.28	0.79
I feel I am proficient in my work	58	5.40	0.77
Empathy (7)			
I willingly listen to others	58	5.22	0.68
I find it difficult to consider another person's point of view	58	2.60	1.23
I am concerned about maintaining good interpersonal relationships	58	4.86	1.05
I use tact in everyday life	58	4.60	0.94
I am a cordial person	58	4.74	0.89
I feel people admire and respect me for the person I am	58	4.86	0.83
I like to maintain good interpersonal relations with workers	58	5.40	0.70
Community (7)			
I am the type of person who is involved with community activities	58	3.66	1.33
I enjoy sharing information with others	58	4.84	0.89
I encourage others to become involved in activities	58	4.57	0.98
Belonging to organizations is important to me	58	4.07	1.37
It is easy for me to develop an interest in people	58	4.93	0.86
I enjoy meeting new people	58	5.07	0.93
Problem Solving (6)			
I understand that other people have feelings, motives, & goals of their own	58	5.40	0.75
I consider myself to be intelligent	58	4.88	0.68
I like to see conflicts resolved	58	5.38	0.70
When someone comes to me with a problem, I try to put myself in their shoes so I can better understand the situation	58	4.79	0.81
I feel confident openly promoting issues that I enjoy expressing my ideas on a given issue	58	4.98	0.91

mean computed on a scale that ranged from 1 "strongly disagree" 6 " strongly agree"

Table 4.
Level of Participation in Activities and Organizations

Activities	Non Participant		Member		Committee Person		Officer		More than one	
	f	%	f	%	f	%	f	%	f	%
High School										
Athletics	10	17.2	36	62.1	3	5.2	3	5.2	6	10.3
Honor Society	36	62.1	24	24.1	3	5.2	2	3.4	3	5.2
Student Council	37	63.8	12	20.7	1	1.7	4	6.9	4	6.9
Class Officer	43	74.1	12	20.7	3	5.2	-	-	-	-
FFA	22	37.9	15	25.9	3	5.2	9	15.5	9	15.5
FHA	57	98.3	1	1.7	-	-	-	-	-	-
College										
Departmental Clubs	18	31.0	23	39.7	2	3.4	4	6.9	11	19.0
Sorority/ Fraternity	43	74.1	3	5.2	4	6.9	3	5.2	5	8.6
Student Government	57	98.3	1	1.7	-	-	-	-	-	-
Professional/ Honor	49	84.5	5	8.6	1	1.7	3	5.2	-	-
Intramurals	22	37.9	30	51.7	3	5.2	1	1.7	2	3.4
ROTC	55	94.8	1	1.7	1	1.7	1	1.7	-	-
Other										
Church Group	22	37.9	26	44.8	-	-	6	10.3	4	6.9
4-H Club	19	32.8	12	20.7	-	-	13	22.4	14	24.1
Boy/Girl Scouts	49	84.5	8	13.8	-	-	1	1.7	-	-
Military	57	98.3	1	1.7	-	-	-	-	-	-

Objective 4: Relationships Between Leadership Skills and Level of Participation

Point-biserial correlations were computed to determine relationships, if any, between leadership skills and participation in college-departmental club activities. Descriptors suggested by Davis (1971) was used to describe the relationships between the two variables. Results are shown in Table 5. Findings revealed low to moderate, positive relationships, significant at the .05 level between 15 leadership skill items and participation in college departmental clubs. The correlations ranged from a low of .27 to a high of .57. For all the sixteen leadership skill items, respondents who participated in college departmental clubs perceived having higher leadership skills than those who did not participate in departmental club activities. Of the 58 respondents, 40 were members of departmental clubs and 18 were non-members.

Conclusions & Recommendations

Based on the findings of this study, the following conclusions and recommendations were made:

Overall, students perceived that they possess leadership skills at a higher level. The leadership skill, achievement, was rated highest by the students, followed by problem-solving, empathy, administration, and community. Findings also indicate that students perceived themselves as not adequately involved in community activities.

Students participated in a variety of organizations and activities. Prominent among them were athletics at the high school level, followed by FFA, and Honor Society. At the college level, however, students participated in intramurals and department clubs. In addition, students also participated in church groups, and 4-H Clubs.

Significant positive relationships were found between leadership skills and participation in departmental clubs. Students who participated in leadership programs significantly rated their leadership skills higher than those students who did not participate in leadership programs. This finding mirrors those results of Birkenholz and Schumacher's (1994) study.

The following recommendations are offered for future research:

Students should be encouraged to be more involved in community activities. Faculty developing courses in leadership programs should include community-based activities in their courses. Also, students might be given bonus points for participation in college departmental clubs.

Participation of students in organizations, especially at the college and departmental levels should be encouraged . Incentives for student participation should be provided. Faculty might consider using service-learning components in conjunction with local 4-H, FFA or other youth organizations.

Table 5
Relationships Between Level of Participation in University Activities and Self-perceived Leadership Skills

Statement	Non-Participation			Participation			Point-biserial
	N	M	SD	N	M	SD	
Other people accept me as a leader	40	4.78	0.70	18	4.06	0.75	.34*
People look to me for advice	40	4.83	0.83	18	4.28	0.96	.27*
I persevere on a project until it is complete	40	5.10	0.93	18	4.7895	0.4284	.35*
I am involved in community activities	40	4.05	1.11	18	2.78	1.40	.40**
Concerned about maintaining good interpersonal relationships	40	5.13	0.97	18	4.28	1.02	.28*
Encourage others to become involved in activities	40	4.80	0.65	18	4.06	1.35	.40**
I use tact in everyday life	40	4.75	0.95	18	4.25	0.83	.44*
I am a cordial person	40	4.88	0.88	18	4.44	0.86	.31*
I am able to convince others of my ideas	40	4.75	0.59	18	4.28	0.89	.33*
People often allow me to lead group discussion	40	4.53	0.96	18	3.83	1.20	.39**
Belonging to organizations is important to me	40	4.45	1.20	18	3.22	1.40	.57**
It is easy for me to develop an interest in people	40	5.10	0.81	18	4.56	0.86	.40**
I enjoy meeting new people	40	5.20	0.85	18	4.78	1.06	.28*
I view myself as a professional	40	4.97	1.00	18	4.39	1.24	.37*
Maintain good interpersonal relations with co-workers	40	5.50	0.60	18	5.17	0.86	.27*

* $p < .05$ level; ** $p < .001$ level.

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STUDENT PERCEPTIONS TOWARD CASE BASED INSTRUCTION DELIVERED VIA THE WORLD WIDE WEB

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Abstract

Student perceptions of World Wide Web delivery methods of a Case-based Turfgrass course were measured using a double-scaled Likert-type instrument containing 16 questions. A total of 35 students – 26 from Penn State (originating site) and nine from Rutgers were enrolled in the course. Overall, the perceptions of Penn State and Rutgers students toward the use of the World Wide Web for instructional delivery were favorable. Students generally agreed or indicated undecided perceptions on the benefits. Students at the Rutgers site indicated displeasure with the World Wide Web as a delivery method, since its "firewall" postponed download time. At the completion of the course, Penn State students expressed a need for advanced training on uses of the World Wide Web. Recommendations included the need for all students to have equal "speed" access to course-related Web sites. Student comfort with computer use should be considered prior to delivering courses using the World Wide Web.

Introduction

Although the history of the Internet in education is short-lived, many screens could "tell a thousand stories." As vast resources on the Internet increase exponentially, so do educators interests of instructional delivery models and cutting-edge techniques for Web-based or Web-supplemented courses. Web-based authoring tools such as WebCT and FirstClass have provided additional distance education opportunities to numerous institutions. Researchers in many disciplines of education are beginning to explore the efficacy of delivery using such Web-based courses (Dabbagh & Schmitt, 1998; Shearer & Rose, 1998).

Theoretical Framework

Studies by faculty in agricultural education have provided evidence of the Internet's effectiveness as a competitive medium for course delivery and/or course supplementation (Newman, Raven, and Day, 1996; Day, Newman and Raven, 1996; and Terry and Briers, 1996). Shih & Gamon, 1998, found that students in Web-based courses enjoyed the convenience and self-controlled learning pace and were motivated by competition and high expectations. Furthermore, the researchers concluded that students with different types of learning styles could learn equally well in Web-based courses. In consideration of the successes of instruction and supplementation with the World Wide Web, experimental uses of mixing the medium with established pedagogical practices is necessary for maximizing its potential in education. One successful educational practice is the use of Case-based learning.

Case-based instruction involves the use of case studies, called decision cases, to expose students to problem situations in which they identify with -- or assume the role of -- the decision-maker. This type of instruction involves little or no lecturing; rather, the instructor employs "discussion teaching" methods by which students are led through a process of inquiry and from which learning largely occurs through discovery (Christensen, 1991).

A case is an incomplete narrative of a problem situation that takes the student to the point at which a decision has to be made. A more-detailed definition provided by Christensen (1987) is "a partial, historical, clinical study of a situation, which has confronted a practicing administrator or managerial group. Presented in narrative form to encourage student involvement, it provides data -- substantive and process -- essential to an analysis of a specific situation, for the framing of alternative action programs, and for their implementation recognizing the complexity and ambiguity of the practical world."

Under the guidance of a competent instructor, students can develop an array of important "process" skills through their exposure to case-based learning. Using an adaptation of Kolb's Learning Cycle Model developed by Turgeon (1993), students begin by concisely and accurately describing the situation presented in the case. This is called the "divergence" phase. Students then conduct a thorough analysis of the situation by drawing on their relevant knowledge to interpret and enrich their understanding of the situation; thus, known as the "assimilation" phase. In the subsequent "convergence" phase, students attempt to identify the issues emerging from the analysis and propose strategies for addressing them. Finally, after selecting an appropriate strategy, the students develop a detailed action plan for operationalizing the strategy to improve the situation -- the "accommodation" phase of the process. Often, students realize that successive iterations of this process may be needed to satisfactorily resolve a complex problem situation.

"Electronic communication information, and imaging technologies will improve how we teach in agricultural education settings…" and will "allow us to reach more students, more effectively, with better information," (Murphy & Terry, 1998). As expert knowledge is delivered using innovative media such as Case-based instruction,

evaluation of its acceptance and efficacy will be necessary. Moreover, recommendations have been made to investigate which subject matter topics can be delivered using distance education technologies (Swan, 1998).

Purpose & Research Questions

The purpose of this study was to assess changes in student perceptions of the World Wide Web for deliveries of course case studies. The research questions used to meet the purpose of this study include:

1. Did student perceptions about the benefits and challenges of using the World Wide Web for course materials delivery change significantly after experiencing it?
2. Were there differences between students' perceptions of the World Wide Web for Case study delivery at the remote site and the originating site?

Methods/Procedures

The population of this study consisted of two groups of students in a senior-level turfgrass management course, "Case Studies in Turfgrass Management," during the Spring 1996 Semester. The course was delivered to 30 students face-to-face at the Penn State – University Park campus and by compressed video to 10 students at the Rutgers University campus in New Brunswick, New Jersey. The World Wide Web was used to deliver Case-based instructional materials for the course, coupled with extensive use of e-mail for interaction between the instructor and students. Because of the small size of the population, a census study was used for the study.

A double-scaled Likert-type questionnaire was used to collect data relating to changes in student perceptions of the use of the World Wide Web for course material delivery. Questions for the instrument were developed from a synthesis of distance education literature. Students' perceptions about the benefits and challenges of the World Wide Web were assessed in a pretest and a posttest. Perceptions were measured on 16 items using a five-point Likert scale ranging from "strongly agree" to "strongly disagree." Face validity was established by a panel of experts in the Department of Agricultural and Extension Education at Penn State. Due to the timing and nature of the study, a post-hoc reliability analysis was used on the 16 items. Cronbach alpha reliability test item scores ranged from .87 to .89, with an overall coefficient of .89. Analyses of data included means, standard deviations, and paired T-tests. For statistical analysis, the researcher considered the students in the class to represent a "Slice of Life" sample of Penn State and Rutgers Students (Oliver & Hinkle, 1981). This theory is based on the premise that the population in the study is representative of a larger relative group. Students were asked to respond to statements regarding the delivery medium prior to and following the course. All students completed the instrument at the session preceding the final class of the semester. The data gathered from the survey were analyzed using the Statistical Package for the Social Sciences for Windows (SPSS).

Results/Findings

Eight of the items related to students' perceptions of the benefits of using the World Wide Web to deliver course materials and 8 that related to challenges. The mean pretest score for benefits statements was 2.7, meaning that students either agreed or were undecided about the benefits of the World Wide Web for course materials delivery. Students were undecided about the challenges of using the World Wide Web for delivering course materials (mean = 3.0). The posttest mean for benefits dropped only slightly to 2.6 while the mean for challenges remained at 3.0. On the whole, the pretest and posttest results indicate that students' perceptions about the use of the World Wide Web to deliver course materials did not change significantly after participating in the course. Table 1 shows the individual scores for all the 16 benefits and challenges items.

A paired T-test procedure revealed changes in perceptions on specific items relating to Penn State students' perceptions about the benefits and challenges of using the World Wide Web for course material delivery. Statistically significant differences ($p<.05$) were found between pretest and posttest perceptions about using the World Wide Web for course materials delivery (Table 2). Students differed on their perceptions about the accessibility of course materials ($t = 2.77$), amount of time spent ($t = 2.32$), amount of distraction ($t = -2.48$), the World Wide Web as a poor choice for delivering materials ($t = -2.52$), and lack of training ($t = -3.28$).

Table 1.
Mean Scores and Standard Deviations of Students' Perceptions of the Benefits and Challenges of the World Wide Web for Course Materials Delivery

Item	Pretest	Posttest
The World Wide Web is an appropriate delivery medium for course materials in TURF436W.	2.61 (.97)	2.77 (1.35)
I have problems accessing course materials through the World Wide Web.	2.64 (1.19)	2.46 (1.50)
Technical difficulties using the World Wide Web restricted my learning.	2.82 (1.07)	2.53 (1.42)
Having all of the course materials easily accessible is important to me.	1.79 (1.14)	1.53 (.94)
Delivery of course materials via the World Wide Web enhances my learning.	2.90 (1.07)	2.91 (1.21)
The computer restricts learning because it is "impersonal."	3.15 (1.00)	3.24 (1.15)
Receiving course materials via the World Wide Web impedes my studies, because I get distracted through exploration.	2.36 (1.03)	1.88 (1.27)
Using the World Wide Web impedes my studies, because I get distracted through "exploration."	3.00 (1.09)	3.47 (1.35)
Considering the potential for distraction that exists with the World Wide Web, it is a poor choice for delivering materials.	3.15 (.88)	3.58 (1.10)
I have NO difficulties corresponding with the instructor through e-mail.	3.33 (1.07)	3.67 (1.54)
The inability to readily discuss course materials with the instructor hindered my ability to learn.	2.91 (.69)	3.15 (.98)
The benefits of accessing course materials via the World Wide Web (i.e. professional graphics, instructor's exact notes, and multimedia presentations) outweighed the time cost.	2.88 (.86)	3.06 (1.27)
I have access to appropriate computer equipment when needed	2.94 (1.35)	2.88 (1.51)
I DO NOT have the necessary training to obtain course materials delivered via the World Wide Web.	3.03 (1.31)	3.68 (1.22)
Delivery of course materials via the World Wide Web helps me become more comfortable with computers	2.24 (.87)	1.91 (1.07)
I am willing to take a course that delivers materials via the World Wide Web.	2.67 (1.16)	2.47 (1.44)

Note. Scale: 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, 5 = Strongly Disagree. Standard Deviations are in parentheses.

Table 2.
Differences Between Pretest and Posttest Perception Scores for All Students (N = 35)

Item	Assessment	Mean	SD	t-value	P
Accessibility of course materials	Pretest	1.79	1.14	2.77	.01
	Posttest	1.55	.94		
Receiving course materials time consuming	Pretest	2.36	1.03	2.32	.03
	Posttest	1.88	1.27		
Get distracted	Pretest	3.00	1.09	-2.48	.02
	Posttest	3.49	1.35		
Poor choice	Pretest	3.16	.88	-2.52	.02
	Posttest	3.59	1.10		
Necessary Training	Pretest	3.03	1.31	-3.28	.00
	Posttest	3.67	1.22		

Note. Scale: 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, 5 = Strongly Disagree.

A paired t-test procedure was used to assess differences between pretest and posttest perceptions of Penn State students of the World Wide Web. Statistically significant differences were found regarding students' perceptions about the use of the World Wide Web to deliver instructional materials before and after participating in the course. Pretest and posttest perceptions differed on problems with accessing course materials ($t = 2.30$), negative influences of the World Wide Web on learning ($t = -2.14$), and the adequacy of training for using the Web ($t = -2.61$). There were differences also regarding changes in level of comfort with the Web after participating in the course ($t = 2.11$).

Table 3.
Test for Differences Between Pretest and Posttest of Perception Scores for Penn State Students (N = 26)

Items	Assessment	Mean	SD	t-value	P
Course materials	Pretest	1.88	1.24	2.30	.03
	Posttest	1.64	1.04		
Hindered learning	Pretest	2.83	.76	-2.14	.04
	Posttest	3.17	1.01		
Necessary training	Pretest	3.16	1.38	-2.61	.02
	Posttest	3.64	1.32		
More comfortable	Pretest	2.32	.85	2.11	.04
	Posttest	1.88	.97		

Note. Scale: 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, 5 = Strongly Disagree

Statistically significant differences were found between Rutgers students' pretest and posttest perceptions of the use of the World Wide Web to deliver instructional materials before and after participating in the course. Pretest and posttest perceptions differed on whether or not accessing course materials on the World Wide Web was time consuming ($t = 2.55$), how distracting the World Wide Web can be ($t = -2.55$), and whether or not students thought the World Wide Web was a poor choice for course materials delivery ($t = -2.65$).

Table 4.
Test for Differences Between Pretest and Posttest of Perceptions Scores for Rutgers Students (N = 8)

Item	Assessment	Mean	SD	t-value	P
Time consuming	Pretest	2.75	.89	2.55	.04
	Posttest	1.63	1.41		
Get distracted	Pretest	3.00	.93	-2.55	.04
	Posttest	4.13	.99		
Poor choice	Pretest	3.13	.84	-2.65	.03
	Posttest	4.13	.99		

Note. Scale: 1 = Strongly Agree, 2 = Agree, 3 = Undecided, 4 = Disagree, 5 = Strongly Disagree.

Conclusions

Penn State and Rutgers students' perceptions toward the use of the World Wide Web for instructional delivery were overall favorable, with agreement or undecided perceptions on the benefits. As with any new medium, some of the problems discovered by the overall group from both universities involved facility concerns. Although the overall T-tests discovered problems with necessary training and time needed for downloading course materials, many concerns developed at the Rutgers site, due to networking difficulties. Students at the Rutgers site indicated displeasure with the World Wide Web as a delivery method, since its "firewall" postponed download time. This trait may be the reason Rutgers students had significant T-test scores on the "time consuming" and "poor choice" survey items. Although a lesser concern, but an important one, Penn State students expressed a greater need for advance training. Additional T-test results presented by Penn State students noted that easy access to course materials and the increased comfort level of computers were benefits of the delivery medium.

Recommendations/Implications

The purpose of this study was to assess changes in student perceptions of the World Wide Web for deliveries of course case studies. In consideration of the low population of the study, a census was used for data collection purposes. Therefore, the researchers realize that the population in this study may or may not represent all students. As a result, the findings of this study should be limited to agronomy students that were enrolled in this course at Rutgers and Penn State universities.

Although students may not be interested in using the World Wide Web for instructional purposes initially, their perceptions can be altered by their experiences with the medium. In future courses delivering materials through the World Wide Web, it is suggested all students have high-speed access from campus lab sites. As suggested in this study, students will not participate in the activity if it is time consuming. Consideration of the advantages that students receive through this chosen delivery method (i.e. ease of course material access, increased comfort with computers) should be built upon early in the design of the course and used to enhance the course. Furthermore, instructors should be cognizant when using this medium, that the learning experience is positive and rewarding for students.

Recommendations for Future Study

1. Future studies should examine the efficacy of Case-based delivery through the World Wide Web. Additionally, the researchers should be cognizant that all potential sites receive information at equal download speed times.
2. Studies should investigate increase (if any) in computer skills by students participating in Web-based courses.
3. Researchers should investigate the efficacy of instruction using the new Web-authoring tools, such as WebCT and FirstClass.
4. Future studies of Web-based delivery methods should include qualitative analyses to determine specific trends and concerns of students enrolled

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EFFECTS OF LEVEL OF OPENNESS IN AGRISCIENCE EXPERIMENTS ON STUDENT ACHIEVEMENT AND SCIENCE PROCESS SKILL DEVELOPMENT

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Abstract

Level of openness in an experiment refers to the extent to which students are provided procedures for performing the lab. In traditional approaches students follow a very prescriptive format, often working to verify what is already known, as opposed to undertaking true experimentation. Many teachers and researchers today are calling for a more open and investigative approach to student experimentation. This study compared the effects of level of openness in agriscience experiments on student achievement and understanding of science process skills. Nine teachers who had previously taught the Biological and/or Physical Science Applications in Agriculture courses (BSAA and PSAA) participated in the study. Each teacher taught three BSAA and two PSAA labs over a 30-day period. Teachers were provided lesson plans corresponding to their randomly assigned teaching approach. Students completed pretests on the BSAA and PSAA labs and science process skills, with these scores used as covariates. The GEFT learning style assessment was used to determine preferred learning styles. The Test of Integrated Process Skills was used to assess students' science process skills. Students in the study were predominantly field dependent learners. MANCOVA and follow-up univariate analyses of covariance procedures were used. Students in the traditional (prescriptive) lab format scored significantly higher on all three dependent measures (BSAA achievement test, PSAA achievement test, and science process skills) than those in the more open, investigative group. Females scored higher than males in the control group but lower than males in the treatment group. Dependent measures were not influenced by learning style

Introduction

The release of *Understanding Agriculture, New Directions for Education*, by the National Research Council in 1988 set in motion a curricular emphasis in agriscience in the secondary schools that continues to gain momentum over 10 years later. The report recommended development of special applied science courses in agriculture that would be viewed as complementary to regular science course offerings and worthy of receiving science credit toward high school graduation and college entrance (National Research Council, 1988). The 1989 report of the American Association for the Advancement of Science further supported this approach when it recommended that applications of science be taught in relevant technological fields, such as agriculture (Project 2061, 1989). Many states responded to this call for curriculum reform by developing new and/or revised courses that emphasized agriscience. Illinois became an early leader in this effort with the release of the Biological and Physical Science Applications in Agriculture (BSAA and PSAA) courses, beginning in 1991. This four semester series of courses has targeted high school students who have completed basic course work in science (biology) and math. Course design has required that experiments be used as the predominant teaching method, and course content has focused on agricultural practices and the corresponding science concepts and principles that explain the basis for these practices. By 1997 over 80% of approximately 266 responding teachers reported that they incorporate the BSAA and PSAA labs into their existing courses, and many Illinois teachers offer BSAA and/or PSAA as separate courses (Illinois Agricultural Education Survey, 1997). Today, these course materials have been used by agriculture teachers in practically every state in the nation.

With the move toward lab-based, agriscience courses taught via experimentation, teachers have found themselves confronted with a number of significant new instructional questions and challenges. Traditionally, agriculture teachers have seldom used experiments as a teaching strategy. In fact, experimentation as a teaching technique has been infrequently used throughout the secondary school curriculum. Even the current "hands-on science" trend has not emphasized true experimentation as a method of learning. Thus, even with the hands-on science movement, many teachers may feel unprepared to effectively teach science using experiments as the predominant teaching method (Osborne, 1992).

A number of teachers and researchers have begun to question the traditional, or "cookbook," method of learning in the science laboratory. Gallet (1998) suggested that traditional cookbook labs are more concerned with the ends of the experiment than the means of reaching them. He described traditional science lab activities as superficial, characterized by a high degree of memorization and dependence on the instructor. He further claimed that students in these labs retain little of what they learn and have difficulty applying what they know. Gallet was very critical of the cookbook approach to science lab activities, stating that:

> "Recipe experiments tend to sterilize imagination and initiative, leave no room for hypotheses, trials, errors, … and above all, preclude students' involvement in the decision-making process. Many parameters that are fundamental to the scientific method are left out by the …cookbook-formula approach." (Gallet, 1998, p. 73)

Herman (1998) indicated that the investigative nature of labs can be enhanced by (1) providing instructions on performing the experiment while leaving data analysis or hypothesis formation open and/or (2) requiring students to design their own experiments. She encouraged science teachers to move toward investigative labs by converting at least one lab per semester to an investigative format. Further support for this view was contained in the 1990 report of the American Association for the Advancement of Science (AAAS), which recommended that science laboratories be open-ended and investigative rather than confirming what is already known (AAAS, 1990). McIntosh (1995) stated that science teachers seldom ask their students to design their own experiments or organize their own data. He stressed the importance of providing students practice in performing critical investigative skills.

The above opinions relate to levels of openness in the science laboratory, particularly when using experiments as the teaching method. Openness refers to the extent to which the research problem, procedures, and results are made known to the students prior to performing the experiment. Tamir (1989) proposed use of a content analysis scheme for determining openness in science lab activities. In a purely traditional (cookbook) lab students would be given the problem, procedures, and results. Thus, the level of openness would be very low. The opposite extreme provides a completely open learning atmosphere in all three of these areas of the experimentation process. In this latter design, the students are given none of the key aspects of the lab. That is, the lab is "open," and the learner is given no "recipe" for lab success. Tamir's work demonstrated that experiment-based curriculum materials for high school students have typically had very low levels of openness. Theoretically, experiments with greater openness can be expected to improve student motivation, investigative skills, and achievement. Thus, the problem under investigation in this study was the lack of empirical evidence to support investigative versus traditional (cookbook) science labs. Does a more open, investigative approach to learning with experiments better promote student achievement and enhance science process skills?

Conceptual Framework

The conceptual framework for the study was an adaptation of the basic tenets of a model for the study of teaching and learning developed by Dunkin and Biddle (1974). These researchers developed a model for the study of teaching that included student presage variables (what students bring to the learning situation), teacher presage variables, context variables (characteristics of the community and classroom that are relevant to learning), teaching/learning process variables, and outcome or product variables (areas of student growth, improvement, and satisfaction). The model developed for this study used the same major headings as the Dunkin and Biddle model. These headings were revised and detailed for the context of teaching agriscience (see Figure 1). The elements of the model that were addressed in this study are shown in bold print. These include the student presage variables of learning style, gender, and science process skills and outcome variables of student achievement and science process skills. The specific learning process under investigation was the level of openness of agriscience experiments. This model suggested that students and teachers bring many abilities and characteristics to the learning environment that impact the nature of the teaching and learning process and the eventual outcomes achieved.

Purpose and Objectives

The purpose of this study was to determine the effects of level of openness of agriscience experiments on student achievement and science process skills. The following null hypotheses were tested at the .05 level of significance:

HO_1: There is no difference in achievement, as measured by score on the BSAA posttest, between secondary agriscience students given open lab experiments and those given prescriptive lab experiments.

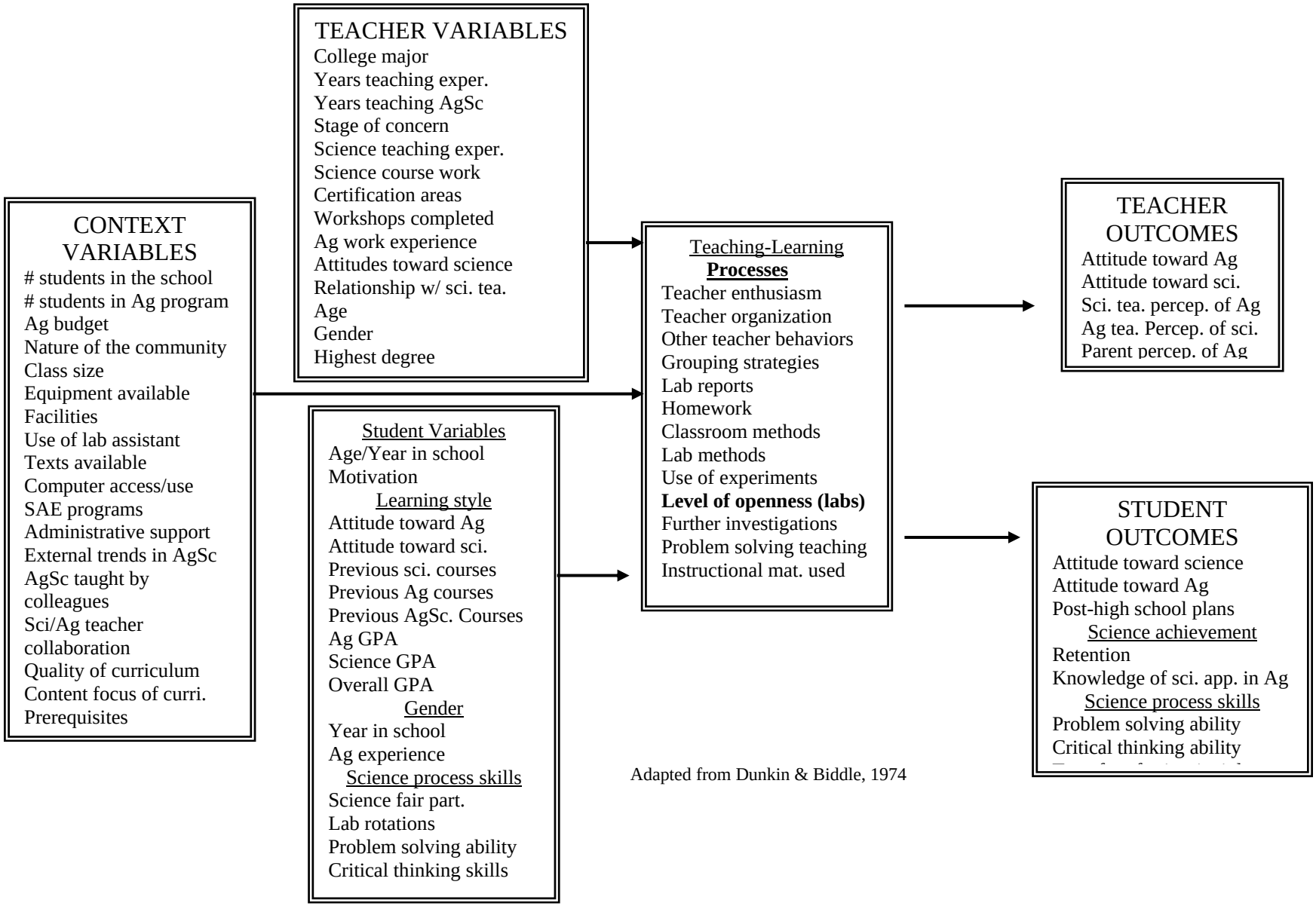
HO_2: There is no difference in achievement, as measured by score on the PSAA posttest, between secondary agriscience students given open lab experiments and those given prescriptive lab experiments.

HO_3: There is no difference in science process skills, as measured by score on the Test of Integrated Process Skills Test (TIPS II), between secondary agriscience students given open lab experiments and those given prescriptive lab experiments.

Research Procedures Used

This study was conducted using a quasi-experimental design. Random assignment of subjects to treatment groups was not possible, so intact groups (classrooms) were used. The research design used was the nonequivalent control group design as described by Campbell and Stanley (1963). The first observation consisted of the BSAA pretest and the pretest for science process skills (TIPS I). The experimental treatment was an open, investigative approach to experimentation in five agriscience labs, while the control was the more traditional, "cookbook" approach to the experiments. Students completed the GEFT learning styles assessment about midway through the study schedule. The PSAA pretest was completed just prior to beginning the first PSAA lab. Posttests were administered after the three BSAA labs were completed and after the two PSAA labs were completed. A delayed retention test and an attitude assessment were dropped, due to the length of the study and the heavy amount of testing already involved. Threats to internal validity in this design included regression and interaction. However, since the groups were not selected as a result of extreme scores, regression effects posed a minimal threat to internal validity. The interaction threat was reduced by using the subject matter and science process skills pretests as covariates in the statistical analysis

Figure 1. Conceptual Model for Research on Agriscience Curriculum and Instruction



Adapted from Dunkin & Biddle, 1974

The population for the study included all Illinois high school students enrolled in laboratory-based agriscience courses. The accessible population was students enrolled in the 42 agriculture programs in the state that offered either the BSAA or the PSAA course during the 1995-96 school year. Agriculture teachers at twenty schools were purposively selected from the set of 42 schools, invited to participate in the study, and asked to indicate their preferences for labs to teach from among a list of 11 possible labs. Fourteen teachers indicated their willingness to participate. Since a purposive sample was taken, results of this study cannot be generalized to a larger population. The 14 schools were randomly assigned to the treatment and control groups (seven schools in each group). Of the 14 teachers, nine completed all or major portions of the study and provided usable data for analysis. This included five assigned to the control group and four schools assigned to the treatment group (76 and 74 students, respectively). Nearly all students were 15 or 16 years old.

The subject matter tests were developed by the researcher, with questions directly based upon the BSAA and PSAA labs taught by the teachers. Twelve multiple choice questions were developed for each of the five labs. The BSAA pretest and posttest each contained 36 items, while the PSAA pretest and posttest contained 24 items. Final

K-R 20 reliability coefficients were .51 for the BSAA pretest, .55 for the PSAA pretest, .47 for the BSAA posttest, and .68 for the PSAA posttest. The posttests represented parallel forms of the pretests and were developed by shifting the order of response choices, using different distracters, and changing the numbers in given situations.

Students' learning styles were determined using the Witkin et al. (1971) Group Embedded Figures Test (GEFT). This instrument has been commonly used in agricultural education research, as well as in many other disciplines. The GEFT is a standardized instrument having an established validity and a reliability coefficient of .82. The Test of Integrated Science Skills (TIPS) consists of 36 multiple choice questions that are designed to test students' ability to state hypotheses, operationally define variables, design investigations, and interpret data. This test was developed for secondary students without preference to a particular area of science. The TIPS instrument has an established validity and a Cronbach's alpha reliability of .89. TIPS II is a parallel version of TIPS I (Dillashaw and Okey, 1980).

Table 1.
Differences in the Control and Treatment Procedures

Step in the Experimentation Process	**Control Group (Traditional Approach)**	**Treatment Group (Investigative Approach)**
Identify the research problem	Teacher presents	Students identify
Determine the design and procedures for the experiment	Teacher presents	Students determine
Identify the materials needed	Teacher gives the list of materials to the students	Students determine the materials needed, based upon their design and procedures
Identify anticipated findings	Teacher leads discussion of expected results	Students identify hypotheses in writing
Determine data summary procedures	Teacher presents a sample data summary chart and explains	Students develop their own data summary strategy/format
Identify conclusions	Teacher leads a discussion of conclusions	Students identify their conclusions in writing, followed by teacher discussion and modification
Identify follow-up investigations	Teacher leads a discussion of possible follow-up experiments	Students identify their own follow-up experiments. Teacher discusses general design possibilities. Students select one of the ideas for further investigation and plan a detailed design.

The total estimated time for teaching the five labs and administering the pretests and posttests was 30 school days. Teachers were provided copies of all tests and lesson plans in advance, along with specific instructions about the order of teaching and testing. All teachers taught the same five labs: Environmental Factors Affecting Germination, Salinity and Seed Germination, Transpiration in Plants, Cutting and Conveying: Use of Simple Machines, and Chemistry of Popcorn. These labs were drawn from the BSAA and PSAA Teacher's Guides. In addition, student texts have been developed for the BSAA and PSAA courses, and the five labs assigned were included in the texts. Teachers received an outline of the experimentation process and lesson plans adjusted for their treatment or control group. Lesson plans for the two groups were identical for the suggested Interest Approach, discussion of

Agricultural Applications (practices), and the Purpose and Objectives of the experiment. Teachers in both groups also used the same guide questions to focus student reflection and discussion after the experiment was completed. Table 1 explains the differences between the treatment and control teaching strategies. All participating teachers were asked to provide audio tapes of two class periods taught during study. Although only four of the nine teachers (two in the control group and two in the experimental group) provided tape-recorded sessions, examination of the dialogue that occurred during these classes confirmed that these teachers were correctly using their assigned approach to lab openness.

Data were analyzed using the SPSS for Windows statistical software. Hypotheses were examined using multivariate analysis of covariance (MANCOVA), followed by univariate analysis of covariance (ANCOVA) to determine the source of variance. Independent variables included gender, learning style, and group (treatment versus control). Dependent variables included BSAA achievement score, PSAA achievement score, and score on the Test of Integrated Science Skills (TIPS II). Covariates included the PSAA and BSAA pretests, plus TIPS I. Pearson correlation coefficients were calculated to determine the relationships between the covariates of the dependent variables. TIPS I correlations with the three dependent variables ranged from .18 to .52. The BSAA pretest correlations with the dependent variables ranged from .13 to .41, while the PSAA pretest correlations ranged from .33 to .47. Thus, all three covariate measures remained in the statistical analysis.

Findings

Approximately 72% of the students in the study were male, and another 28% were female. These same percentages held true (within a few percentage points) for the makeup of the control and treatment groups. The average GEFT score was 9.64 and 9.08 for all males and females in the study, respectively. Scores below the national norm of 11.3 are considered to represent a field-dependent learning style. Scores ranged from 0 to 18, with 51% of the students scoring nine or lower. Overall, nearly two-thirds of the students were classified as field-dependent learners. Table 2 below provides the percentage of students by gender and group.

Table 2.
Frequency and Percentages of Students by Group, Gender, and Learning Style

Learning Style	**Group**		**Gender**	
	Control	Treatment	Male	Female
Field dependent	49 (68%)	40 (58%)	64 (63%)	24 (63%)
Field independent	23 (32%)	29 (42%)	38 (37%)	14 (37%)

The MANCOVA procedure was used to simultaneously test for the effects of the treatment on multiple dependent variables while statistically adjusting group means to account for pre-existing differences between the groups on the variables of interest. The Box's M statistic was used to assess the homogeneity of the within-cells variance-covariance matrices. The statistic of 48.32 with an F value of .643 (36,187) was not significant ($p = .941$). Therefore, the assumption of homogeneity of dispersion matrices was met. Levene's Test ($p > .05$) indicated that the error variance of the dependent variables was equal across all groups. Descriptive statistics for each of the covariate measures are listed in Table 3. Students in the traditional approach group (control) had slightly lower scores on the TIPS I and the BSAA pretest, while their scores were slightly higher on the PSAA pretest. Covariate adjustments were made to these group means to control for pre-treatment differences.

Table 3.
Mean Covariate Scores by Level of Openness Group

	Traditional Approach		**Investigative Approach**	
	M	SD	M	SD
TIPS I	18.00	6.16	19.83	6.14
BSAA Pretest	13.55	4.70	14.46	5.35
PSAA Pretest	10.46	3.23	9.09	3.03

Hotelling's T^2 statistic for the effects of level of openness on the dependent variables was .46, $F(3,68) = 10.50$, $p < .001$. Follow-up univariate analysis of covariance indicated significant differences in all three dependent measures in favor of students in the control group (see Table 4).

Table 4.
Univariate Analysis of Treatment Effects

Variable	**MS**	**F**	**p**
Science Process Posttest	534.13	15.50	< .001
BSAA Posttest	332.18	17.57	< .001
PSAA Posttest	209.95	19.43	< .001

Hotelling's T^2 statistics for the effects of gender and learning style were not significant. However, the interaction of group and gender was significant, with a statistic of .16, $F(3,68) = 3.60$, $p = .018$. Univariate follow-up up analyses

indicated significant differences in student achievement on the PSAA posttest ($F = 10.77$, $p = .002$). Female students in the control group scored higher on the PSAA posttest than male students in the control group, while female students in the treatment group scored lower than males.

Results of the MANCOVA and subsequent ANCOVA were used to evaluate the three null hypotheses formulated for the study. Means were statistically adjusted, using the three covariate measures. The three null hypotheses stated that there is no difference in achievement, as measured by scores on the BSAA posttest, the PSAA posttest, and TIPS II, between secondary agriscience students given open (investigative) lab experiments and those given prescriptive (traditional) lab experiments. Student achievement was measured by the number of correct responses on each of the three instruments. Table 5 contains the summary statistics for the univariate tests. Results indicated that students in the control group scored significantly higher on all three achievement measures (see Table 4 for F statistics and levels of significance).

Table 5.
Mean Achievement Scores by Treatment

	Control Group		Treatment Group	
	Observed Mean	Adjusted Mean	Observed Mean	Adjusted Mean
TIPS II	18.39	21.03	14.57	14.37
BSAA posttest	19.36	23.97	19.36	17.74
PSAA posttest	16.54	17.74	15.49	13.56

* Adjusted means evaluated at 20.77 for the TIPS II, 14.81 for the BSAA pretest, and 9.85 for the PSAA pretest.

Conclusions

Based upon the findings of the study, the following conclusions were drawn. (Note: The findings and conclusions of the study cannot be generalized beyond the data sample.)

1. Students in the data sample were predominantly field dependent learners.
2. Students who participate in a prescriptive (traditional) learning format when conducting experiments, as opposed to an open, investigative format, develop higher levels of science process skills.
3. Students who participate in a prescriptive (traditional) learning format when conducting experiments, as opposed to an open, investigative format, develop higher levels of achievement in biological and physical science applications in agriculture.
4. Based upon students' scores on the TIPS II instrument, the science process skills of students in the study are very weak.

Discussion and Implications

The results of this investigation are surprising, given current philosophical views that prevail in the literature. In particular, one would think that students who successfully designed their own laboratory investigations would develop more advanced science process skills. As stated earlier, the results of this study cannot be generalized to other groups. Many questions come to mind in reflecting upon the findings. Why did the students in the traditional (control) group outperform those in the open, investigative group, especially on the science process skills assessment? Did students follow the directions of the teacher and remain on task as they conducted their investigations? What were their thoughts about the open approach to experimentation? Unfortunately, the heavy testing activity associated with the study resulted in a decision to drop plans to gather data on student attitudes.

Bases upon analysis of the audio tapes provided by the four teachers, one of the teachers in the treatment group conducted detailed discussions with the students before they proceeded with their labs. Students made their own decisions about lab design and procedures, but they probably found the pre-lab discussion very helpful in making these decisions. The validating comments provided by the teacher may have caused some degree of openness to be lost from this particular class.

Overall student performance on the science process skills and achievement posttests was poor. Before scores were adjusted through the MANCOVA procedure, students in both groups correctly answered only about 50% of the items on the science skills pretest and posttest. Perhaps science process skills can be increased if the intervention occurs over a complete semester or even longer period of time. On the achievement pretests students answered about one-third of the items correctly and answered about one-half of the items correctly on the achievement posttests. Although the achievement scores increased, overall performance on all tests was poor. Only about 10% of the students scored 80% or better on the science process skills posttest and the BSAA posttest. About 20% of the students scored 80% or better on the PSAA posttest. Although these poor scores are not unusual in studies of this type in agricultural education, they are disturbing and warrant further consideration and analysis. Some caution is suggested in interpreting the results of this study due to the relatively low internal reliability estimates of the achievement tests (.47 to .68).

A large majority of the students in this study were field dependent learners. Given that students with this preferred learning style need to have structure provided for them in the learning environment, this suggests that students in the experimental group may not have responded well to the unstructured, open learning environment in which they were working. Field dependent learners would be expected to benefit from external structure provided by the teacher, which might explain to some degree the greater success realized by students in the traditional, prescriptive group. In addition, one might argue that students should study and learn under a prescriptive approach for some time before they are gradually moved toward an open, investigative approach to learning via experiments. This study was conducted near the beginning of the fall semester, and students in the treatment group had little experience at that point in learning through either a prescriptive or investigative approach. An intriguing outcome of the study was that females performed better in the control group and worse than males in the treatment group. A possible explanation is that, given the predominantly field dependent nature of all students in the study, the structure provided in the control group enabled female students to excel, whereas the lack of structure present in the investigative group made the female students more reluctant to outperform their male counterparts. Much research has demonstrated a pattern of lower achievement in science by female students, and those dynamics may have been influential in the outcomes of this study.

Recommendations

On the surface, the results of this study suggest that agriculture teachers with primarily field dependent learners should use a prescriptive, cookbook approach to their experiment-based agriscience labs. However, further study is clearly needed before this recommendation can be confidently forwarded. Areas of inquiry suggested include:

1. What are the effects of level of openness with students grouped by learning style?
2. What are the comparable attitudes of teachers and students who are teaching and learning under the prescriptive versus investigative laboratory approach?
3. How can student achievement scores be boosted across the board, regardless of the approach used in teaching with experiments?
4. What teacher behaviors and traits are conducive in teaching with an open format?
5. How can student performance in an investigative lab format be fairly and accurately evaluated?
6. Are certain types of labs best taught and learned under prescriptive versus investigative formats, and vice versa?
7. What student variables enhance performance and achievement under each of the learning formats?
8. Does class size have an impact on the success of the investigative approach?

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USE OF THE INTERNET IN GEORGIA'S AGRICULTURAL EDUCATION PROGRAMS

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Abstract

The main purpose of this study was to determine the use of the Internet in Georgia's Agricultural Education Programs, which included looking at the factors that would encourage use of the Internet and at the demographic and school-related characteristics of these educators. This was a descriptive study of attitudes and perceptions of teachers of agriculture in Georgia. It was based on a national study by Layfield (1998), whose instrument was adapted to reflect Georgia's Agricultural Education Program. A stratified, random sample of programs was selected from the 1998 Agricultural Educators Directory. Head teachers from 56 departments (62% of the sample) provided responses. Literature on the use of the Internet in Agricultural Programs is limited; therefore, this study may be used as a benchmark for further research on Internet use in Georgia. The demographic data indicated that, typically, agricultural teachers were male with an average age of 40 years, 15 years teaching experience and 5 years of experience working outside of teaching. A majority (67%) of the Agricultural Educators held a graduate degree, while 33% held only a bachelor degree. All areas of Georgia's Agricultural Education regions were represented in this study with 67% being from rural, small town communities. A diversity of agricultural curricula were also represented, with Horticulture, Agricultural Mechanics and Natural Resources being the main subjects taught. A majority of the respondents (80%) taught in the high school (grades 9 -12) and reported that the school library (78%) was the most available site for Internet access. Home (35%) and the school computer lab (35%) were other sites for accessing the Internet. About one-third (37%) of the respondents reported using the Internet, while 63% reported not using it. The major uses of the Internet/World Wide Web were: FFA information, agricultural research, references, current events/global awareness, and downloading educational programs. The uses of e-mail were similar, with correspondence being most mentioned. These data indicate that the Internet is being used, but only to limited degree in Georgia's Agricultural Education programs. As to concerns about the Internet, a majority of the teachers agreed that the Internet will have an effect on their program and that they would like to know how the Internet could be used. Respondents said that they had the staff but needed more access to training and equipment for effective use of the Internet in their programs. Respondents indicated that they had basic computer competence, but that their students knew more about the Internet than they did. Thus, adoption of the Internet is likely to be slow until teachers feel more comfortable about using the new technology. Recommendations were made for improved pre-service and in-service training of Georgia's Agricultural Education personnel in use of the Internet.

Introduction

With technology advancing and improving rapidly in the world, educators need to make an effort to keep up with the new technology. One of the fastest growing areas of technology is in communication, where the Internet has grown exponentially over the past decade. The Internet is a "network of networks" across the United States and throughout the World. It is a combination of the E-mail system and World Wide Web's multimedia browsing system (Provenzo, 1998). The use of the Internet has the potential to bring extraordinary information and communication resources to the classroom while it removes the confines of the classroom and local community to gather information and see the world (Provenzo, 1998). The Internet has also been indicated as a means of breaking the barriers of economic inequity, rurality, ethnicity, social and cultural issues. Integration of technology could change traditional teaching methods such as the lecture format, thus adding value to K-12 programs. With the availability of this new technology, teachers need to be trained to integrate and use it in the curriculum.

In his 1996 State of the Union Address, President Clinton (1996, [online]) issued a challenge that Americans be provided with educational opportunities needed to face the next century, and that every classroom be connected to the information superhighway, with computers, software and well trained teachers. In a related background document, the government's educational technology initiative was described as having four "pillars": 1) modern computers and learning devices will be accessible to every student; 2) classrooms will be connected to one another and to the outside world; 3) the development of educational software will be an integral part of the curriculum; and 4) teachers will be ready to use and teach technology (U.S. Department of Education, 1998, [online]).

The government has set goals to encourage programs to help fund projects, create new teacher education classes and make better equipment available to the schools. President Clinton, in his 1997 State of the Union address, outlined a ten-point plan for improving schools through his Call to Action for American Education, which included the connection of all schools with the Internet (Clinton, 1997). To meet these national goals, some states have taken up their own initiatives. The State of Pennsylvania, for example, established an initiative promoting the adoption of the Internet in the classroom. Link-to-Learn, a three-year, $132 million project, is intended to expand the use of technology in the classroom. The project is expected to provide funds for new and upgraded computers for schools

and technology training for teachers (About Link-to-Learn, 1998). Another state with an initiative is in Georgia. Governor Zell Miller had already developed and executed a plan to help raise money for education. The Georgia Lottery for Education Act, passed in 1992, specified that the proceeds from the sales be spent in three educational areas: capital outlay projects for educational facilities; tuition grants, scholarships or loans to college students and teachers; and voluntary pre-kindergarten programs (Georgia Lottery Corporation, 1998, [online]). Six years later, the voters of Georgia overwhelmingly approved an amendment to Georgia's Constitution, which states that the Georgia Lottery proceeds will be earmarked for educational programs. Since the beginning of the lottery, the Georgia Lottery Corporation has transferred $ 2.85 billion to the Lottery for Education Account (Georgia Lottery Corporation, 1998). Since the start of the program, the money allotted to technology in Georgia schools has been approximately $606 million with a $124 million being budgeted for K-12 classroom computers for the four-year period. An important part of the Lottery law prohibits the General Assembly from reducing or removing funds from the General Budget allotments for education.

Recently, the CEO Forum on Education and Technology -- a group of industry and education leaders formed to help meet the goals of the four pillars -- proposed requiring that teachers obtain technology training in college before starting to teach. The group pointed out that, "Simply using computers to drill students doesn't raise achievement. But students who use the computers in more complex ways – for example, to stimulate science experiments – do have higher test scores" (Associated Press, 1999). Clearly, having the technology and funds available are important, but teachers need to learn how to use the equipment and be able to integrate it into their classroom.

Encouraging teachers to learn how to use the new technology is often difficult. The important factor is understanding teachers' attitudes and skills when planning workshops, in-services, courses and other materials for integrating the Internet into the curriculum (Layfield & Scanlon, 1998). Teachers must also understand that "employers tell us that nearly all workers entering the job market in this next century need to have expanded sets of technical skills in communication, problem-solving and production. Productivity and profit will both be linked to workers' effective uses of new technologies" (Gaines, Johnson, & King, 1996). The new technologies can be time savers, but if the teacher doesn't understand how to use and teach with the technology, student won't learn the most efficient uses of the technology.

Use of technology allows individuals to use new tools that are productive, motivational and empowering. These tools make learning more fun, especially when they allow the users to both access and develop new realms of knowing and doing (Gaines et al, 1996). The use of the Internet allows a teacher to reach students in three main ways. The use of e-mail, web site, and newsgroups can effectively develop and improve a course (Partee, 1996). Adapting new teaching methods for the Internet is necessary for successful use of the new technology (Forsyth, 1996). The Internet has proven to benefit teachers and students. The teachers are <u>less</u> likely to be the center of the class activities, and <u>more</u> likely to: link subject matter to student interest, use the technology as a means rather than the end for classroom and student activities, and believe that their students will succeed (Garner & Gillingham, 1996). Several teachers reported in Rogan's (1996) study that they had the "exhilarating experience" of having access to unlimited information and resources, a sense of excitement and renewal for new ideas and resources, and a sense of becoming a part of the global community. Another benefit described in Garner and Gillingham's (1996) case studies was the improvement of the social and cultural understanding, when the lessons were treated as social activities. These activities allowed the students to select their topics when contacting students in a distant state. This selection allowed the students to practice reading and writing skills with other students while the teacher acted in an advisory capacity.

Even though many benefits have been noted, some obstacles also occurred. With subject and curriculum requirements, many teachers do not have the time to plan for use of new technology. Another obstacle is that classroom management may be more difficult. Other problems relate to the technology's limitations for access at certain times of the day. The fact that the information on the Internet is not censored, and may be completely inaccurate, is also a serious concern. Perhaps the greatest obstacle, however, is the teacher's management of time. With more being required of teachers -- including family and civic duties -- time management becomes a very important factor to consider. The Internet can also become somewhat addictive, with the interest and links taking the teacher further into the subject matter (Rogan, 1996). Many teachers and professors, whether through fear, lethargy and ignorance, prefer familiar teaching methods to spending precious hours learning the new technology. Similarly, many students in the secondary schools, and even those who enter the university system, may not have been exposed to other uses of the computer (Partee, 1996). Consequently, the need to learn about the Internet and other technologies is growing. Knowing about these benefits and obstacles will help with the implementation of the new technology in the school.

The integration of the Internet into the curriculum has strong potential to improve classroom learning. However, studies need to be conducted on how to integrate this technology into the curriculum. Therefore, it is important to determine current use in order to understand the factors that will encourage Agricultural Educators to use the Internet and other technology in their program.

Purpose and Objectives of the Study

The primary purpose of this study was to determine the use of the Internet in Georgia's Agricultural Education programs. Specific objectives were to:

1. Describe demographic and school-related characteristics of Georgia Agricultural Educators.
2. Determine how the Internet was used in Georgia's agriculture programs.
3. Identify factors that encouraged or discouraged use of the Internet in Georgia's Agricultural Education programs.

Methods and Procedures

This was a descriptive study involving attitudes and perceptions of teachers of agriculture. The instrument for this study was adapted from Dr. Dale Layfield's doctoral research, "Factors encouraging use of the Internet by secondary agriculture teachers: A national perspective" (1998). The instrument had three parts which were developed to determine the use of the Internet, factors that encouraged use and integration of the Internet, and the demographics and characteristics of the schools and programs involved. The basic form of Layfield's instrument was followed, but with modifications for additional demographic information related to Georgia's Agricultural Education program. Four professors in the Department of Agricultural Leadership, Education and Communication reviewed the instrument for face and content validity. After revision, a field test was conducted in an Occupational Studies Foundations of Education class. Based on this field test, the instrument was finalized and printed.

The population for the study consisted of head teachers of Agricultural Education employed at secondary schools, middle schools, and in young farmer programs across the State of Georgia. With 182 programs in Georgia, a decision was made to do a stratified random sample. The sample was determined using a formula for a 90% confidence level, which required that 90 schools be surveyed. A coin toss was used to determine a starting point, and every other program was selected from the 1998 Agricultural Educators Directory (Henry, 1998) for the State of Georgia which resulted in 91 programs being selected. The study was reviewed for human subject use and approved by the Institutional Review Board. Data were collected from September 1 through December 4, 1998. Post cards, phone calls, and a reminder sent through the State Agricultural Education listserve were used to obtain more returns. A total of 56 responses were received for a return rate of 62%.

Of the 56 returns, a total of 54 contained useable data; two were telephone interviews that contained insufficient information for data analysis. A Cronbach's Alpha was calculated to determine reliability of the three major constructs. The Concerns construct had an alpha of .86; the Staff Development construct yielded an alpha of .81; and the Adoption construct had an alpha of .54. The medium reliability of the latter construct may have been caused by the low number of items tested. An overall alpha of .80 -- moderately high -- was found for all 33 Likert-type items. Mainly descriptive statistics – means, frequencies, percentages, standard deviations and range – were used to analyze the data. However, early and late responses were compared on the Likert-type items using Chi-square and t-test; no significant differences were noted. This was also an indication that missing respondents were similar to those studied (Miller & Smith, 1983).

The Chi-square and t-test were used to determine differences among the 33 Likert-type items when cross-tabulated with demographics. However, only four items were significant at the 0.05 level, which was set *a priori*. These may have occurred by chance alone; for when the .05 alpha was divided by the number of items tested, $p \leq .005$ would be required in order to be statistically significant. Since no items tested at $p \leq 0.005$, no differences by demographics are reported.

Findings

Demographics

Referring to the data in Table 1, it was found that 91% of respondents were males with nearly two-thirds holding a graduate degree. One-third held the bachelor's degree. A majority of the respondents (76%) were between 31-50 years of age, with a mean age of 40 years. The non-teaching experience ranged from 0 –10 years for the majority (85 %) for a mean of 5 years, while the two largest groups in teaching experience had from 0-10 years and 21 or more years, for a mean of 15 years. All six administrative areas of the State of Georgia were represented in this study. For community attributes, more than two-thirds of the schools were located in rural or small town communities (67%), while suburban schools and urban schools were represented by smaller numbers of respondents. Horticulture (33%) and Agricultural Mechanics (33%) were indicated to be the main subjects taught, with Agriscience and Career Exploration (8%), and Natural Resources (4%) reported as other subjects. When the secondary subject was requested, Horticulture (22%) was first, with Natural Resources (20%) second; Agricultural Mechanics (19%) came in third. For school level taught, most (80%) of the respondents indicated that they taught in the high school (grades 9-12); junior high school, middle school, and young farmer programs were represented by smaller numbers of respondents.

Table 1
Demographic Characteristics of Respondents (N=54)

Characteristic	N	%	M	SD
Gender				
Male	49	91		
Female	5	9		
Age				
Less than 30 years	7	13	40.2	10.54
31- 40 years	17	32		
41- 50 years	24	44		
51- 60 years	5	9		
61or later years	1	2		
Years taught				
0 - 10 years	20	37	15.2	8.71
11- 20 years	14	26		
21 or more years	20	37		
Years worked (non-teaching)				
0-10 years	46	85	4.8	6.46
11- 20 years	5	9		
21 or more years	3	6		
Highest degree earned				
Bachelors	18	33		
Masters	23	43		
Specialists	9	17		
Doctorate	4	7		
Georgia Region and Area				
North Region, Area 1	13	24		
North Region, Area 2	6	11		
Central Region, Area 3	12	22		
Central Region, Area 4	8	15		
South Region, Area 5	8	15		
South Region, Area 6	7	13		
Community Type				
Urban	7	13		
Suburban	11	20		
Rural / Small Town (less than 5,000)	36	67		

Access to and Use of the Internet

In Table 2, teachers indicated that the school library (78%) was a common location to access the Internet. Some respondents had access to the Internet: at home (33%), in the computer lab (33%), and in their classroom (33%); 17% reported having access to Internet in a community library.

In order to determine the possible number of Internet-accessible computers, the educators were asked about accessibility in their departments. Respondents reported the number of computers with Internet accessibility ranged from 0 to 60 computers, but one computer (6%) was the most-reported number. These figures can be seen in Table 2.

The operating system reportedly used the most was the PC version and/or in combination with the network or Unix system, for a total of 29 or 53%. The most reported provider for Internet access was an Internet Service Provider, such as America Online, Planttel, or MSN, while a Regional Educational Service Agency (RESA) was the next highest reported provider (20%).

In Table 3, it can be seen that only about four in ten (37%) said that they used the Internet in their program. However, seven teachers who said "no" indicated that they would be using the Internet in the future. When asked how often their students used e-mail, 22% responded that students were not using e-mail, while 7% responded that they used it daily. The main reasons for using e-mail were for FFA correspondence (13%), agricultural research (11%), and teacher correspondence (6%). Students' use of the World Wide Web was low; weekly (9%) and monthly (7%) frequency of use were reported. Reasons for using the World Wide Web were for: agricultural research (26%), references (22%), and FFA information (20%). However, the teachers may have responded for themselves instead of indicating their students' use. The educators were also surveyed about having a web page on the National FFA Website and /or local web page on their school website. The data indicated that only 6% had a web page on the National FFA Site and just 2% had a local website.

Table 2.
Internet and Computer Access in Georgia Schools (N=54)

Characteristic	N	%
Internet Access Location*		
School library	42	78
At home	19	35
Computer lab	19	35
In your classroom	19	35
Community library	9	17
Laptop computer	2	4
Number of Internet accessible Computers in department		
0	30	56
1	13	6
2	3	4
3	2	4
5	1	2
8	1	2
10	1	2
14	1	2
60 (likely included entire vocational department)	1	2
Computer's Operating System*		
PC	18	33
Unix (Network)	11	20
Mac	3	4
No response	26	43

Table 2. (Continued)

Characteristic	N	%
Source of Internet Access		
Internet Service Provider (ISP)	15	28
Regional Educational Service Agency (RESA)	11	20
Other:	7	13
No Response	21	39

*Some respondents checked more than one choice.

Factors and Concerns for Encouraging Internet Use

It can be seen in Table 4 that users and non-users were similar in their ratings of 33 statements about the Internet. In the category of Concerns about Using the Internet, just two items, "I have limited knowledge¼" and "My school has a policy¼" had significantly different means when analyzed by t-test. Means for the user group indicated that they had superior knowledge and a policy at their school that promoted use of the Internet. Logically, this would be expected in user schools. In the category of Staff Development and Equipment, users clearly had the equipment to access the Internet in their classrooms; oddly, users rated the item, "I have had the necessary training¼" significantly lower (disagreed more) than the non-user group. This may indicate a greater capacity on the part of the user group for self-help in using the Internet. In the Adoption and Integration category, only one item was rated significantly different by the two groups; users rated the statement, "I am computer literate enough to use the Internet" significantly higher (were more in agreement) than non-users. Composite scores for each of the three constructs were also analyzed by t-test; only the Staffing construct had significant differences between users and non-users (p=.042). However, it should be noted that the power of the t-test is affected by low numbers of cases; the small number of cases (54) may have adversely affected the results of the test.

Table 3.
Program Use of the Internet in Georgia (N=54)

Characteristic	*f*	%
Program uses Internet		
No	34	63
Yes	20	37
Student's use of E-mail (n =18)		
None	12	22
Weekly	4	7
Daily	1	2
Monthly	1	2
Reasons for using E-mail* (n =18)		
FFA correspondence	7	13
Ag research	6	11
Teacher correspondence	3	6
Visiting with resource person(s)	1	2
Mail lists	1	2
Global awareness activity	0	0

Table 3. (Continued)

Characteristic	*f*	%
Student's use of World Wide Web (n = 20)		
Weekly	9	17
Monthly	7	13
Daily	2	4
None	2	4
Reasons for using World Wide Web* (n =20)		
Ag research	14	26
References	12	22
FFA information	11	20
Awareness of current events	6	11
Global awareness activity	3	6
Downloading educational programs	3	6

* Note: Some respondents checked more than one choice.

Table 4.
User and Non-User Ratings of Attitudinal Statements about the Internet (N=54)

Category / Statement		Users (N=20) M	Users (N=20) S.D.	Non-Users (N=34) M	Non-Users (N=34) S.D.
Concerns About Using Internet					
1.	I am concerned about student's attitudes toward using the Internet.	3.10	1.021	3.12	1.274
2.	I can use the Internet for several different purposes in my program.	4.25	0.716	4.09	0.965
3.	I have very limited knowledge of the Internet.	2.35	1.182	3.23	1.350*
4.	My school has a policy regarding the use of the Internet.	4.65	0.587	3.71	1.425*
5.	I am concerned about how the Internet might affect my students.	3.15	1.182	3.18	1.167
6.	I would like to know what resources are available if the Internet is to be integrated into my program.	4.55	0.759	4.29	0.8359
7.	I would like to know how my teaching will change because of Internet use in my program.	4.20	0.616	4.29	0.836
8.	I am concerned that I do not have enough computers with Internet access in my classroom to use the Internet efficiently.	3.95	1.503	4.41	0.925
9.	I would like to know how my role in the classroom will change when I am using the Internet.	4.05	0.605	3.85	0.958
10.	I would modify our use of the Internet based on the experience of our students.	4.00	0.649	3.91	0.753
11.	I am concerned that the students will spend more time at “cool sites” than “on-task” with an assignment.	3.80	0.894	3.79	0.978
12.	I would like to know what other people are doing in relation to the Internet.	4.35	0.671	4.12	0.844
13.	I am concerned that students will try to access “inappropriate” web sites on the Internet.	4.10	0.718	4.09	1.055
14.	I would like to know how the Internet is better than the methods I use or plan to use to do my job.	4.05	0.759	3.94	0.851
15.	I would like to excite my students about my program through the use of the Internet.	4.40	0.598	4.09	0.712
16.	I would like to use feedback from my students to change the use of the Internet.	3.85	0.813	3.79	0.880
17.	I am concerned about the time needed to learn about the Internet and about the time missed from my job.	2.60	1.231	3.23	1.156
Staff Development & Equipment					
1.	I have the equipment needed in my classroom to access the Internet.	3.30	1.525	2.32	1.471*
2.	I have access to funds to purchase needed equipment for Internet access.	2.60	1.231	2.44	1.307
3.	I have had the necessary training to use the Internet.	2.35	1.182	2.41	1.282*
4.	My school district has an ongoing plan for staff development on the Internet.	3.40	0.940	2.82	1.141
5.	I have access to a computer lab with Internet capabilities.	3.50	1.192	2.82	1.466
6.	I have access to funds for purchasing upgrade equipment for Internet access.	2.55	1.191	2.62	1.371
7.	My school district provides incentives to participate in Internet training.	2.45	0.825	2.35	1.070
8.	I have technical support staff knowledgeable of the Internet at my school.	3.95	0.825	3.76	0.855
9.	I have administrative support to attend an in-service on the Internet.	3.55	0.759	3.29	1.168
10.	I work with colleagues who use the Internet in their classroom.	3.40	0.882	2.85	1.258

Table 4. (cont)

Category		Users (N=20)		Non-Users (N=34)	
Statement		M	S.D.	M	S.D.
Adoption & Integration					
1.	I have opportunities to attend in-service on using the Internet.	3.75	0.786	3.26	0.963
2.	My administrators provide time for me to learn about using the Internet.	2.95	0.944	2.91	0.933
3.	Well-designed curriculum resources are not available on the Internet.	3.15	0.933	2.82	0.999
4.	I am concerned that the computer will be corrupted by viruses, etc. due to Internet access.	2.90	1.021	3.32	1.036
5.	I am computer "literate" enough to use the Internet.	4.25	0.716	3.59	0.988
6.	I believe my students know more about the Internet than I do.	3.90	1.021	4.03	0.999

* Significant p £ .05

Conclusions

Demographics

This study covered personnel in the six administrative areas of Georgia and included the three main types of communities. The rural/small town was highly represented in this study, consistent with the fact that most of Georgia's programs are located in this type of community. Even though most of the respondents were male, females were also represented in close approximation to the proportion found in the state's distribution. Many types of agricultural programs were also represented, from horticulture to career exploratory. In Layfield's (1998) national study, a smaller percentage of educators were teaching horticulture and natural resources.

Access to and Use of the Internet

Georgia's Agricultural Education programs have limited Internet access and use. This is similar to the national findings of Layfield (1998), who concluded that teachers who do not have direct and easy access to the Internet would not adopt or try to integrate the Internet into their program. With support from colleagues and administrators, the adoption and integration of the Internet into the curriculum would be easier to accomplish. A motivated person will likely be more open to make the extra effort to use the Internet in his/her program if it is readily available in the school.

Factors Encouraging Internet Use

Agricultural Educators in Georgia were similar in attitudes toward the Internet, regardless of whether or not they were users; they differed significantly only in perceived knowledge level, school policy, equipment availability, training and computer literacy. They were generally positive toward and interested in using the Internet in their classroom. However, the teachers had concerns related to students using the Internet, as well as their own ability to integrate the Internet into their programs. Still, they were generally willing to go to courses, workshops, and other training opportunities. In their study of vocational teachers in Idaho, Thompson and Connors (1998) reported that the teachers with personal concerns would ignore learning new technology until their concerns were addressed. Meeting the concerns of the teachers of Agriculture in Georgia should encourage them to become more objective in integrating the Internet into their programs.

Recommendations

The state should set up model Internet demonstration programs for teachers to observe. These model classrooms, where the Internet is integrated into the program, can help ensure that the technology is used effectively. A transitional model, such as that developed by Ronald Havelock, is a means of encouraging teachers to adopt new technology. This model postulates that technology should be adopted slowly over time so that teachers would integrate the new technology willingly into their classroom (Terrell, Dringus, & Rendulic, 1995).

A long-term approach should be taken in providing in-service education that deals with personal concerns of teachers regarding use of the Internet. Thompson and Connors (1998) indicated that the Idaho teachers' personal concerns must be satisfied before they would be ready to integrate the new technology into their programs. Concerns of Georgia teachers of agriculture must be addressed in order to make optimum use of the Internet in Agricultural Education classrooms.

Georgia's Agricultural Education State Staff should provide leadership in funding and maintaining Internet access to programs across the state. This assistance should be part of staff development courses, workshops, and other training opportunities used to instruct the Agricultural Education teachers on how to use the Internet in their programs.

Internet use should be incorporated into the teacher education programs provided by the state's universities, in order to prepare pre-service students for using the Internet in their future programs.

Suggestions for Further Research

1. Additional research should be generated to investigate the effectiveness of the Internet in the classroom, especially focused on student responses.
2. Studies should be conducted on developing and maintaining websites and other learning materials related to the Internet for the FFA and the agricultural program.
3. Future studies should be completed on the potential of the Internet for program-related activities outside of the classroom.

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MACRO AND MICRO LEVEL CHALLENGES TO PROGRAMEVALUATION AND ACCOUNTABILITY

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Abstract

The demand for documenting outcomes of extension programs continues to increase. This study examined challenges to program evaluation and accountability. The challenges were categorized into two levels--macro level (national) and micro level (grass roots or state level). The findings indicated several challenges--five macro and six micro level challenges. Based on the review and personal experience of the author, a framework to address the challenges was developed. The framework consisted of three components--using accountability information, customer satisfaction, and developing a generic evaluation instrument to assess program impact. In addition, three strategies--communication, teamwork and distance education were suggested to build evaluation capacity among county staff.

Introduction

In the past Extension programs focused on convincing clientele to follow certain practices such as planting hybrid corn, preserving food safely, etc. An Extension agent was viewed as a change agent (Sawer, 1984). The concept of "innovators" "early adopters" became a focal point of a program of research. Attempts were made to evaluate Extension programs using the "educational objective" approach of the formal school system. The concept of "program objectives" then came into existence. And following that the focus of extension programs shifted more toward knowledge, attitudes/opinions, skills, and aspirations (KA(O)SA) change (Bennett, 1979). Extension agents were viewed as educators (Sawyer, 1984). During this time, large amounts of money were allocated to social intervention programs which aimed at eliminating poverty and improving health care. Extension programs were also expanded to reaching urban and other non-traditional audiences. Evaluation of these programs tended to be of informal judgment rather than formal assessment. Systematic measurement of outcomes was elusive and programmers used testimonials, case studies, happiness indexes etc., to show the worth of their programs. The expected outcomes were hard to document using these methods (Patton, 1978; Smith, 1981; and Sawer, 1984, Boyle, 1996).

Several federal statutes were enacted which demanded greater accountability. Examples of legislation included: 1) Federal Regulations for the Community Mental Health Centers Act of 1964, which required needs assessment; 2) the Social Security Amendment Act of 1972, which established reviews for checking appropriateness and quality of services provided; 3) Federal Regulations for the Community Mental Health Center Amendment Act of 1975, which authorized for funds to do evaluation; 4) the Farm Bill of 1977, which mandated large-scale evaluations of the social and economic consequences of Extension programs; and 5) the Sunset Act of 1978, which combined concepts of program review and zero-based budgeting. These legislations made clear that it was no longer enough to report dollars spent on what and how many participated etc. This lead to competition of funds and greater demands for program effectiveness and efficiency. Number of programs offered, participants reached, hours worked and dollars spent were no longer adequate to assess program effectiveness.

Accountability is not new to extension. However, its importance has become more pronounced because of stricter mandates from federal, state, local and university level legislation. According to Ladewig (1997), Cooperative Extension, like all public agencies, has seen an increased emphasis from government on program performance and accountability. The role of accountability in the budget process is certainly on the rise (Irwin, 1999) and Cooperative Extension is no exception. Accountability is defined as an implied or explicit requirement to accept responsibility for performance, progress, accomplishment, effectiveness or success of a program, activity, or project in terms of results achieved (South Carolina State Government Quality Network Association, 1998).

Accountability requirements and reporting systems at the federal level have gone through a variety of different approaches throughout the history of Extension from the Extension Management Information System (EMIS) in 1970 to the National Accomplishments Reporting System (NARS) in 1982 to the Program Planning and Reporting System (PPARS) in 1992 to Government Performance Results Act (GPRA) in 1993. These frequent changes in reporting systems in Extension indicate the complexity of the reporting systems, burden on states to comply with new systems of reporting, and challenging states to develop their own reporting systems to meet state, federal and local mandates. Almost all land-grant universities, including 1890s and 1994s, have some method of reporting--DOS, electronic, Web-based, and other manual means of collecting information to comply with state and federal reporting requirements.

Furthermore, several studies have identified lack of time, lack of resources, and limited expertise in evaluation methodology, in developing surveys, data analysis and reporting, as factors inhibiting agents to conduct systematic evaluation of their programs (Kiernan, Fennelly, Mulkeen, Mincemoyer, Cornell, Masters, Radhakrishna, Lewis, and Baggett, 1994; Ott, 1996; and Depp, 1996).

Today, the educational programs delivered by extension agents today are more varied than they have ever been and will continue to change to meet the changing needs of the clientele they serve (Radhakrishna, and Martin, 1999). Coupled with a diversity of programs being delivered, there has been an increased emphasis from government and other public agencies on program performance and accountability (Ladewig, 1997). The enactment of Government Performance and Results Act (GPRA) in 1993 and several states adopting performance-based budgeting for Extension are good examples. Funders, policy makers, and decision makers now want data relating to program results, impact, and social and economic consequences. As a result, the traditional paradigm of evaluation has changed from reporting numbers to using results in the new performance measure paradigm (Mustian, 1999).

The most frequently asked question for Extension professionals is "What happened as a result of your program?" Extension administrators, faculty, specialists, and agents are constantly hearing buzz words such as documentation, impact, outcome, output, benchmark, trends, effectiveness, and accountability. This expanded requirements to document program results and impact calls for use of innovative and multiple approaches to systematically evaluate Extension programs.

As we look toward the year 2000 and beyond, the press for accountability, reduction in government funding for all programs will be a major concern. Further, the ever-changing world, the information explosion and the demand on professionals to demonstrate the usefulness of services they perform is likely to increase tremendously in the new millennium (Boyle, 1996). It is believed that such demand will create more opportunities for Extension professionals, especially for those involved in program evaluation and accountability, to assess needs, demonstrate program outcomes and impact on targeted audiences.

Purpose and Objectives

The overall purpose of the study was to present a historical perspective relative to challenges and opportunities to program evaluation and accountability. Such perspective would serve as a springboard for discussing issues relative to program evaluation and accountability in the new millennium. Specific objectives of the study were to:

1. identify and describe macro level challenges to program evaluation and accountability;
2. identify and describe micro level challenges to program evaluation and accountability;
3. suggest strategies to address some of the challenges and opportunities in the new millennium.

Methods and Procedures

Review of literature and personal experience of the author were the data sources for the study. A number of books, journal articles, conference proceedings and government documents were reviewed to identify and describe challenges to program evaluation and accountability. Informal discussions and interviews with a number of faculty and staff were also documented as evidence of data. In addition, visits to counties and discussion meetings with county staff on issues related evaluation and accountability were also documented. The information thus collected were summarized to identify and group the challenges into micro and macro level. Finally, the summary and synthesis of information gathered provided a basis for suggesting strategies to address the challenges to program evaluation and accountability in the new millennium.

Results and/or Findings

Objective 1: Identify Macro Level Challenges

The first objective of the study was to identify macro level challenges to program evaluation and accountability. The following five macro level challenges were identified based on extensive review of literature and discussion with experts in the field.

1. The changing world
2. Heightened concern for relevance of Extension programs
3. Greater demand to determine "impact" or "outcomes of programs
4. Demand for greater accountability and changing accountability systems
5. The information explosion

1. The Changing World: We are in a changing world and we must recognize that changes are inevitable and these changes reshape the social, economic, cultural and political landscape of the environment we live in. In addition, these changes impact the lives of clientele we serve and the nature of Extension programming.

2. Heightened Concern for Relevance of Extension Programs: During the last decade, Extension faced major challenges of relevance in society that was encountering phenomenal change (Boyle, 1996). Though Extension has responded to the challenges of change throughout history, it is under intense scrutiny over its present and future programs. Some traditional clientele and supporters think that Extension has disavowed its long term commitment to agriculture. They do not see changing agricultural programs to focus on priority issues of biotechnology, farm

profitability, sustainability, community and economic development, youth programs, etc. They do not see that many youth from rural areas, including farm youth, also have alcohol and drug problems. Therefore, there is a need to communicate and convince traditional stakeholders the importance and value of investing Extension efforts in non-traditional programs.

3. Greater Demand to Determine "Impact" or "Outcomes" of Programs: Extension professionals are frequently asked to determine impact of Extension programs. One of the major challenges faced by Extension professionals is defining appropriate "impact" indicators. Indicators guide collection data--evidence that will indicate the degree to which program objectives or targets are achieved (Rockwell, 1994). Unfortunately, early identification of defined and needed indicators through program objectives are not practiced by many county staff (Radhakrishna, 1998).

Perhaps agents are not skillful enough to put time and effort to address this challenge. As a result, it becomes complicated at later stages to gather evidence to document impact of programs. Early identification of indicators through developing measurable program objectives will help strengthen planning and evaluating Extension programs. As one moves in the Bennett's hierarchy of Extension programming, greater is the need for evidence. Further, as the cost of obtaining evidence of program impact generally increases as the hierarchy is ascended (Rockwell, 1994). In addition, there are several other challenges which needs to be addressed. These include: scattered sources of evidence, program impact versus impact of other sources of change, and greater time lag of outcomes following programs. Therefore, program developers and evaluators should consider, prior to implementation of a program, the action specifying the "chain of program events" and the "kinds of evidences" and or appropriate "indicators" for each event in the chain (Verma and Burnett, 1999).

4. Demand for Greater Accountability and Changing Accountability Systems: Accountability is not new to Extension. However, its importance has become more pronounced in recent years because of mandates from federal, state, local and university level legislation (Radhakrishna, 1998). Accountability requirements and reporting systems have gone through a variety of different approaches throughout the history of Extension. For example, in the last 30 years, we have seen accounting and reporting systems change from NARS in the early 1970's to GPRA in the 1990's. The problem with the accounting system is that it is so complex and does not really address the practical or field level problems of reporting. The recent enactment of the Agricultural Research Education and Extension Reforms Act (1998) is a good example. The frustrations in preparing the recent plan of work included lack of communication from the federal government, lack of time, frequent changes to reporting guidelines and formats, and lack of understanding of the guidelines. In addition, there is a lack of communication between federal, state and university administration, and county staff, relative to plan of work

and reporting of accomplishments.

5. The Information Explosion: Instant worldwide communication has brought a rapidly changing knowledge base. Technology development and usage are expanding at a rapid rate. New electronic delivery methods are altering the way Cooperative Extension and Outreach systems are operating nationwide (Spanier, 1996). The rapid development of technology has both advantages and disadvantages relative to Extension programming. The advantages are thinking of many things that Extension can do with the technology--distance learning, on-line courses, putting Extension publications and educational materials on the Internet. The disadvantage is that Extension does not have the capacity and resources to embrace the fast changing information explosion. If Extension cannot embrace this, they are missing the boat.

Objective 2: Micro Level Challenges

The following micro level challenges were identified based on literature, discussions with experts in the field, and personal experience of the author.

1. Emphasizing evaluation procedures and criteria up-front
2. Evaluation stops at the lower level of Bennet's hierarchy
3. Extensive reliance on single method of program evaluation
4. Limited skills in interpreting evaluation results
5. Philosophical roles of Extension agents
6. Reporting evaluation and accountability results

1. Emphasize Evaluation Procedures and Criteria Up-front: Based on review of evaluation plans for a variety of Extension programs, it was found that county staff is not treating evaluation as a part of program planning process (Radhakrishna, 1998). As a result, educational objectives that are developed are not measurable, observable, and realistic. Because of this lack of emphasizing evaluation criteria up-front, county staff are frustrated that they could not accomplish what they had originally planned. Manipulating evaluation process to fit into Extension programs should be avoided. What is best for the program to be evaluated should be emphasized.

2. Evaluation Stops at the Lower Level of Bennett' s Hierarchy: In most instances, programs are evaluated only up to the level of KOSA (knowledge, opinion, skill, and aspiration). Assessment doesn't go beyond the KOSA level to determine "impact." In addition, county staff rarely follow-up to determine outcomes of Extension programs and resulting practice change. As discussed earlier, there are multitude of problems why evaluation efforts of county agents don't go beyond KOSA. First, there is no cooperation and communication between the agent and the specialists regarding developing an evaluation plan to assess impact of programs. Second, a majority of agents do not have the time and resources to do a follow-up of program participants to determine practice change and/or program impact. Third, a number of agents do not possess the needed skills to develop an evaluation plan, implement that plan and report outcomes of such evaluation efforts. The course, Targeting Outcomes of Programs (TOP) by Rockwell and Bennett (1994) is an excellent resource to address some of the issues relative to assessing program impact.

3. Extensive Reliance on Single Method of Program Evaluation: A majority of county staff relies extensively on single method of evaluation which limits assessing of program impact. Perhaps, agents may not have the knowledge or skills needed to use multiple methods. As indicated earlier, the problems are many, especially at the county level. First, agents do not have the time or skills to use multiple methods to evaluation. Lack of support from the specialists adds to the existing problem. Second, the use of multiple methods is very time consuming and as a result, agents get frustrated and will not be in a position to accomplish the set goals. It is cautioned, however, one must take into account the purpose or goal of evaluation, the evaluation design and the methodology to use.

4. Limited Skills in Interpreting Evaluation Results: A number of studies have reported county staff lack skills in interpreting evaluation results (Radhakrishna, 1998 and Kiernan, et al., 1994). There is a greater need to make sure that county staff understands everything they do about evaluation. As said earlier, county staff and specialists need to treat evaluation as an integral part of the program planning process. How interpretation of results helps market Extension programs should be communicated to county staff.

5. Philosophical Role of Extension Agent: Agents' primary function is to act as a change agent. In reality, he/she is not a change agent, but an educator having multiple program responsibilities--agriculture, food safety, 4-H, environment, community development, etc. Need to convey this message to stakeholders that agent is more than a change agent. Fear, anxiety, and uncertainty exist among county staff regarding evaluation. In addition, an attitude is developing among agents that Government Performance Results Act (GPRA) is just another reporting mechanism. There is a need to convey to the agents that GPRA is more than just reporting, and emphasize up-front how GPRA reports can be used to improve extension programs, reallocate resources, and to make managerial and personnel decisions (Walker, 1997). Agents perceive program evaluation as reflecting upon their own personal performance. This negative perspectives on evaluation should be changed. There is a need to emphasize that evaluation is a way of garnering information to help agents to improve their programs, but not to evaluate their performance.

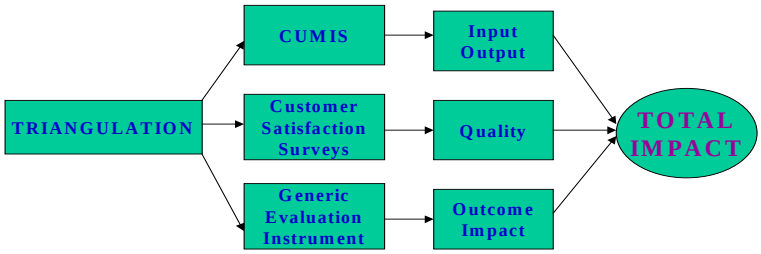
6. Reporting Evaluation and Accountability Results: How to report evaluation and accountability results is going to be a major challenge for Extension professionals dealing with accountability. Good evaluation data often times don't get reported. Even if reported, too much information is presented which may not be useful to the stakeholders. Lack of communication and/or marketing appears to be a problem in reporting evaluation results. Need exists for developing simple communication procedures where results are presented in a short and concise format, supported with charts and graphs would help convey the results better. Highlighting significant parts of a program plus some unique findings would encourage people to read the information. Using existing communication and information technologies would help prepare reports easier and faster.

Objective 3: Strategies to address the Challenges:

The foregoing review suggest that there are many challenges to program evaluation and accountability. The review also suggest that we must change to address many of the challenges identified. An evaluation framework to address the challenges are presented. In addition, key strategies with examples to address the challenges are also discussed.

Evaluation Framework: A three-prong evaluation framework has been designed to assess the effectiveness and impact of Extension programs (Figure 1). The three components of this framework are: 1) Clemson University Management Information System (CUMIS), 2) Customer Satisfaction Surveys (CSS), and 3) Generic Evaluation Instrument (GEI). This evaluation framework is being used for all Extension programs included in the POW. A brief discussion of each of the components is presented in the following paragraphs.

The CUMIS system provides data relative to time spent, contacts made by gender, race and limited resource, number of programs/activities conducted, number completing programs, number increasing knowledge, number adopting practices and six other indicators specific to each project. In addition, narrative stories are also included.



EVALUATION FRAMEWORK

Figure 1. Component 1: CUMIS

Component 2: Customer Satisfaction Surveys

A customer satisfaction survey (CSS) has been developed and being currently pilot tested in the counties. The major purpose of the CSS is to assess the quality of services provided by Extension staff in the 46 counties of the state. Specifically, it measures customer's satisfaction with information obtained from calling or visiting the Extension office. The goal of CSS is to help county staff find ways to improve program quality, information delivery, and more important, to assist in the accountability process.

Each county will randomly select 30 individuals who have received Extension services or information. For purposes of accuracy and ease, two categories of participation were identified. These include: 1) office visits and 2) planned programs. Once the 30 individuals are identified, a team of agents/staff will call these 30 individuals and collect data relative to the four indicators--1) Extension information being up-to-date, useful, relevant and easy to understand, 2) the extent to which recipients had the opportunity to use the information, 3) the extent to which they have shared the information with others, and 4) the extent to which they are satisfied with the services provided by Extension.

Component 3: Generic Evaluation Instrument

A generic evaluation instrument (GEI) has been developed to collect information to assess impact of select Extension educational programs on individuals who had participated in Extension programs in all the 46 counties. Impact will be assessed through: 1) knowledge gained, 2) behavior change, 3) adoption of practice, and 4) economic gain through generation of income or savings as a result of participation and using Extension information and services. Bennett's hierarchy of Extension programming will be used as a guideline to assess program impact.

Two programs/projects in each of the five PSA goals will be randomly selected for each county. In all, 460 (2x5x46) programs/projects will be selected for gathering information on GEI. Once the selection of programs/projects is completed, a list of participants in those programs/projects will be identified. Then, a random sample (depending on total number of participants) of participants will be selected. The GEI will be administered via telephone. Data thus collected will be analyzed to assess impact. Data from CSS and CUMIS reports will also be used to assess impact.

The above mentioned evaluation framework will address more of accountability challenges and somewhat less of program evaluation challenges. Therefore, additional strategies are discussed which specifically address the micro level challenges to program evaluation and accountability. The strategies include: 1) a two-year program to build evaluation capacity of county staff and 2) establishing a evaluation clearing house for Clemson Extension Service. A brief description of the two strategies are presented in the following paragraphs.

Building Evaluation Capacity of County Staff: A two-year program is being developed to build evaluation capacity of county staff. Currently, Clemson Extension Service employs about 250 agents and program assistants in the 46 counties of the state. These 46 counties are further grouped into 14 clusters. The proposed program requires each and every agent and program assistant to undergo an intensive 2-3 day training relative to program evaluation and accountability. Seven clusters are selected each semester (fall and spring) with six to eight agents and program assistants per cluster participating in the training. Training will be offered at the cluster level so that agent travel is minimized. Primary area of program responsibility of agents will also be considered in the design and delivery of training. Training will be coordinated jointly by the subject matter specialist and evaluation specialist.

Evaluation Clearing House: In addition to enhancing evaluation capacity of county staff, establishing an evaluation clearing house is being proposed. The major purpose of this clearing house is to help Extension specialists, county agents, program assistants, departments and other units in the college regarding planning, implementing, and conducting systematic evaluation of Extension programs. The clearing house will offer technical services in the areas of instrumentation, data collection and analysis, and report writing. A nominal fee will be charged for the services provided. It is believed that the clearing house will be of immense help to all engaged in Extension program development and evaluation. It not only saves time and resources for conducting systematic evaluation, but also helps specialists and agents focus more on program development and program delivery.

Conclusions and Recommendations

The need for documenting extension program outcomes and providing accountability information continues to increase in the new century. As dollar amounts continue to shrink, this need becomes even more critical.

The foregoing review suggests that there are many challenges that need to be addressed in the new century if we are to effectively communicate Extension program outcomes to the stakeholders. The evaluation framework suggested would help provide useful information to determine program outcomes, impact, and managerial decision making.

Communication, teamwork, and use of technology in program evaluation and accountability becomes increasingly important as we look at opportunities in the new millennium. Constant communication between federal, state, university and county staff is very important. Expectations of each agency or institution relative to program evaluation and accountability need to be communicated in an understandable way. Federal and state governments who develop accountability measures must take into account the practical and real problems agents, specialists, and other county staff face in meeting accountability requirements. Perhaps, agencies and governments may want to seek input from county staff when they design accountability measures.

Teamwork is a key to successful implementation of program evaluation and accountability measures. It is recommended that a team of individuals interested in program evaluation and accountability at the county level be formed to provide guidance and technical support to the county staff conducting evaluations. This team of individuals should be adequately trained in evaluation methodology so that they assist in measuring impact of extension programs. County staff will appreciate and better understand when one of their peers discuss and share their efforts and experiences. Such understanding and appreciation will help address many of the micro level challenges identified in this study.

Finally, use of technology is critically important as we prepare to address the challenges in the new millennium. Distance education technology should be used to offer courses in program evaluation and accountability. In addition, educational materials relative to program evaluation and accountability should be put on the World Wide Web so that users can access information at any time and anywhere. A question and answer section suitable for electronic communication should be developed so that county staff get immediate information and guidance on evaluation and accountability.

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FRAMEWORK TO IDENTIFY INSERVICE TRAINING NEEDSOF EXTENSION AGENTS

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Abstract

A new approach was used to identify inservice education needs of Clemson University Extension personnel. The approach used included responses from county staff and Extension specialists. First, agents were asked to identify training needs in three areas--subject matter, professional development, and technology. The training needs identified by agents were shared with Extension specialists as they prepared for their annual inservice offerings. Agent needs and inservice offerings of specialists were matched to identify gaps in training needs. Findings revealed a good match between what was needed and what will be offered. A framework was developed based on the findings.

Introduction

The Cooperative Extension Service (CES) is said to be an "agency of change" for problem solving, a catalyst for individual and group action (Rasmussen, 1989). Rasmussen stated, "Extension was invented by the American people to meet a vital educational base for making rural life profitable, healthful, comfortable, and attractive" (p. 16). The CES was established in 1914 under the Smith-Lever Act with a mission to disseminate useful and practical information in agriculture, home economics, and related subjects to improve the lives of people. The CES is in the forefront of lifelong learning and behavioral change for adult learners. From its very beginning the CES philosophy has been one of advocating positive, lifelong, individual and behavioral change.

American agriculture and lifestyles of American people have drastically changed from what they were in 1914. Extension had to adapt to the societal changes to reorient to a fundamentally industrial and service oriented population (Russell, 1995). The roles and responsibilities of Extension agents have also changed. The educational programs delivered by Extension agents today are more varied than they have ever been and will continue to change to meet the changing needs of the clientele they serve (Radhakrishna, 1998). In addition, the new technology of information gathering, exchange and processing is forcing CES into new roles and away from the traditional research-specialist-agent-farmer hierarchy that has characterized technology transfer (ES-USDA, 1988).

The future of Extension programs will be determined to a large degree by the ability of the agents to do the job and the extent to which they are up-to-date on the subject matter topics. As indicated by Prawl, Medlin, and Gross (1984), the success of educational programs in Extension, just as in teaching, depends heavily upon the abilities of individual professionals. The delivery of a high level of competence is the principle public justification for the Cooperative Extension Service (Strother, 1977). Furthermore, to constantly produce a high volume of quality work, employees must be competent, able to do the job, and be willing to put forth the effort required for the job (Mott, 1972).

Today's challenge for Extension is an expanded educational effort to effectively relate the total expertise and resources of institutions of higher education to the solutions of complex problems of individuals and the society in general (ECOP, 1987). This challenge creates a continuous need for staff development for Extension professionals. One of the most perplexing questions facing Extension staff development is what type of professional development activities do Extension professionals need? Adult learning theory emphasizes the importance of using the needs of the clientele as a basis for inservice training programs. As indicated by Lentz (1983), the purpose of identifying needs is to build a foundation for providing inservice education. Such identification will assist staff development leaders in establishing priorities and designing inservice education offerings. Barrick and Powell (1986) suggest that the strength of inservice training and the follow-up evaluation depends upon planning and planning depends on assessing needs.

Inservice training has been defined as education delivered in a structured setting that enables one to become more competent professionally, that is, to further develop technical subject matter competencies to keep abreast of and, if possible, ahead of change, and to explore educational and technological content and processes in varying depth and to extend personal competencies (National Policy Guidelines for Staff Development, 1977, and Smith, 1995).

Inservice training is used extensively by county staff in Clemson University's Cooperative Extension Service. In fiscal year 1998, there were 99 in-services conducted through the Extension Staff Development office, with over 2,083 participants. Of the 99 in-services offered, 55 were subject matter topics with 1,580 participants, 28 were professional development topics involving 296 participants and 16 were in the area of general education involving 207 participants. A majority of these in-services were held at Columbia (a central location), Regional Education Centers (RECs), and Clemson.

Studies reveal that Extension specialists/faculty are one of the primary sources of information for county agents and staff (Radhakrishna & Thomson, 1996, and Shih & Evans, 1991). Because of the critical role the specialists play as information providers, it is important that they understand the inservice needs of county agents and staff,

development of educational materials, offering inservice training, program evaluation and finally the Extension education process (Mincemoyer & Kelsey, 1999; Baker & Villalobos, 1997; and Gibson & Hillison, 1994).

The traditional approach of identifying inservice training needs has been asking Extension specialists to submit subject matter topics, location, date and time and educational resources needed to do the training. This approach has worked well in the past, but has not been able to meet the expectations of Extension agents. Agents felt that their needs of inservice training did not match with what was offered, resulting in not getting the training needed to improve their skills and be current. In addition, rapid changes in technology and information delivery systems and changing roles and responsibilities of Extension agents call for new approaches to identify and deliver inservice training programs. This study was conducted to develop a framework to identify inservice training needs of Extension agents and determine how those needs can be met.

Purpose and Objectives

The overall purpose of the study was to develop a framework to identify inservice training needs of Extension agents and county staff. Objectives of the study were to:

1. Identify inservice training needs of agents relative to subject matter topics, professional development and technology.
2. Categorize the identified training needs into Public Service and Agriculture (PSA) goals of Clemson University.
3. Match identified training needs of agents with inservice offerings proposed by specialists.
4. Based on objectives 1, 2, and 3, develop a framework that can be used to identify future inservice training needs of agents.

Methodology

In this section, a brief description of Clemson University Cooperative Extension Service and Public Service and Agriculture (PSA) activities are presented. In addition, the population used for the study, instrumentation, and data collection and analysis procedures are also discussed.

The Clemson University Extension Programs goal is to help all families, individuals and communities affected by such changes and identify ways to understand and address those changes so that it will improve the quality of life of all South Carolina citizens. The Clemson University Cooperative Extension Service Plan of Work (POW) is driven by base programs of the state and of the nationwide Cooperative Extension System. The plan includes broad parameters for program development and planning by university and county faculty. Extension advisory board and program identification committees also provide input to the POW (South Carolina Cooperative Extension System Plan of Work: 1997-2001, 1998).

The POW contains 16 initiatives, covering a wide variety of programs and topics that address the critical needs of South Carolina citizens. These 16 initiatives are further grouped by the five strategic goals of Public Service and Agriculture of Clemson University which include: 1) Agrisystems Productivity Profitability, 2) Economic and Community Development, 3) Environmental Conservation, 4) Food safety and Nutrition, and 5) Youth Development (See Table 1). These five PSA goals mirror the Government Performance Results Act (1993) goals developed by USDA-CSREES. Under each initiative, there are projects which specifically address issues relative to the initiatives and PSA/GPRA goals.

Public Service and Agriculture (PSA)

The Public Service and Agriculture (PSA) activities at Clemson University focus resources toward addressing five strategic goals stated above. The Public Service and Agriculture organizations at Clemson work closely together on the university's main campus and at the four research and education centers, 4-H leadership centers, and all the 46 county Extension offices around the state. The public service groups at Clemson include 1) Agricultural and Forestry Research System which develops relevant, research-based knowledge for agriculture, natural resources and the rural environment to enhance economic development; 2) Cooperative Extension Service which transfers scientifically-based information to individuals, groups and communities to help improve the quality of life; 3) Livestock-Poultry Health Programs which ensures the safety and health of livestock and poultry produced in South Carolina, as well as the health of companion animals and wildlife; and 4) Regulatory Programs which ensure the safety and health of plants produced in South Carolina and certifies the safe and effective use of chemicals in agriculture and home pest control (Public Service for South Carolina, Clemson University, 1997).

Population and Instrumentation

The population for this study consisted of all 240 county Extension agents employed by Clemson University Cooperative Extension Service (CUCES). A survey instrument suitable for electronic communication was developed to collect data. The instrument was designed to obtain information on two major characteristics: 1) the inservice education needs of extension agents relative to subject matter topics, professional development and

technology, and 2) demographic information--years of experience, primary area of program responsibility, etc. Respondents were asked to list at least five topics in the three categories (subject matter, professional development and technology) for which they needed inservice training. In addition, county Extension agents were asked to comment on their previous inservice training experiences. The instrument was validated for question clarity and content by a panel of three experts consisting of an extension specialist, inservice training coordinator, and an information technology specialist.

The instrument was sent to all county agents via electronic mail with a request to return (via electronic mail) the completed surveys. After two follow-ups (electronic mail), a total of 133 agents responded for a return rate of 55 percent. Frequencies and percentages were used to summarize the data.

Findings

Objective 1& 2: Identify Training Needs

The training needs identified by agents categorized by subject matter topics, professional development and technology are shown in Table 1. As shown in Table 1, a total of 100 topics were identified by county agents. Of these 100 topics, 65 (65%) were in subject matter areas grouped by five PSA goals, 21 (21%) in professional development and 14 (14%) in technology. Also, shown in Table 1 are inservice training proposals submitted by Extension specialists. Extension specialists submitted a total of 76 inservice training proposals. Of these 76 proposals, 52 (68%) were in subject matter areas grouped by five PSA goals, 16 (21%) in professional development, and 8 (10.5%) in technology. Overall, data in Table 1 indicates a good match between what was needed and what will be offered. However, there are PSA goal areas where limited number of inservice proposals submitted by specialists compared to the need expressed by county agents. It must be noted here that one cannot meet all the training needs expressed by agents because of availability of expertise, time, resources, location and other responsibilities specialists may have in offering inservice training. Therefore, specific topics under each of the five PSA goals for which training is needed should be examined.

Table 1.
List of Training Needs Expressed by County Agents and Inservice Training Proposals Submitted by Specialists Categorized by PSA Goals, Professional Development and Technology

	County Agents		Specialists	
Topics by PSA Goals	f	%	f	%
Subject Matter Topics				
PSA Goal 1: Agrisystems Productivity & Profitability	13	13.0	8	10.5
PSA Goal 2: Economic & Community Development	9	9.0	9	11.8
PSA Goal 3: Environmental Conservation	24	24.0	20	26.4
PSA Goal 4: Food Safety and Nutrition	8	8.0	8	10.5
PSA Goal 5: Youth Development	11	11.0	7	9.2
Total (Subject Matter Topics	**65**	**65.0**	**52**	**68.4**
Professional Development	21	21.0	16	21.1
Technology	14	14.0	8	10.5
Grand Total	100	100.0	76	100.0

Objective 3: Matching Agent Training Needs with Specialist Inservice Offerings

Figure 1 shows the matching of subject matter topics by PSA goals, professional development, and technology inservice training needs identified by Extension agents (left column) and inservice training proposals submitted by specialists (right column). As shown in figure 1, training needs of agents closely match with specialist's inservice offerings in the PSA goal areas of economic and community development (Goal 2), food safety and nutrition(Goal 4). However, matching of training needs versus inservice offerings by specialists were "somewhat" limited. For example, in PSA goals 1, 3, and 5, the need for training in subject matter topics exceeded the specialists' inservice offerings. Similar findings can be evidenced for professional development and technology as well (Figure 1). This discrepancy in training needs and inservice offerings calls for further examination of the specific topics needed, resources available and collaborative efforts so that the training needs can be met in a systematic, cost-efficient way.

Figure 1: Matching Agent Inservice Training Needs with Specialists' Inservice Offerings

Inservice Training Needs by Agents

PSA Goal 1: Agrisystems...
Building New Agriculture Market
Livestock Marketing--Beef, Meat, Goat
Cooperative Marketing--Cattle
Marketing Updates
Business Mange in Horticulture
Ag Finance and Management
Property Rights
Research Updates in Agriculture
Marketing Programs to Underprivileged
Retention of Small/Minority Farms
Small Farmer Vegetable Production
Embryo Transfer, Genetic Engineering
Gene Splicing and Transfer Technology

PSA Goal 2: Economic & Community...
Family Resource Management
Recruiting Underprivileged Volunteers
Managing Volunteers
Volunteer Recruitment
Leadership
Marketing Place
Nursery Crop Production
Home/Commercial Turfgrass Management
Fire Ant Control

PSA Goal 3: Environmental Conservation...
Forest Herbicides
Timber Marketing
Forest Management
New Methods for Handling Manure
Aquaculture Wildlife
Aquatic Weed ID with "Real" Weeds
Farming Wildlife
Nuisance Wildlife
Wildlife Management

Inservice Training Proposals Submitted by Extension Specialists

PSA Goal 1: Agrisystems...
Beef Cattle Risk Management
Farmland Protection and Retention Issues
Partitioned Aquacultural System
First on the Scene
Soil Nitrogen, Soil Properties
Precision Agriculture
Extension's Role in Biotechnology
Soil Acidity and Liming--Part II

PSA Goal 2: Economic & Community...
LifeSmarts for Youth
Money 2000 Reunion
Working with Volunteers
Public Issues Management
Community Leadership Development
Business Retention and Expansion
Train the Trainer--Communication Skills
Residential Irrigation
Professional Turfgrass

PSA Goal 3: Environmental Conservation...
Forestry Herbicides
Issues in Forest Management
Peanut Management Training
Current Muscadine Production Technology
Regional Small Fruits Inservice
Modern Strawberry Production
Basic Forage & Pasture Management
Pest and Crop Modeling in Tree Fruit
Weed Mgt. for Pastures and Hay Fields
Nutrient Mgt. for Pastures and Hay Fields

Inservice Training Needs by Agents

PSA Goal 3 (Continued)
Wildlife--food plots, harvesting, control
Housing Materials, Trends and Impacts
House as a System
Troubleshooting Moisture Problems
Household and Structured Pests
New Termite Treatment
Irrigation Management
Fertilization Management
Entomology
Horticulture
Poultry Science
New/Alternative Forages
Soil Amendments
CCA and Pesticides
Non-Pesticide Control Approaches

PSA Goal 4: Food Safety and Nutrition...
Food Safety
Food Styling for Media Work
Foods and Nutrition

How to Conduct Cooking School
Food Preservation
Basic Food Preparation Series for Adults
Herbal Medicine and Nutrition
Food Nutrition: Intuitive vs. Dieting

PSA Goal 5: Youth Development...
Teen Programming
Educational Materials for 4-Hers
Project Books for 4-Hers
4-H Projects
4-H General Training
4-H Program Ideas
Youth Nutrition Programs
New and Innovative Youth Programs
Information Packets
Curriculum Training
Livestock Projects

Inservice Training Proposals Submitted by Extension Specialists

PSA Goal 3 (Continued)

Evaluating Innovative Techniques and Technologies
Reducing the Impact of Animal Agriculture
Animal Manure Utilization
Urban Runoff Management
Stream Team Training
Home-A-Syst
Healthy Indoor Air in Warm Humid Climates
Pesticide Application Calibration
Insect Pests Around the Home
Introduction to Home Moisture & Related Health Issues

PSA Goal 4: Food Safety and Nutrition...
Food Packaging Basics
ServSafe Recertification
Managing Crisis Within the Media

Master Food Preserver
Post-harvest Safety and Quality of Fruits and Vegetables
Advanced Media Techniques
Helping Consumers Understand Food Safety
Home Food Preservation Foundations

PSA Goal 5: Youth Development...
Conflict Resolution and Anger Management Update
4-H Program Management Level 1
4-H Work Smarter, Not Harder
4-H Each one Teach One
Building Family Strengths
4-H Teen Leadership Development
Youth Nutrition Programs

Inservice Training Needs by Agents

Professional Development...
Writing Grants
Evaluation
Marketing Extension Programs
Filing Systems
Retirements/Benefits
Stress Management
Better Work Habits
Time Management
Balancing Workload with Less Money
Diversity
Writing News Columns/Newsletters
Coaching Skills
Career Plan
Maintaining Records
Teamwork/Communications Skills
Developing Partnerships/Futuristic Goal Setting
Problem Solving
Supervision
Evaluation of Employees
Personnel Procedures
Professional Etiquette

Technology...
Design Newsletters/Brochures
Using Internet
Windows
Web Page Development
Y2K
EFNEP Program Reporting System
Presentation
Power Point
WordPerfect
Pegasus
Quickens
Digital Camera
Word
Excel

Inservice Training Proposals Submitted by Extension Specialists

Professional Development...
Orientation
Civil Rights
Filing and Documentation
Conducting Successful Needs Assessment
Introduction to Program Development and Evaluation
Tying Program Development and Evaluation
Developing Survey Instruments
Grants: How to Get One
Diversity
Teamwork/Communications Skills
Developing Partnerships/Futuristic Goal Setting
Problem Solving
Supervision
Evaluation of Employees
Personnel Procedures
Professional Etiquette

Technology...
Windows 98 - 6 sections
WordPerfect 8 - 6 sections
WPN. - Advanced - 6 sections
Excel - 6 sections
Internet and Netscape - 6 sections
Power Point 8 - 6 sections
Pegasus - 6 sections
Digital Imaging - 6 sections

Objective 4: Framework for Inservice Training

Figure 2 depicts the proposed framework for offering inservice education programs at Clemson University Cooperative Extension Service. As shown in Figure 2, the responses from county agents to the three major components of the survey--subject matter, professional development and technology were summarized. For purposes of clarity and focus, the identified topics were further grouped into Clemson University's five Public Service and Agriculture (PSA) goals--1) Profitability of Agriculture, 2) Economic and Community Development, 3) Food safety and Nutrition, 4) Environmental Conservation, and 5) Youth Development (Table 1 and Figure 1). The 100 subject matter topics identified by agents and the 76 inservice proposals submitted by specialists were compared and/or matched to determine final inservice offerings to be included in a catalog. An inservice training catalog was developed and distributed to all agents. The next step is to monitor inservice offerings, enrollment, inservice evaluation and submission of a final report to the administration.

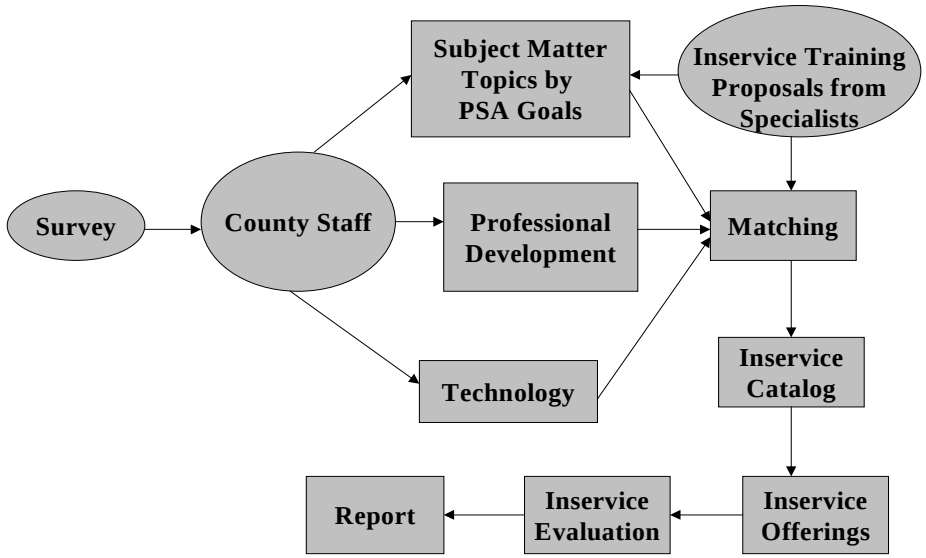

Figure 2: Framework to Identify Inservice Training Needs

Conclusions and Recommendations

Inservice training is a two-way process between university and county staff. The findings of this study have helped Clemson University Cooperative Extension Service to strengthen its inservice training programs by taking a proactive approach to identify inservice training needs of county staff.

The framework has provided a sense of direction and purpose to offering inservice training programs at Clemson University. The findings are of immense value to Extension staff development in establishing priorities to design and to implement inservice training programs. The approach used has helped both county staff, specialists and staff development personnel in targeting the critical needs of training relative to subject matter topics, professional development and technology. Such a proactive approach to inservice training will enhance the abilities of county staff to do their job and keep them up-to-date.

The findings, especially the matching of needs of agents with inservice offerings of specialists have helped the staff development unit to collaborate with other agencies--university and private--to offer inservice training for mutual benefit. For example, the Human Resources Office at Clemson University and Extension staff development are coordinating six training programs relative to professional development. Similarly, discussion is ongoing between Extension staff development and the Technical College Systems in South Carolina to identify areas of training where both institutions share expertise, educational resources, and costs.

The framework has provided a mechanism to integrate Public Service and Agriculture (PSA) goals of Clemson University, Cooperative Extension Plan of Work and inservice offerings. It is hoped that such integration will help the county staff in meeting their training and program needs that are applicable to local issues and programming.

Based on the findings and conclusions, the following recommendations are offered for further study or to make informed decisions relative to inservice training programs:

1. Extension staff development should explore opportunities for agents to meet with other agents in other counties with similar responsibilities to share ideas and successful programs.

2. Extension staff development should develop a plan or a mechanism to track or document trainings taken by county staff to determine the effectiveness of training and its lasting results that can be traced.

3. Extension administration, in consultation with county Extension directors, initiative chairs and staff development should develop guidelines to involve county staff in the planning, development, and delivery of inservice training programs.

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CONGRESSIONAL DISTRICT AGRICULTURAL SCHOOLS LAND-GRANTS AT THE SECONDARY LEVEL

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Abstract

Congressional district agricultural schools were established in Alabama (1889), Georgia (1906), and Virginia (1908). This study used historical research methodology to determine the precedents established by the Congressional district agricultural schools for the cooperative extension service, teaching agriculture, and the conduct of research at experiment stations and farms. Numerous extension activities associated with the schools occurred prior to the passage of the Smith-Lever Act in 1914. The study documents how the schools had courses of study taught for agricultural education before passage of the Smith-Hughes Act in 1917. Typically, the agriculture teacher would teach during the school year and conduct demonstration work during the summer. Faculty members at the schools also worked with youth activities. In addition, with an experiment station or farm on the campus, research was conducted by both the faculty and students.. An additional educational service achieved at the schools was that of teacher preparation.

The Congressional district agricultural schools activities of extension, teaching, research, and teacher preparation showed a great deal in common with traditional Land-grant universities. The funding sources helped set precedents with a combination of state funding through the Land-grant university and local support. Contemporary faculty members in Land-grant colleges of agriculture, extension agents, and high school agricultural education teachers must look to an earlier time than they usually do to find the beginnings of cooperative extension and secondary agricultural education. Both began long before the Federal acts that actually legitimized what was already going on in those fields. A significant model for the Congressional district schools was the Land-grant university. With extensive role model use and even administrative oversight, especially with reference to funding, the Congressional district agricultural schools had a marvelous model to follow in the already established Land-grant university. Is it no wonder that they became secondary versions of their role model?

Introduction

Most agricultural professionals are quite familiar with Land-grant universities and many claim such institutions as their alma maters. Such professionals would typically report that Land-grants have been and still are instrumental in the development of scientific agriculture. They would also report that Land-grants only exist at the higher education level. Such information is almost correct. However, during the late 1800s and early 1900s, there were secondary schools which so closely emulated Land-grant universities that they could be considered miniature Land-grants. Those schools were called Congressional district agricultural schools.

Congressional district agricultural schools were state and locally funded schools, which had the tripartite mission of teaching, extension, and research primarily in the field of agriculture. Such schools were located in Alabama, Georgia, and Virginia.

Conceptual Framework

Everything has an antecedent. Before agricultural experiment stations, instructional programs, and cooperative extension could exist on a large national scale, the Land-grant the Act of 1862 had to be passed by Congress and signed by President Lincoln. With the establishment of Land-grant universities agriculturally-based instruction, extension, and research all had physical and administrative homes. Before the innovative Acts known as Smith-Lever (1914) and Smith-Hughes (1917) could be fully implemented with extension agents and agricultural education teachers on the job and the total program functioning, grassroots efforts were already in motion. Many of the grassroots efforts occurred at Congressional district agricultural schools. In addition, precedents were established at the schools which helped cooperative extension and agricultural education get off to a fast start when Federal funding became available to the programs. In fact, both of the native Georgians who sponsored the 1917 legislation were cognizant of the Congressional district agricultural schools located in their home state.

The Congressional schools were quite innovative and meant a great deal to the communities in which they were located. In fact, there was even a degree of competition among communities to have the schools located in each one. True and Crosby, 1912. reported that in Georgia alone over $800,000 was contributed by people in local communities for the schools. Carnes (1991) reported that farmers were more up-to-date in the community where a Congressional district agricultural school was located. One alumna (Hillison, 1988) reported the establishment of such a school was the greatest thing to happen to her home community.

Not only were the Congressional district schools very much like Land-grant universities, they also had close ties to such universities. It was not unusual for the Land-grant university in states with such schools to have administrative

oversight of the schools. State funding was sometimes channeled through the Land-grant university to the district schools. The story of how Congressional district schools got started and what they accomplished is quite an interesting one.

Purpose and Objectives

The major purpose of this study was to document the activities of Congressional district agricultural schools and to demonstrate how they were secondary-level versions of Land-grant universities.

Specific objectives of the study were as follows:

1. To document the establishment and early history of Congressional District Schools.
2. To document the extension activities of Congressional district schools.
3. To document the teaching activities of Congressional district schools.
4. To document the experimental farm utilization of Congressional district schools.
5. To document the teacher preparation at Congressional district schools.

Research Procedures

Historical research methodology was utilized to accomplish the objectives of the study. Both primary and secondary sources were used to obtain the information needed. Primary sources included journal articles, state statutes, minutes of meetings, school catalogs, script from an interview, and books. Secondary sources included magazine articles, doctoral dissertations, proceedings, bulletins, and books. Information was collected at numerous sites including the Library of Congress, National Education Library, National Agriculture Library, various Congressional district school sites, and various Land-grant university libraries. All references were subjected to both internal and external criticism which tests for accuracy of material and to determine if the material examined was authentic.

Findings and/or Conclusions

Establishment of Schools

Alabama established the first Congressional district schools on February 28, 1889 (Acts, 1889). Act No. 579 established two branch agricultural experiment stations and agricultural schools in the state (Acts, 1889). The Alabama farmers and Grange worked hard to establish such schools at a time when high schools were virtually non-existent in Alabama (Thompson, 1965).

Georgia established such schools on August 18, 1906 (Acts, 1906). The specific language of the Act stated

That the Governor is hereby authorized to establish and cause to be maintained in each congressional district of the state an industrial and agricultural school in accordance with the further provisions of this Act. Said schools shall be branches of the state College of Agriculture, a department of the University of Georgia. (p.72)

The governor at the time of full implementation of the Georgia Act was Hoke Smith. One of the Georgia schools was built in the home district of Congressman Dudley Hughes.

Two years after Georgia passed its enabling legislation, Virginia also established such schools (Acts, 1908). By 1910 the Virginia legislature was very specific in how its legislation was worded.

> . . . that at least one public high school to be selected by the State Board of Education in each congressional district in the state, a thorough course in agriculture, the domestic arts and sciences and manual training shall be given in addition to the academic course prescribed for such high schools, and at least one-fourth of the school time shall be devoted to these subjects. (Acts, 1910, pp. 362-363)

The 1910 legislation also required the State Board of Education and the president of Virginia College of Agriculture and Polytechnic Institute in Blacksburg be the governing bodies of the schools (Acts, 1910).

Extension

There was a strong relationship between the development of the Congressional district schools and the beginning of extension work in the state. In fact the principal, who also served as an agriculture teacher at the school, carried on a great deal of extension work. The principal supervised home projects of his students, organized boys' and girls' clubs, organized farmers' institutes, offered responses to farmers and homeowners making agricultural requests, set up farm experiments and farm demonstrations, and traveled to other schools and community meetings to provide educational programming (Lane, 1915).

Extension work in the Virginia schools was especially strong where each of the 11 carried on some form of the work. The success of the extension programming efforts at these schools helped lay the groundwork for extension programming in the traditional areas of agriculture, home economics, and youth development. By doing so, the

Congressional district agricultural schools contributed significantly to the ultimate success of the extension program in Virginia.

Agricultural Education. The Congressional district agricultural schools conducted a wide variety of agricultural extension work. Most of the schools organized and conducted farmers' institutes which were typically 1 or 2 days in length. Farmers would gather at the Congressional district agricultural school and participate in educational programs conducted by faculty of the state agricultural college and other agricultural experts (Agricultural Instruction in High Schools, 1913). In addition, the farmers' groups often took field trips for on-farm demonstrations and frequently successful farmers shared information during the farmers' institutes (Siddons, 1994). The Manassas Agricultural High School organized the first farmers' institute for their school in 1908 and after three years had an average attendance of 75 farmers (Agricultural Instruction in High Schools, 1913).

As valuable as the information given by the speakers was, the social interaction was even more valuable. Rural citizens, at that time, were isolated by bad roads and by the lack of community spirit due, in part, to the rapid turnover in ownership patterns of farmland in the late 1800s (Agricultural Instruction in High Schools, 1913). The Congressional district agricultural school helped alleviate this isolation through the organization of farmers' institutes. Farmers and their wives attended the meetings and time was provided for social interaction.

Another area of agricultural programming conducted through the Congressional district agricultural schools was the winter short course program which was modeled after the short course offered by the agricultural college. Each short course concentrated on an agricultural topic of interest to the local community (Agricultural Instruction in High Schools, 1913). The target audience consisted of the sons of farmers. The youth did not have to attend the Congressional district agricultural school to participate in the short courses (Siddons, 1994).

The principal/agriculture teacher at the Congressional district agricultural schools also responded to requests for agricultural information, tested milk and seeds, carried out experiments on the school farm and with cooperating farmers, figured feed rations, and calculated fertilizer formulas ("Chartered in 1795", 1913). In addition, the agricultural teacher spoke to farmer groups, on road trips, and at other schools. Further, he visited the farms of his students during the summer to assist them in conducting their projects (Davis, 1981).

The following quote provides insight as to the similarities between the daily work of the Congressional district school principal and that of an agricultural extension agent of today (Agricultural Instruction in High Schools, 1913, p. 76):

> In the village I am constantly called upon to prescribe for the ailments of flowers, trees, shrubs, and to destroy scales, plant lice, caterpillars, and miscellaneous bugs. Outside the village I am more and more frequently called on for expert advice on alfalfa, drainage, locations for orchards, sick cows, sick trees, and the like.

In the same article Professor Button, Principal of the Manassas Agricultural High School, explained that he wrote an article for the two newspapers each week. Mr. Button kept abreast of the latest research at the land-grant college and read current scientific publications in order to provide information to farmers.

It is interesting that the Appomattox Agricultural High Schools' song and the current 4-H pledge both use the words 'head, heart, and hands'. Following is the school song as remembered by Mary Inge, a graduate of the Appomattox Agricultural High School (Hillison, 1988):

> Girded by a circling hill
>
> Stands a high school proud and wide
>
> The pride of every boy and girl
>
> For she's known throughout the land
>
> Highest purposes to stand
>
> For the enlightenment of the head, heart, and hand.

In his 1914 annual report of farmers cooperative demonstration and extension work, Dr. Joseph Eggleston made the following statement concerning corn club work (Eggleston, 1914):

There is not a single reason why an intelligent, patriotic teacher or superintendent of schools should not give this work his enthusiastic support, while there is every reason that he should. The corn clubs should be organized by the teachers, and in most cases the agent should give his instruction through field meetings on the demonstration plots. I believe that in the future the work will have to be done this way. (p. 37)

Funding. The development of extension work at the Congressional district agricultural high schools led to the initiation of shared funding sources for extension programming. Several Congressional school principals simultaneously served as the county demonstrator. This was true of at least two of the Congressional district agricultural schools: Turbeville Agricultural High School ("Coming home," 1978), and New London Academy

("Chartered in 1795", 1913). During the 1914-15 school session, W. G. Wysor was teaching at the Lebanon agricultural high school two days a week and as the county demonstrator four days a week. Wysor was being paid $750.00 from federal and state funds and $750.00 from the county government (J. D. Eggleston, Jr., Eggleston collection, June 17, 1915). Several principals were employed for 12 months, nine months at the school and three months as a county demonstrator (W. S. Green, Eggleston collection, August 18, 1917).

Later the schools had a more formalized relationship as evidenced by school letterhead, which included extension farm and home demonstrators as faculty members (B. K. Watson, Eggleston collection, March 13, 1917). Another example was found at the Elk Creek Training School. In a letter to Dr. Eggleston, dated August 24, 1916, Principal Chas. Graham requested $300.00 for the school's part of the county demonstrator's salary and an additional $250.00 for organizing girls' clubs.

Instruction

The recommended course of study for the Georgia Congressional district schools was both comprehensive and practical. Lane and Crosby (1916) indicated the State College of Agriculture and the district school principals recommended a course of study that included English, mathematics, history, science, agriculture, farm mechanics, and domestic arts and science. The agricultural portion of the curriculum included general agriculture, poultry, rural school agriculture, feeding, general horticulture laboratory in pruning and spraying, popular fruit growing, soils, fertilizers, farm management, and landscaping. Farm mechanics instruction included freehand drawing, woodwork, forgework, and elementary farm surveying.

The recommended faculty for a Georgia school was: (1) The principal, who, the committee thinks should be an educator with an agricultural training. (2) A teacher of agriculture. (3) A teacher of science, who should be a man capable of assisting the professor of agriculture. (4) A teacher of mathematics and farm mechanics. (5) A teacher of English and history. (6) A teacher of domestic science. (7) A matron. (Lane & Crosby, 1916, p. 9)

Alabama had specific recommendations for the academic courses taught at its district schools. The science classes recommended were physics, botany, and chemistry. The mathematics recommended were geometry, algebra, and arithmetic. Specific recommendations on English included spelling and composition (An Educational Study, 1919).

Students in the high school agriculture classes attended the Manassas farmers institutes and wrote reports which served as material for both English and agriculture classes. According to the principal of the Manassas Agricultural High School, the reports on the farmers' institutes were the best English papers turned in at the school (Agricultural Instruction in High Schools, 1913).

Several examples of youth organizations can be found as part of the instructional program in Virginia district schools. The first corn clubs were organized through the Congressional district agricultural schools at Burkeville and Chester (Epsilon Sigma Phi, 1940). In 1909, the Chester Corn Club enrolled 25 boys and won the state corn championship (Chester Agricultural High School Catalogue, 1911). Each member of the club conducted a demonstration by growing an acre of corn. The stated purpose of the club was to create interest in practical farming among boys (Chester Agricultural High School Catalogue, 1911).

In 1910, Ella Agnew, State Agent Girls Tomato Clubs, started the first tomato clubs in Nottoway County through the Haytokah Agricultural High School. The purpose of the tomato club was to teach girls better methods of canning for family use and to make it possible for them to earn money for the sale of their product (Epsilon Sigma Phi, 1987). The Haytokah Agricultural High School also organized a poultry club for girls and boys.

Another Virginia Congressional district agricultural high school, New London Academy, had an active corn club from 1909 until it was converted into a 4-H club in the 1920s (Siddons, 1994). The corn club was selected as the Virginia state champion corn club in 1913. At that time there were 23 members. The school also had poultry and livestock clubs as well as a canning club (Siddons, 1994).

The agricultural clubs offered by the Congressional district agricultural schools were open to any youth. While most of the members were students of the school, several youth in the local community also joined the clubs (Third Annual Catalogue, 1912). Benson (1915) even suggested that boys and girls should be given school credit for their club work.

In addition to organizing agricultural clubs, the schools conducted youth work at rural elementary schools within the district in which the school was located. The principal of Manassas Agricultural High School, Professor Button wrote the following concerning the in-school instruction which he was conducting (Agricultural Instruction in High Schools, 1913, pp. 74-76):

> Another successful line of work has been in the rural schools. As 75 per cent of the school children and practically all of the next generation of farmers attend the one-room rural schools. I have endeavored to reach them by such methods as would quickly interest them and were at the same time within reach of my very limited resources. My efforts to improve these schools are along two lines, the schools themselves and the future teachers who are now in the normal training class.

> As all farmers keep cows and raise corn, I chose milk testing and seed-corn selection as the best topics for my work in the schools. I borrowed a Babcock milk tester from the dairy division of the United States Department of Agriculture, and with a small exhibit of choice seed corn I visit a country school each week. If the lesson is to be on milk testing, the pupils bring samples of milk and with these I instruct both pupils and teacher in the operation of the test.
>
> Lane (1915) suggested several ways teachers in the instructional program could integrate with other programs to extend the classroom instruction in the fashion of cooperative extension and the youth organization experience possible for students.

(1) by supervising the home-project work of his pupils; (2) by directing agricultural instruction in the grades; (3) by organizing and following up boys' and girls'clubs; (4) by acting as organizer for the one week's short courses for farmers; (5) by offering personal counsel and advice o certain days to farmers of the community; (6) by assisting in organizing farmers' reading courses; (7) by directing school agricultural exhibits locally and at the county fair; and (8) thru (sic) Saturday meetings with farmers and by farm visitation. (p. 1134)

Experimental Farm

If it had not been for the research and experiment station portion of the Congressional district schools, the first state to establish such schools, Alabama, might not have passed its enabling legislation. Thompson (1965) held the opinion that the Alabama legislature was initially more interested in the experiment station part of the facility than the school part. The wording of the first act verifies his point.

> . . . that the board must cause such experiments to be made at the stations as will advance the interests of scientific agriculture, particularly on Tennessee Valley lands, and on red pine lands and lands of similar character in southeast Alabama, and to cause such chemical analyses to be made as deemed necessary; all such analyses, if requested, to be made under the supervision of the commissioner of agriculture by the chemist of the agricultural department without charge. (Acts, 1889, p. 1037)

Carnes (1991) gave testimonial to the importance of the experimental farm at Albertville, Alabama school. He noted that the research was supervised by a practical farmer with help from the agricultural teachers and students on a 40 acre plot of land. He further stated

The farm and experiment station was a very important part of the school, and most of the school's emphasis centered around it. It was a teaching laboratory for the student, and they were required to do a certain amount of practical work on the farm every week. Before home economics was established as a course, the girls were required to do work in floraculture (sic) and horticulture. (p. 187)

Carnes (1965) further reported the use of research aspects of the farm. He noted that work with Auburn University and the United States Department of Agriculture meant the school had the very latest research information. Farmers in the community were encouraged to attend open houses at the school where research findings were shared.

The Second District Agricultural and Mechanical School located in Tifton, Georgia reported a farm inventory of "2 mules, 2 horses, 6 cows, 8 young cattle, 75 hogs, 100 chickens, $400 tools, 1 barn, 47 acres cultivated last year, 35 acres more cleared this year . . . (Georgia Department of Education, 1910, p. 168) The same report noted that the 1909 farm crops were valued at $2,800. (p. 168)

A. C. True, director of the Office of Experiment Stations for the United States Department of Agriculture and also President of the American Association Agricultural Colleges and Experiment Stations, recognized the use of farms and research components at Congressional district agricultural schools by expressing a degree of concern about them. Charles Prosser, as a member of the 1914 Commission asked True if he was opposed to the establishment of experiment stations at such schools in the future if it was part of Federal legislation. True's response was "Yes, as a general rule" (Report, 1914, p. 212). In fact True and the Land-grant universities only supported the Smith-Hughes Act after it became obvious that experiment stations would not be part of future schools.

For most schools the experimental farm was a local contribution. Georgia farms averaged 280 acres. The schools received proceeds from the state oil and fertilizer taxes (Leake, 1915, p. 136). Using commodity checkoffs would become a very common way to fund experiment station research. Virginia school farms were from 5-20 acres in size (Hutcheson, 1910).

Teacher Preparation

Teacher preparation was a minor part of the purpose of the Congressional district schools. It was based primarily on the Lancasterian method of peers teaching each other. A typical situation was older students teaching younger students under the supervision of the school principal. Mary Inge, a 1915 graduate of the Appomattox school learned enough from that type of experience that she had a career as a substitute teacher (Hillison, 1988). Carnes (1991) reported more graduates of the Albertville Agricultural School had chosen teaching as a career than any other choice. He also reported that one district school had 65% of its graduates in the teaching profession (p. 208).

Implications and Discussion

Congressional district agricultural schools were truly innovative and precedent setting. They influenced the lives of thousands of graduates. They influenced the lives of an untold number of people, especially farmers, who lived near the schools and learned the latest in scientific agricultural research. The schools also influenced both the Smith-Lever Act of 1914 and the Smith-Hughes Act of 1917 by being located in the home state of Hoke Smith and the home Congressional district of Dudley Hughes.

Congressional district schools truly emulated the structure and the success of the older and larger Land-grant universities. The traditional tripartite mission of extension, instruction, and research was achieved on the secondary level.

Perhaps today's high school agricultural education programs should place more emphasis on also emulating Land-grant universities. We would find contemporary programs that would provide instruction in classrooms, laboratories, and experimental farms. We would find agricultural education departments that worked more extensively with the community. Youth organizations would continue to play an important role in the department.

A magnificent model of cooperation was established between extension activities and instructional activities at the schools. There was no concern over which portion of the program received credit for winning certain contests. Both the extension activities and the instructional activities were provided by the same person. The youth organizations were commodity-specific, not general in nature as 4-H and FFA became. With the same person performing both activities communication could not have been better. Perhaps contemporary agricultural educators need to look to Congressional district agricultural schools to find more compatible partners. Do agricultural educators have more in common with peer extension agents or with other vocational educators?

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AGRICULTURE STUDENTS' ACADEMIC ACHIEVEMENT, ATTITUDES TOWARDS PAPERLESS EXAMS, COMPUTER ANXIETY, COMPUTING ATTITUDES, AND LEARNING STYLES

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Abstract

The purpose of this study was to determine if a statistical relationship existed between academic achievement and exam delivery method for students enrolled in a Computer Applications in Agriculture course during spring semester 1999. A purposive sample of college of agriculture students (n = 45) had their computing application skills tested through traditional (paper and pencil) and electronic (e-mail) methods. Significant, moderately positive associations resulted between academic achievement and exam delivery method for the quiz exam scores. Agriculture students who took the quiz using paper and pencil had significantly higher scores than did students who took the quiz through an electronic version. A significant moderate relationship existed between academic achievement and learning style for the quiz; field-independent students achieved significantly higher quiz scores than did field-dependent learners. No significant associations were found between academic achievement and students' attitudes towards computers, computing anxiety levels, attitudes towards electronic exams, or gender. The variable of time may have a significant impact upon academic achievement for students involved in computerized testing situations. Early identification of field-dependent learners affords the instructor time to provide additional assistance for those who find learning computing skills an academic challenge.

Introduction

University students experience anxiety or stress, when computers malfunction, data are lost, or when program errors have caused complete computer file destruction. These anxious moments may be heightened during times of extreme pressure such as staying up all night to finish a term paper before a pre-determined deadline. It is fair to assume that students suffering such "computer anxious" times may be hypersensitive when newly learned computing skills are tested under time constraints and without paper and pencil. However, if agricultural educators are preparing students in a true work-related manner, then we can ill-afford to neglect the value of a computerized testing situation in our classrooms. Many agribusiness firms require interviewees to "demonstrate" their computing skills, without paper and pencil, and during an anxiety-filled job interview.

> The true power of computing (acquiring data electronically, formulating solutions to problems, and transferring saved data electronically to a distant location) may not be fully realized in most university-level computer applications courses. The very nature of testing students' computing skills in an authentic situation lends itself to evaluations of those skills in a paperless computing environment. As a precursor to implementing this evaluation method, certain questions must be addressed about the relationships between computing anxiety, students' attitudes towards computers, and students' learning styles. What relationships exist between these variables for university agriculture students in a Computer Applications in Agriculture course?

Conceptual Framework

The incidence of computer usage as an instructional aid in agriculture programs at the secondary and post-secondary levels of education has increased dramatically during the past decade. At the high school level, much research has been conducted to better understand agriculture teachers' computer usage (Raven & Welton, 1989; Birkenholtz, Stewart, McCaskey, Ogle, & Lindardt, 1989; Birkenholtz & Stewart, 1991; Camp & Stuphin, 1991; Miller & Connors, 1996; Nordheim & Connors, 1997) and teachers' related anxiety towards using computers in their programs (Drueckhammer, Kotrlik, & Parton, 1986; Fletcher & Deeds, 1994). Studies conducted at the post-secondary level have focused mainly on students' attitudes towards computers, preferred learning styles, and levels of computing anxiety (Marrison & Frick, 1994; Raven, Newman, & Day, 1997; Day, Raven, & Newman, 1998) and academic achievement, teaching method, and learning styles (Sexton, Raven, & Newman, 1998; Sexton, Newman, & Raven, 1998). The research efforts concerning computer usage in agricultural education are commendable. One of the elements missing from those studies was the specific exclusion of using computers to evaluate, without paper and pencil, university students' ability to apply their computing skills in a problem solving situation.

Although student testing through an electronic medium (exclusively) is not new to education, it is not mentioned in agricultural education studies. Recent scholarly work has been devoted to student assessment through an "electronic only" testing environment. Boo (1997) found respondents preferred taking the computerized sub-tests for the Iowa Tests of Educational Development (Vocabulary, Ability to Interpret Literary Materials, Ability to Do Quantitative Thinking) to the paper and pencil versions. Also, Boo's respondents had favorable attitudes about the general features of the computerized tests. A point of interest in Boo's study was that group mean differences in computer anxiety and computer experience did not fluctuate between test scores and administration mode. This may be due to a predominance of younger students feeling more comfortable with computerized testing situations. Because computers and communication mediums have become more pervasive in our society, we will continue to see future

university students “expecting” to use computers in the teaching, learning, and assessments processes.

In support of the position stated above, Digh (1997) used the Lloyd and Gressard (1984) Computer Attitude Scale to find that 135 pre-service teachers (K-12) in Tennessee significantly reduced their computer anxiety and increased their computing confidence after taking a semester-long Instructional Technology course. However, no significant difference was found for the perceived usefulness of the personal computer following the course. As educators, we should take particular interest in advocating the transference of computing skills beyond a single-semester computer applications course. Chmielewski (1998) explored the transfer of Internet training. Transfer of training was divided into four categories: e-mail knowledge, Web knowledge, e-mail use, and Web use. The study focused on working adults who represented a range of characteristics. Results showed that people who participated in the Internet training used e-mail and the Web significantly more often and had significantly higher e-mail and Web knowledge scores than did those people not participating in the training.

Additional studies on students’ computer anxieties, attitudes, and electronic versus paper and pencil assessments includes the study by Sternberger (1998). Sternberger found that of 180 nursing students, females had more negative computer attitudes than did males. Also, consistent with computer attitudes, females who took the mathematics test using the computer-based format had lower achievement scores. Regardless of testing format, there was no difference in achievement scores for males. Sternberger used the Lloyd and Gressard (1984) Computer Attitude Scale to measure attitudes towards computers. Contrary to these findings, Otomo (1998) found no significant gender differences concerning computer anxiety and test anxiety for 153 community college students. Similarly, Lynch (1997) found no significant differences in test mean scores for 87 community college students enrolled in three sections of Introductory Psychology when comparing computerized versus paper and pencil tests. However, Lynch did find a tendency for computer test scores to be higher initially than paper and pencil scores, but the differences diminished with each successive test. Although these studies contribute to our knowledge base about traditional versus computerized testing, they do little to address the evaluation methods used for testing students’ computer application skills in a traditional versus electronic medium.

College students do experience anxiety when using computers for the first time. They may experience additional stress if asked to demonstrate their computing skills through an electronic only testing situation. The research studies mentioned above help us understand that students may experience less academic achievement in computerized testing situations initially, but the detrimental effects (computing anxiety and/or test anxiety) appear to diminish with time. Successive computerized testing environments produced notably higher academic achievement for several groups. However, the diminishing effect may not hold true for female students. Does the mere passage of time reduce students’ anxiety towards computers in general? Does the same passage of time reduce students’ anxiety towards computing skills tests in particular? What is the nature of computer anxiety, test anxiety, and a student’s preferred learning style? Future employees in public and private sectors alike will have demands placed on them that specifically entail their computing skills before they are offered employment.

Extensive literature concerning computer usage, computer-assisted teaching methods, students’ attitudes towards computer, preferred learning styles, and computer anxieties pervades the agricultural education profession. Effective design and implementation of computer applications courses are incomplete without a study of the evaluation methods used to test students’ computing skills. If field-independent students had significantly positive attitudes toward computers (Raven, Newman, & Day, 1997) would this hold true when taking a computing skills examination through an electronic medium? Is there a relationship between a student’s preferred learning style and exam delivery method? It is necessary to address these questions before recommendations can be made to incorporate “electronic only” evaluations of students’ computing skills.

Purpose and Objectives

The purpose of this study was to investigate relationships between agriculture students’ academic achievement in a computer applications course and exam delivery method. A secondary purpose was to explore relationships between agriculture students’ academic achievement and their learning styles, computer anxiety levels, attitudes towards computers, attitudes towards electronic examinations, and gender. The following research questions guided this study.

1. What were students’ academic achievements, as measured by quiz and midterm scores, computer anxiety levels, attitudes towards computers, and attitudes towards paperless computer examinations?
2. What relationships existed between agriculture students’ academic achievement and exam delivery method (paper and pencil versus electronic format) or gender?
3. What was the association between agriculture students’ academic achievement and learning style as measured by the Group Embedded Figures Test (GEFT)?
4. Did relationships exist between students’ academic achievement and their attitudes towards paperless computer exams, computer anxiety scores, attitudes towards computers, or gender?

Procedures

Descriptive survey methodology and a correlational design were used in this study (Ary, Jacobs, & Razavieh, 1996). The dependent variables were quiz and midterm exam grades in the AgEE 62-Computer Applications in Agriculture class. The independent variables were learning styles, exam delivery method, computer anxiety levels, attitudes toward computer scores, attitudes toward electronic exams, and gender.

AgEE 62-Computer Applications in Agriculture was offered originally for students majoring in agricultural education. Due to the extreme popularity of this course, another section was offered on an open-enrollment basis for all college of agriculture students. Each section attained the maximum enrollment of 23 students for a total of 46. The accessible population ($N = 46$) was all students who chose to enroll in the AgEE 62 course during the 1999 spring semester. During this study, one student did not complete the AgEE 62 quiz or midterm exams; therefore only 45 (97.82%) respondents were included in the purposive sample. AgEE 62 met weekly (15 weeks total) for two 90-minute sessions. The course instructor utilized a laptop computer and projection unit to teach key concepts and applications. Each section had a teaching assistant who monitored students' progress. Course content included computer operating systems, file management, electronic communications (e-mail), word processing, spreadsheet applications, presentation/graphical programs, Internet use, and Web authoring.

AgEE 62 course enrollment required all students to participate in a paperless computer exam environment at the onset of the semester. Students were required to activate their e-mail accounts during the first week of class. Weekly practice assignments for sending, receiving, and attaching files were conducted with the instructor. Prior to the first quiz (occurring in week four), academic performance consisted of five projects in Word® '97 and e-mail using Eudora Pro®. Before the midterm exam (occurring in week eight), academic performance consisted of three projects using Excel® '97 and e-mail use.

Data were collected in two rounds, using Chou's (1997) original computer attitude scale (round one in week one) and a modified version (round two in week eight). Chou's instrument contained three sections measuring 1) computer anxiety, 2) attitudes toward computers, and 3) demographics. The first section contained a twelve-item, four-point, Likert type scale measuring responses to computer anxiety. Responses could range from Strongly Disagree (1) to Strongly Agree (4). Cronbach's alpha coefficients for section one were .86 (round one) and .89 (round two). Section two contained the same Likert type scale, but consisted of 26 items that measured attitudes toward computers. Cronbach's alphas for section two were .92 (round one) and .90 (round two). Also, section two was comprised of three sub-scales measuring a) computer confidence (Cronbach's = .81 in round one; .76 in round two), b) computer enjoyment (Cronbach's = .84 in round one; .72 in round two), and c) using the computer as an instructional medium (Cronbach's = .81 in round one; .84 in round two). Chou's instrument was derived from extensive development and testing (Raven, Newman, & Day, 1997) and was considered reliable and valid in this research study.

Chou's (1997) original instrument was used in its entirety for the first administration, but the demographic section was deleted during the second round. A researcher-developed section measuring attitudes toward paperless exams was included as the third section during the second round. Students' perceptions regarding the paperless exam process were recorded on a 19-item, five-point Likert type scale. The researcher chose a five-point scale since this was a relatively new research area. Responses could range from Strongly Disagree (1) to Undecided (3) to Strongly Agree (5); it was pilot tested in three consecutive semesters before the 1999 spring semester. Cronbach's coefficients during those three semesters ranged from .78 to .82. For this study, Cronbach's alpha was .84.

The GEFT (Witkin, Oltman, Raskin, and Karp, 1971) was used to determine students' preferred learning styles. Witkin et al. (1971) determined two types (field-dependent and field-independent) of learners exist. AgEE 62 students who scored greater than the national mean (11.4) were classified as field-independent learners, while those who scored less than the national mean were classified as field-dependent learners. Internal consistency was measured by treating each scored section as split halves. Witkin et al. (1971) reported a Spearman-Brown reliability coefficient of .82 on the GEFT. For this study, the Spearman-Brown reliability coefficient was .87.

> Prior to the first computer skills quiz (50 points possible) in week four, students in both sections were informed that one-half (chosen randomly) would receive the quiz through e-mail and one-half would take the quiz using paper. E-mail examinees were required to download the quiz using Eudora Pro, answer the problems, save the results on their diskette, attach all answer files to an outgoing e-mail message, and turn in the diskette to the instructor. They were not permitted to print any instructions. Paper and pencil examinees were given the exact same quiz on paper, required to answer all questions, print all results, save all files on diskette, and turn in paper answers and diskette to the instructor. The same procedures were followed for the midterm (100 points possible) in week eight, except the e-mail and paper and pencil groups were switched. The computer quiz and midterm exam were closed-note, closed-book tests, but students could use any on-line resources for help except for another student (via e-mail). All test problems were patterned after the projects completed during the course of the semester. Both exams were deemed valid and reliable assessments of students' computing skills by the researcher. The instructor scored all quiz and midterm exams for both sections. The instructor assessed and scored all students' learning styles in the sixth week.

Descriptive statistics and bivariate analyses were used to describe the data. Pedhazer's (1982) convention for dummy coding variables was used. Relationships were explored using Pearson's product-moment correlations for interval-type data and point-biserial correlations were employed to examine interval and nominal data. Davis' (1971) convention was used to describe the magnitude of relationships.

Findings

Table 1 shows that a majority of male, junior class, agricultural education majors were enrolled in the AgEE 62-Computer Applications in Agriculture course during the 1999 spring semester. The average age of all students was 21.13 years (SD = 2.85).

Table 1.
Descriptive Statistics for AgEE 62 Students' Demographics (n = 45)

Factor	Label	f	Percent
Gender	Male	24	53.3
	Female	21	46.7
Class Status	Junior	16	35.6
	Sophomore	12	26.7
	Senior	11	24.4
	Freshmen	6	13.3
Major [a]	Agricultural Education	27	60.0
	All Others	18	40.0
Age	19	13	28.9
	20	10	22.2
	23+	9	20.0
	21	7	15.6
	22	4	8.9
	18	2	4.4

[a] Majors other than Agriculture Education included students from Animal Science, Forestry, Plant Science, Agricultural Economics, and Environmental Protection.

In answering the first research question, AgEE 62 students who took either exam using the paper and pencil version achieved higher scores than did students who were in the e-mail group (Table 2). In general, respondents held similar attitudes towards electronic exams, computing anxiety levels, and attitudes towards computers, regardless of exam delivery method. However, computing anxiety levels increased from the quiz to the midterm exam for students who were required to complete the exam using the paper version. Computing confidence increased for both groups from the time respondents took the quiz to the time they finished the midterm exam. AgEE 62 students had more positive attitudes towards electronic computer exams while participating in the paper exam version, but held more negative attitudes towards electronic exams while being tested in an electronic only situation.

Table 2.
Descriptive Statistics for Dependent and Selected Independent Variables (n = 45)

Variable	Mean Values		
First Administration	Grand	E-mail (n = 23)	Paper (n = 22)
Quiz Score	42.60	41.13	44.13
Computer Anxiety	22.44	22.83	22.05
Computer Attitudes	78.38	78.52	78.23
Attitudinal Sub-scales			
Computer Confidence	31.64	31.61	31.68
Computer Enjoyment	28.73	28.96	28.50
Computer as Instructional Medium	18.00	17.96	18.05
Second Administration			
Midterm Score	88.56	84.91	92.04
Computer Anxiety	23.07	22.41	23.70
Computer Attitudes	78.09	78.17	78.00
Attitudinal Sub-scales			
Computer Confidence	32.27	32.72	31.82
Computer Enjoyment	27.93	27.68	28.17
Computer as Instructional Medium	17.89	17.77	18.00
Electronic Exam Attitudes	60.11	58.52	61.57

Bivariate analyses were used to answer the second research question. Table 3 illustrates a moderately negative relationship between students' quiz scores and exam delivery method (r_{pb} = -.326). Exam delivery method was coded as 0 (paper) and 1 (e-mail). Students who took the quiz using the paper version had significantly higher scores than did students in the electronic only quiz group. No significant relationships occurred for the midterm exam.

Table 3.
Correlations Between Academic Achievement and Exam Delivery Method (n = 45)

	Exam Delivery Method	
Variable	r	Sig.
Quiz Scores	-.326*	.029
Midterm Exam Scores	-.233	.123

[a] Point-biserial correlation coefficients.
*p<.05

A near even split existed between students who were field-dependent (n = 23) and field-independent (n = 22) learners. Cumulative scale scores for learning styles were correlated with raw quiz and midterm exam scores. Table 4 shows a significant moderately positive relationship existed between academic achievement and learning style (r_{pb} = .432). Field-independent students had significantly higher quiz scores than did field-dependent learners. No significant relationships occurred for the midterm exam (Table 4).

Table 4.
Correlations Between Academic Achievement and Learning Style (n = 45)

	GEFT	
Variable	r	Sig.
Quiz Scores	.423**	.004
Midterm Exam Scores	.160	.294

[a] Point-biserial correlation coefficients.
**p<.01

Bivariate analyses (fourth research question) were used to determine if significant relationships existed between students' academic achievement and their attitudes toward electronic exams, computer anxiety levels, attitudes toward computers, attitudinal sub-scales, or gender. No significant associations existed between these variables.

Conclusions

AgEE 62-Computer Applications in Agriculture students performed significantly worse on the quiz if they took it through an electronic medium only. No significant relationships were found between groups when analyzing midterm exam scores. These findings are the converse of what Lynch (1997) found when psychology students performed better on computerized tests than did those who took the paper and pencil versions. Lynch also found that significant differences between evaluation delivery methods diminished with each successive test, as was found in this study. One explanation of this finding may be that students were not sufficiently comfortable with using e-mail prior to the quiz. As a group, they agreed that taking computer skills exams electronically was not as easy as taking the exams in a more traditional paper and pencil fashion. Educators should take note that this trend may reverse direction within the next five years as families, as well as elementary and secondary level schools continue to purchase and use (especially e-mail) computers daily (Marcus, 1999).

Field-independent students had a significantly higher likelihood of doing well on the quiz than did field-dependent learners. This finding supports those of Raven, Newman, and Day (1997) who found that field-independent learners were more likely to attain higher academic achievement in a computer applications course than were field-dependent learners. Due to the absence of significant relationships between academic achievement and midterm exam delivery method or learning styles, it is possible that with time, AgEE 62 students became more comfortable with using computers in general and with the "expected" testing procedures used in this computer applications course. This result provided further support for Lynch's (1997) study, while it nullified the notion that field-dependent students have more difficulty in solving problems (Witkin et al., 1971).

The lack of significant relationships between students' academic achievement and their attitudes toward electronic exams, computer anxiety levels, attitudes toward computers, attitudinal sub-scales, or gender could be attributed to any extraneous variable, but is most likely the cause of a small, homogeneous sample. Caution is warranted in generalizing this finding to other groups and/or other computerized testing situations.

The findings in this study further support the expanded research concerning learning styles, academic achievement, and computer skills. Field-independent learners achieved higher academic performance in computer applications than did field-dependent learners. Witkin, et al. (1971) described field-dependent learners as people who perceived the world in a global fashion, found it difficult to solve problems, were highly sensitive, were conscience of their social environment, and favored the spectator approach to learning. Unfortunately, students who are field-dependent

learners are at a disadvantage when learning computer applications skills. Students who are afraid, anxious, and/or timid about learning new computing skills on their own, would not do well in a computer applications course where 23 students are vying for one instructor's time. Additionally, the very nature of becoming a proficient computer user, who is at-ease with computers, has generally positive attitudes toward computers and electronic communications, will require something other than a "spectator approach" to learning. Acquiring computing skills is much like welding; it is a practiced skill.

Implications and Recommendations

The most important implication resulting from this study is recognizing that the next generation of students will utilize e-mail and other forms of electronic communications long before they reach our classrooms. The next generation of students will be technological decades ahead of today's students. Are we ready to provide challenging, intellectual, and practical teaching and learning environments for future students? Continued study of computing skills is warranted when considering possible differences among learner groups' computing skills in comparison by exam delivery method.

The magnitude of variation among learning styles and its effect on academic achievement, computer anxiety, and attitudes towards computerized exams should be studied in other situations and with larger samples. It is believed that early identification of field-dependent learners will allow the instructor, teaching assistants, and/or cooperative learning teams an opportunity to provide additional assistance for students who find learning computing skills an academic challenge. The eventual goal is that field-dependent learners will find using computers enjoyable, have less anxiety about using computers, and maybe achieve greater academic success.

In an ever-expanding world of technological frontiers, we owe it to our students and to ourselves, to push the envelope in our computing prowess. The agricultural industry continues to seek graduates who have the most proficient computing skills upon entering the workforce. Electronic communication will play a major role in many educational and business settings beyond the year 2000. Agricultural educators who teach computing skills at the university level must advance their curricula design, implementation, and evaluation (in an authentic testing environment) of students' computing skills.

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VALIDATION OF THE PERCIEVED BENEFITS OF COMPETITIVE LIVESTOCK EXHIBITION BY TEXAS 4-H MEMBERS: A QUALITATIVE STUDY

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Abstract

The purpose of this qualitative study was to validate the benefits gained through competitive livestock showing by Texas 4-H members. Participants of the study were 4-H members, 4-H parents, 4-H advisors, and show officials in their natural settings at the Houston Livestock Show and Rodeo and stock shows leading up to the Houston Livestock Show and Rodeo. Methods used for the study were (1) in-depth interviews, (2) field observations, and (3) review of historical documents. Data analysis was performed using axial and selective coding. Six major themes related to the benefits of competitive livestock showing emerged. Those six themes were (1) social relations, (2) character, (3) family, (4) competition, (5) new cultures and environments, and (6) finance for education. It was concluded that participation in competitive livestock showing benefits Texas 4-Hers in developing life skills. Recommendations were that the Texas 4-H Program continue to utilize competitive livestock shows as a means of educating its youth members at the local, county, regional, and state level.

Introduction and Theoretical Framework

The Cooperative Extension Service 4-H Program is a youth organization which uses a series of rewards and incentives in the field of competition to educate its members. The 4-H mission is to help its youth members develop into useful and productive members of society. Weber and McCullers (1986) noted that the 4-H system of competition has proven to be highly effective for over 70 years. One of the 4-H program's biggest competitive endeavors is competitive livestock shows, and the program uses the Houston Livestock Show as one of its competitions to help satisfy this need.

The Houston Livestock and Rodeo has been around for over six decades. It was in 1931 that the Houston Fat Stock Show and Live Stock Exposition was founded, and it would not be for another thirty years that it would become known as the more familiar Houston Livestock Show and Rodeo. Today, the Houston Livestock Show and Rodeo is one of the largest livestock shows in the world. The Houston Livestock Show and Rodeo's motto is "Benefiting Youth and Supporting Education." Today more than 14,000 4-H and FFA members from the ages of nine through nineteen compete annually in the junior show exhibitions. (Available Internet: http://www.hlsr.com/gihistory.html)

Over the past few years, however, competitions such as competitive livestock exhibitions have come under some criticisms. Weber and McCullers (1986) stated that literature increasingly shows that competition and rewards may have some surprising and unexpected hidden costs or side effects. They also claimed that although competition may be intended to motivate youth to stretch abilities and reach goals otherwise unattainable, they may also limit a child's creativity and interest.

This research study was designed to validate some of the perceived benefits of competitive livestock exhibition at the Houston Livestock Show and Rodeo. The following report was qualitative in nature and showed benefits youth can gain through competition. The study was built on the qualitative triangulation method. First, a series of intensive interviews was conducted with 4-H parents and exhibitors. The other two methods were livestock show observations and review of historical documents. The primary livestock show observations were conducted at the Houston Livestock Show and Rodeo to observe Texas 4-H members competing in a natural environment.

The theoretical framework for data collection was rooted in symbolic interactionism. This focused the interest of the research toward understanding how individuals developed meaning in interaction with others (Marshall and Rossman, 1994). Blumer (1969) suggested that symbolic interactionism is based on the following central principles: (1) human beings act toward things on the basis of the meaning that things have for them, (2) this attribution of meaning to objectives through symbols is a continuous process, and (3) meaning attribution is a product of social interaction in human society. Charon (1995) noted that symbols include words, objectives, and almost all acts with other people. Symbols are the basis for almost everything that characterizes the human being in nature. A necessary condition for the study of social interaction is careful attention to the overt behaviors and behavior settings of actors and their interactions (Denzin and Lincoln, 1994).

Purpose and Research Questions

The purpose of this study was to validate the perceived benefits of competitive livestock showing by Texas 4-H members at the Houston Livestock Show and Rodeo and other livestock exhibitions. As a means of accomplishing the purpose of this study, the following research questions were asked:

1. What type of benefits can be attributed to competitive livestock showing by Texas 4-H members at the Houston Livestock Show and Rodeo?
2. How are these benefits developed in the environment of and interactions with the

Houston Livestock Show and Rodeo and other livestock show competitions?

This study was conducted during fall and winter of the 1997-1998 livestock show season concluding with the Houston Livestock Show in early March.

Methods and Procedures

The research design for the study was qualitative in nature, which is common in behavioral and social sciences. Campbell and Martin (1992) noted to be effective and of service as agricultural and extension educators, qualitative research methods should be incorporated into research projects. The assumption of qualitative research is the researcher can best come to know the reality of a situation by being there and becoming immersed in the stream of events and activities (Hathaway, 1995).

According to Denzin and Lincoln (1995), a bricoleur researcher is adept at performing a large number of diverse tasks which allows for better perception of the subject at hand. In order to achieve various methods for interpretive research, this study used the triangulation method for collection of data. The data collection methods included (1) in-depth interviewing, (2) observations, and (3) a review of historical documents.

In-depth interviewing can be considered to be like a conversation with a purpose (Marshall and Rossman, 1995). This interviewing process is an informal process where the researcher explores a few general topics looking to uncover the participants meaning perspective. The researcher respects how the participant frames and structures his or her responses, which is an assumption fundamental to qualitative research. This process allowed for the participant's beliefs to not be influenced by the researcher. Interviews for this study took place prior to the 1998 Houston Livestock Show and Rodeo at familiar settings for the participants such as their home or place of business. Informal conversations at livestock exhibitions were also used, but they were recorded as field observations.

The second process was observation and is a fundamental method in all qualitative inquiry. The researcher needs to witness the phenomenon at hand in order to analyze it (Adler and Adler, 1995). This procedure allowed the researcher to view 4-H exhibitors in a natural environment. The Houston Livestock Show and Rodeo along with several other settings were used to satisfy this need throughout the study. Observations were conducted from several settings such as animal stalls, holding pens, and inside and outside of the show ring. Observations were recorded as written text and/or videotaped and converted to field notes at a later time.

The final method was a review of historical records, which enabled comparison of what is happening in the 4-H livestock show program now to what happened in the past. Documents and articles about livestock shows in general along with the Houston Livestock Show and Rodeo specifically were reviewed. These texts were reviewed carefully for emergent themes that appeared often.

The participants who participated in the interview portion of the study were purposely selected. Qualitative research allowed for the selection of the project's participants. Those selected to be interviewed were considered to be experts in the subject as all had multiple years' experience in the area. Some of the people interviewed served dual roles. All of the past exhibitors had also gained experience volunteering with livestock exhibitors since they finished showing. Two past exhibitors had even volunteered for the Houston Livestock Show and Rodeo and one now serves as an assistant County Extension Agent actively involved with 4-H exhibitors. The majority of parents interviewed showed livestock as a youth and part showed at the Houston Livestock Show and Rodeo. All parents interviewed also volunteered with their local 4-H club. Observation participates were all observed at either the Houston Livestock Show and Rodeo or the barrow sift which was held at Brenham, Texas.

This study was conducted during fall and winter of the 1997-1998 livestock show season concluding with the Houston Livestock Show in early March. This period of time included 4-H members purchasing, caring for, and exhibiting their livestock projects. Although several types of livestock could be shown the study was limited to exhibition of market swine, market sheep, market steers, and breeding heifers. These were the most numerous types of livestock exhibited by 4-H members at the Houston Livestock Show and Rodeo. In order for perfection of field observations and exposure to the culture data were gathered during several area jackpot shows, local shows, county shows. These atmospheres provided a practical view of the 4-H show industry, and helped perfect the research for application prior to observations at the Houston Livestock Show and Rodeo. Livestock shows used for practice observations were all within the South Plains and Panhandle of Texas. In order to conduct observations at the Houston Livestock Show and Rodeo all appropriate facilities and establishments were observed. All places

exhibitors were allowed on the Houston Livestock Show and Rodeo grounds were noted in field observations. Two other direct observation sites related to the Houston show were the barrow sift at Brenham, Texas and the whether sift at Rosenberg, Texas. Also, Houston hotels, motels, and restaurants were included for observations. All of these observation sites were related in the development of themes for the study. The interviews conducted for the research were primarily conducted at the willing participant's homes. Interviews conducted in the homes of exhibitors and their families allowed for the participants to be comfortable during the interview sessions. Also, visits to some of the places where current exhibitors kept their animals were allowed.

In qualitative studies data analysis occurs by data being broken down, conceptualized, and put back together in new ways. This process of analysis is called coding (Strauss and Corbin, 1990). The goal of coding is to communicate a true and accurate report of the findings (Brink, 1991). Three methods of coding rooted in symbolic interactionism were used in the study. Open, axial, and selective coding were these methods and were used to analyze the interview transcripts, field observations, and historical documents. The coding of data by means of open, axial, and selective coding can be used to conduct thematic analysis (Benner, 1985). Breaking down, examining, conceptualizing, and categorizing data make up the process of open coding. After open coding data were put back together through axial coding by making connections between categories. Axial coding involves utilizing a coding paradigm involving conditions, context, action/interactional strategies and consequences (Strauss and Corbin, 1990). Finally, data were selectively coded by putting data into core categories and developing themes related to the study.

> In order to supply a qualitative study with validity, control measures are built into the study. In this study multiple steps were taken in order to avoid interpretive biases. Proper control methods assure truthfulness of presented results. Triangulation was used in the research study. Triangulation involves the incorporation of multiple data collection methods in order to increase the confidence that may be placed in research findings (Glesne & Peshkin, 1992). This study used in-depth interviews, observations, and review of historical documents to establish three methods for triangulation. Data from the three methods was constantly compared to establish emergent themes and eliminate weak themes. The use of audio tape and videotape was used for credibility and avoidance of researcher biases. Audio tape was used for interviewing and reflective journal entries and it aided to give word by word accounts of what was being said or occurring. The reflective journal helped the researcher more closely evaluate personal biases. Videotape was also used for observation field notes. The final control method was to conduct the study during the same time frame of a similar study. The two researchers compared findings in order to help eliminate each other's personal biases.

Findings

After axial and selective coding of the notes six major themes related to the benefits of competitive livestock showing emerged. Those six themes were (1) social relations, (2) character, (3) family, (4) competition, (5) new cultures and environments, and (6) finance for education.

Development of Social Relations

The most prevalent theme to emerge from the study was development of social relations by 4-H livestock exhibitors. The development of social relations was believed to be a key life skill gained by exhibitors. Social relations were believed to be a main component of developing 4-H youth into productive and contributing members of society. Being able to meet and get along with people is something that applies to life everyday. Learning abilities related to social interactions at a young age can expediate the process of growth toward adulthood. Through livestock shows, exhibitors are not only given a chance to interact with people with a similar interest, but they have an opportunity to make social contacts for their futures. Participants were given the opportunity to establish relationships leading to college and possible future careers. Finally, social interactions that take place at livestock shows meet the innate human need for companionship and camaraderie. The following are quotes from participants that support the theme:

> *Interviewee F: The interactions, the friends they made and we've made. Sure we'd take a grand champion every year, but and I think just part of it is that feeling when you win with a good animal. There's no way to describe the feeling its what keeps you going back also, but I have to say its the interactions with the people and the kids that's the most important.*

> *Interviewee N: I think in regard to life skills, something that we receive, that a young person gets out of there would be number one, friends that one makes. New friends and old ones that you have met down there and you get reacquainted with plus the new friends that you meet every year that you go down there. Then through these friendships, you also have the ability to maybe make some connections down the road and, you know, it's just one of those things where a person grows through the number of friends and what you make of your friends. I think other than friendship, I think the ability to get along with people. But the winning and the ribbons and the placing is important, but I think the friendship and the ties that you have with it is probably the most meaningful to me.*

Development of Character

The development of character was the second theme to emerge from the research study. This theme included several sub-categories such as the development of responsibility, work ethic, decision-making skills, sportsmanship, and exposure to the loss of something cared for such as an animal. Livestock shows are an effective event that can act as a guide to develop these traits in its participants. One of the most obvious developments occurs as responsibility. Livestock projects require time and dedication to be successful. Time is needed to feed, groom, and care for the animals shown. Exhibitors who commit to showing livestock are not just taking on an interest, they are taking on responsibility. Through the time and effort put in with caring for animals, livestock exhibitors can also develop qualities related to work ethic. Junior exhibitors get first hand experience with hard work and how it can bring many rewards. In caring for and showing animals exhibitors also have to make many decisions on their own which can enhance their decision making or thinking skills. Exhibitors are required to make decisions as minor as where to hold an animal or as complex as knowing the health status of the animal. Exhibitors can also acquire sportsmanship abilities in the livestock show ring. Livestock shows are unique in that it is one exhibitor versus many exhibitors. These competitors must be able to accept it when they do not win first and to be humble when they do. The final theme that related to character was exposure to loss of something cared for. The majority of livestock show projects are terminal in nature in that at the end of each livestock show season an exhibitor typically sells his or her animal through the show ring. Exposure to the loss of something cared for can give exhibitors first hand knowledge of loss and how to deal with it. Also, they can learn an important lesson regarding the value of life itself. The following are quotes from participants that support the theme:

> *Interviewee O: I think it teaches a young person responsibility more than anything does. Because, there were many times that I wanted to go out and I wanted to go have a good time with my friends, especially when I got older. I wanted to go party with my high school friends, and I would have to stay home because I had a sow that was farrowing. You know, I had to walk my pig two miles because he was getting a little fat and I had to have him real lean for Houston. You know, when I wanted to sleep in the morning that would make me go out in below freezing weather and chip ice out of the water. It teaches a young person responsibility more than anything does.*
>
> *Interviewee F: Discipline, sportsmanship, work, to get there by working with their animals, I imagine its pretty lonely out there showing an animal, where you are all by yourself and have complete control I think that's a feather in their hat.*

Family

The third theme that emerged was the development of strong family relations by Texas 4-H members who show livestock. Livestock shows are unique in that they are one of the few youth activities that involve the whole family with every aspect of the program. One rarity is how children of various ages are all able to get involved in this program. Livestock shows can bring families together in numerous ways. Parents can help their children immensely with livestock projects. This help can include monetary aid, help with grooming at a show, or just them feeding for their child while he or she is at another school function. Help to their children can be as simple as giving a ride to a younger exhibitor so he or she can go care for his or her project. Through livestock shows, families travel as a family unit that is working toward a common goal and experiencing new and foreign environments as a family. Finally, livestock shows bring in emotions of the entire family. In livestock shows it is unique in how a parent can truly help his or her child. This is one of the few activities where parents can do more than just watch their child participate. Parents are given the opportunity to be a teacher, model, and example for their child to observe and try to develop the same positive traits. The following are quotes from participants that support the theme:

> *Interviewee J: I know that I would not have been successful in the livestock shows if it wasn't for my family, and I don't recommend anyone to try to do it by themselves. I don't think they can do it. I think that even the kids and the young adults that show through FFA chapters, I still think have to have involvement from their family in order to be successful. If anything, it brought us closer together. When we won, we cried together, and when we lost, we cried together. I mean, it was, my parents were extremely supportive and luckily, I grew up in a home that was able to support my dreams and things I wanted to do financially, and that made a big difference as far as my success in the show ring. And there are a lot of young adults that haven't had that opportunity, but they still had the opportunity to go there and experience what it is about, win or lose.*
>
> *Interviewee B: You can't say that being in the wash rack was the enjoyable part, but in a way it was because it was a teamwork effort. Those years, I remember more than any vacations actually. Because we were working towards a common goal. You know, on a vacation, it's just sort of to have fun. And ours was to have fun, but we had that common goal to compete and it didn't matter if we won or lost. We gained something from going. And that was something that we shared as a family. That's the whole thing. I never would have thought of not going and supporting the kids.*
>
> *Interviewee F: The fondest memories, I guess are the family getting together and doing that as a family thing as opposed to some other athletic or school events where its usually one child just involved the whole*

families involved, we like the comradeship with all the people that go with us. and the good times we have with all the other people and their families.

Competition

Exposure to competition was the fourth theme to emerge from coding of data. Competition in livestock exhibitions is believed to be something desired by those who are involved. Livestock competitions are unique in that there can be different levels of success. A majority of youth competitive activities are designed where you only have a first place and everyone else is a non-winner. In livestock shows you have a first and a last, but you can have numerous participants placed in between. Many participants can see winning in this competition in many ways. While every exhibitor desires to win first just making a premium auction may be satisfactory. At major livestock shows exhibitors can place many places away from first place and still feel successful. Competition in livestock shows is also seen as a positive as any one can compete from the ages of nine to nineteen. In livestock shows a child does not have to be the fastest, the strongest, or the most talented. Every child can show an animal effectively. The following are quotes from participants that support the theme:

Interviewee J: Well, I'm sure that many people have many different ideas about whether competition is friend or foe. I personally consider it is friend. I think that in everything that you do in life you compete and there is always a winner and always a loser. There is always someone on top and someone on bottom. I think not only in, I mean, just comparing livestock shows to other activities, one thing that I think really hits home as far as the competition factor is that there is money involved. There is at stake and something on the line. And that makes it even that much more important to be successful. I think that, as far as the competition factor in my experience, that it was something that was always extremely important to me and I tried not to see it as, you know, a win or lose. It was just do the best that I can and kind of go with that and see what happens.

Interviewee O: Competition. I guess it makes you deal with life because competition is out there in anything that you do whether you are competing for a job or competing for a girlfriend, you know, you're competing for anything. I think competition is always out there and it has to, it gets you used to it. It makes you be able to handle pressure, I guess is another thing. It doesn't make you get all mad at a friend, because, like I said, that friend, I showed against friends and there were many times that we were showing and I was either in first hole or maybe fifteenth hole and he was in fourteenth or placed below me or placed above me. And, you know, I had to be able to compete against him real hard in that show arena and try to beat him, but then afterwards, I had to be able to become his friend again.

Interviewee C: I think competition is important because if you are not out competing, if you're not trying your best or if you don't want to succeed, there's no need to be doing something. I mean, even though stock shows are fun and a big part of the importance of stock shows are to meet the people and to reach all those values that you get from stock shows, but it is also important to be competitive. Competitive, that is a value I think, that you gain from stock shows and that you keep all your life. I think everybody wants to win, but at the same time, being competitive also teaches you to be a good loser. If you do not win, I think it is important that you take your loss gracefully and be happy for whoever did win. You know, that's another value that it teaches you. As long as you are competitive, you want to win and you strive harder and you try to reach your goals and achieve your goals, and I think that relates back to anything in life. If you are competitive, you want to be the best that you can in anything and you'll try that much harder for whatever you're doing, and I think that you can kind of pick up that from stock shows and learn how to deal with it and how to handle both winning and losing. You've got to be a good loser, but you've got to be a good winner too. You know, you don't want to win and then go rub it in everybody's face. You want to be humble with your winning and also be gracious with your losses.

New Cultures and Environments

The fifth theme to emerge was exposure to new cultures and environments. Livestock shows are truly special in that they can educate those involved about how not every thing is the same as it is in their hometown. Many exhibitors would have never experienced differences in the world if not for competing in livestock shows. Through seeing and meeting new cultures and being thrown into new environments exhibitors can gain new knowledge and grow as individuals. The following are quotes from participants that support the theme:

Interviewee C: Being from a small town and never going to a big city, being a big city for you, once you go to Houston, you never forget the size of it, you know, the malls and eating and places like that. Just how huge it was, you know, especially for a young kid. You know, it is hard to remember, but I'm sure it is just amazing to see the size, the big city and the big buildings. And I always remember Houston being the largest stock show in the world, and it was always important when you were younger to keep up with your parents or somebody because it was so easy to get lost in the Astrohall. So that will always be a big memory too was the size of the town.

Interviewee A: Then I guess exposure to people from different parts of the state and different cultures. They just need to, they're exposed to people that they don't normally have to be exposed to. And they can see some different things and meet some different people. I remember some kids it would be the first time they'd eaten in a restaurant. And some, eating breakfast in a restaurant, they didn't even know how to order a scrambled egg. I remember a kid one time he was eating at one of those seafood places and they had horseradish on the table. He asked one of the other kids "what is that" and they said "oh, it's some kind of salad dressing" and he took a big old spoonful of it and put it in his mouth. His old eyes went to watering. I thought they'd killed the kid. You know, it just, it was just a phenomenon to them. No, kids are more well-traveled now and they've, either they've traveled by miles or they travel through the TV and it, they probably aren't as easily impressed as those kids were back in the 70s and early 80s. But, it was country coming to town, I guarantee you.

Interviewee E: I remember meeting a lot of neat people. I remember a housekeeper named Opal at the hotel we always stayed at. She was there for like five or six years in a row. She liked us because she had never been around Ag. type people from a small town before. Of course, we thought she was neat because we had never been around many people from a big city.

Finance for Education

The final theme that emerged after selective coding was financing for education for exhibitors. While livestock shows are no way to get rich, they can provide money for a child's future education. As some studies have indicated a majority of livestock exhibitors do use their winnings for education. This financial ability can only help participants as they try and continue their education after high school. Through education an individual can become more open-minded and grow as a person to become a contributing member of society. The following are quotes from participants that support the theme:

Interviewee C: Just important things that help me want to be the best that I could and it opened a lot of doors for me. It opened doors at college and it also opened doors here at University, as far as people, administration and people like that. If it wouldn't have been for stock shows, they probably would never have heard of me and I probably would never have heard of them. It just kind of opened those doors to where I could get in touch with them and allow them to help me as far as getting my education is concerned. You know and scholarships and things of those matters. And also, doing good at stock shows, all that money allows you to save that money and be able to afford to go to college.

Interviewee G: It's not monetary for us but yet we've helped the kids and had them put there checks in there savings account and that is how the girls have paid there way to college also, so it's a way of saving over the years, our daughter went 4 years of college on her earnings.

Interviewee L: I do think that they put a lot of money back into the education for the Ag kids, and I think that's great.

Recommendations

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

The Texas 4-H Program should continue to utilize competitive livestock shows as a means of educating its youth members. Although this study has validated, through qualitative measures, the benefits of competitive livestock exhibition for this group, additional studies need to be replicated with a larger population.

Competitive livestock exhibitions should continue to be offered at the local, county, regional, and state level for Texas 4-H and FFA members. Each level of livestock shows offers educational opportunities for participants and their families.

As there have been many benefits of livestock shows validated in this study, the Texas 4-H program should publicize and promote these livestock projects through educational journals, newspaper articles, and through additional research as educational for 4-H members and their families. 4-H leaders and livestock show officials should consider publicizing the perceived benefits of competitive livestock shows. These benefits should be listed in the following recommended order: (1) social relations, (2) character, (3) family, (4) exposure to competition, (5) exposure to cultures, and (6) finance for education.

As livestock shows have been proven as educational for 4-H participants, more 4-H leader training should be conducted related to competitive livestock shows.

Due to the homogeneous make-up of the majority of families involved in the livestock show program, the Texas 4-H program should do more to encourage more diverse families involvement. More diverse families would include more single parent families, more minority families, and more urban families.

More monetary advancement opportunities should be established specifically for livestock exhibitors. Participants of this study indicated use of their monetary gains for furthered education.

In order to support the emergent themes of this study, similar qualitative and quantitative studies should be conducted. Suggested topics are: (a) a factor analysis of the perceived benefits identified by various groups to determine if the same themes emerge as quantitative factors, (b) a study to determine how individuals perceive how these particular benefits of livestock shows effect academic and/or career success, (c) a study on the demographics of the participants at the Houston Livestock Show and Rodeo and how they relate to academic and/or career success compared to non-exhibitors, and (d) a study which examines the effects and benefits gained from participating as volunteers at livestock exhibitions such as the Houston Livestock Show and Rodeo.

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PROBLEMS FACED BY BEGINNING AGRICULTURAL TEACHERS PREPARING FOR LEADERSHIP DEVELOPMENT EVENTS AND CAREER DEVELOPMENTS

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Abstract

The purpose of this descriptive study was to determine the preservice needs of beginning agricultural science teachers in Texas in regard to preparing for career development events and leadership development events. Perceptions of beginning agriscience teachers were used to determine these pre-service needs. The data was collected using a mailed questionnaire. The subjects of this study were a random selection of the beginning to fifth year agriscience teachers in Texas according to a list from the Vocational Agricultural Teachers Association of Texas (VATAT). The population consisted of 285 beginning teachers. One hundred forty-two beginning teachers were chosen to participate in the study. Beginning agriscience teachers rated chapter conducting highest of the LDEs in terms of importance, competence and familiarity. Ag. Issues Forum is the LDE which most beginning agriscience place the least amount of importance as well as having the least competence and familiarity. Beginning agriscience teachers consider livestock judging to be the most popular CDE in Texas. Depending on geographic areas in which beginning teachers had completed either high school or university training, forestry and cotton classing are the events which are considered least in terms of familiarity, importance and competence. No significant relationship occurred between familiarity with events and perceived importance of events by respondents.

Introduction and Theoretical Framework

Teachers of agricultural sciences have always had a need for inservice education and will always have this need (Garton & Chung, 1996, p. 52). These programs have been aimed toward assisting agricultural science teachers, especially beginning teachers, to learn the knowledge and skills essential to carry out their professional duties (Barrick, Ladewig, & Hedges, 1983; Birkenholz & Harbstreit, 1987; Nesbitt & Mundt, 1993). Many of these teacher inservice programs were developed based on various previous research projects by Hillison (1977); Shippy (1981); Hachmeister (1981); Claycomb and Petty (1983); Veeman (1984); Birkenholz and Harbstreit (1987); and Valli (1992) that identified the needs of beginning teachers (Garton & Chung, 1996, p. 52).

One major responsibility of teachers of agricultural science is to serve as advisors of local FFA chapters. "The primary goal of the FFA is to make a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education" (Vaughn, 1999, p.2). Osborne and Witt (1985) suggest that teachers should accept contest participation as part of their job, solely for the tremendous benefits received by the students. According to Bowen and Doerfert (1989) most State FFA award winners from 1984-1986 aspired to gain employment in some professional field as a career. "As student and community needs differ from community to community, the need to produce agricultural leaders is a goal of every instructor" (Gartin, 1985 p.11). However, while FFA competition and events utilize active student involvement for quality enhancement of local FFA chapters, many teachers will not enjoy their benefits "because they lack the necessary technical and/or pedagogical competencies required to train the contestants" (Schumann, 1977 p. 65).

Purpose and Research Objectives

Research has shown that Garton and Chung's 1996 study on the inservice needs of beginning teachers of agriculture was a viable study, and the researchers suggested the study be conducted in other states to enhance the generalizability of the study. The purpose of this study was to determine the preservice needs of beginning agricultural science teachers in Texas, in regard to preparing for career development events (CDE) and leadership development events (LDE). Perceptions of beginning teachers were used to determine these pre-service needs. The specific overall objectives of this study were to:

1. Describe the characteristics of beginning agriscience teachers in regard to the following variables: (a) number of years teaching agriscience; (b) number of years at current school; (c) number of students enrolled in program; (d) university from which bachelor degree was earned; (e) university from which master degree was earned, if applicable; (f) FFA area where respondent attended high school, if applicable.
2. Describe the self-perceived preservice needs of beginning agriscience teachers in relation to training teams for leadership development events and career development events.
3. Determine the perceived abilities of beginning agriscience teachers to train teams in the leadership development events and career development events.

Methods and Procedures

This study was descriptive in nature. The data was collected using a mailed questionnaire patterned after the instrument used by Garton and Chung (1996). The questionnaire was mailed according to suggestions of Dillman's (1978) Total Design Method with a cover letter stating the purpose of the study and instructions for completing the questionnaire. A self-addressed, stamped envelope was included in the package for the convenience of the respondents. The questionnaire was sent to agriscience teachers in the state of Texas with one to five years of teaching experience.

Subject Selection

The subjects of this study were a random selection of the beginning to fifth year agriscience teachers in Texas according to a list from the Vocational Agricultural Teachers Association of Texas (VATAT). The population consisted of 285 beginning teachers. One hundred forty-two beginning teachers were chosen to participate in the study. Errors could exist due to the following factors: (a) teachers hired by districts after the latest VATAT membership list was comprised; (b) new teachers to Texas who have taught for more years outside of Texas; or (c) new teachers choosing not to join the VATAT. Procedures for subject selection were followed according to Dillman (1978).

Instrumentation

The survey instrument used to collect data was a questionnaire used to determine the level of knowledge possessed by the participants of the LDEs and the CDEs. The researchers following an extensive review of the related literature, developed the questionnaire.

Following extensive modifications and input from a panel of experts in the Department of Agricultural Education and Communications at Texas Tech University, a pilot test was conducted using student teachers from Texas Tech University to determine reliability and validity of the instrument. Demographic information was collected to determine independent variables. A rating system was developed to determine respondents' opinions of the importance of each event, and their own perceived abilities regarding training for the events.

More independent variables were established by the respondents' personal past participation in the events, as well as their high school and university exposure to these events. Additionally, open-ended questions were also included to determine other perceived strengths or weaknesses of the respondents. The questionnaire was coded to identify non-responding participants.

The instrument was printed in booklet form on white paper and included a photocopy of the FFA emblem and the title of the instrument on the front cover and a thank you reminder with the return address on the back cover and was stapled along the spine.

Data Collection

In mid-spring a cover letter, instrument, and self-addressed stamped envelope were sent to the sample of agriscience teachers. The letter explained the purposes and objectives of the study and asked the agriscience teachers to participate. The letter was printed on letterhead from the Department of Agricultural Education & Communications at Texas Tech University and the researcher and the committee chairperson individually signed each one. The questionnaire and letter were mailed in a 61/2" X 91/2" envelope so that the questionnaire would not need to be folded.

Two weeks later, a reminder postcard was mailed to all members of the sample group whose instrument had not been returned. This served as a reminder of the due date to return the questionnaire. The postcard was printed on white cardstock and included a graphic of the FFA emblem as a tieback to the study. The postcard did not require any action from the respondents.

A second questionnaire, and the same original cover letter was sent two weeks later to non-respondents. The letter was again printed on department letterhead and bore the same signatures as the original letter.

In order to increase response rates, telephone surveys were conducted May 25, 1999-May 28, 1999.

The data collection phase was concluded on May 30, 1999. Any completed questionnaires received after this date were not considered in the data. All agriscience teachers who had not sent their questionnaires by this date were considered non-respondents.

Seventy-five usable instruments were received. This produced a response rate of 52.8%. Realizing this response rate was comparatively low, Goldhor's (1974) suggestion was implemented. According to Goldhor, early responses were compared to late responses. Yielding no significant differences between the early and late responses allowed the research to assume there would be no significant differences between those that responded and those that did not respond.

Findings and Discussion

Characteristics of Respondents

The mean number of years teaching of respondents was three years, and they had been at their respective schools for an average of 2.6 years. Mean enrollment in local programs of the respondents was 126.3 students. Almost all (95.9%) of the respondents received their bachelor degree from a Texas university and while a majority (74.7%) of the respondents indicated they did not have a master degree, of those that did, 36.8% indicated that their master degrees had come from Texas Tech. Thirteen of the respondents indicated they had attended high school in Area X in Texas.

Importance of Events

Teachers were given lists of the various events available for participation in Texas FFA during the school year and asked to indicate their perceived level of importance of the events based on a scale of 5 = very important and 1 = not important. There was an overwhelming (3.9 or higher) indication (Table 1) that all of the LDEs were of high importance. LDEs receiving importance ratings of 4 or higher were Chapter Conducting (4.6), FFA Skills (4.3) and Public Relations (4.3). Ag. Issues Forum, FFA Creed, FFA Quiz, and FFA Radio all received mean importance ratings of 3.9.

Table 1.
Importance of LDEs

Name of LDE	M	SD
Ag. Issues Forum	3.91	.81
Chapter Conducting	4.59	.55
FFA Creed	3.93	.86
FFA Quiz	3.92	.88
FFA Radio	3.89	.82
FFA Skills	4.27	.79
Public Relations	4.32	.78

Note: Higher mean indicates greater perceived importance

The five CDEs (Table 2) receiving ratings of 4.0 or higher were: Livestock Judging (4.4), Ag. Mechanics (4.3), Meats Judging (4.2), Farm Business Management (4.1), and Land Judging (4.0). Horse Judging, Horticulture, Poultry Judging, Range & Pasture Judging, Range & Pasture Plant ID, and Tractor Mechanics all earned importance ratings of 3.9. Ag. Sales and Dairy Cattle Judging received 3.8 importance ratings from the respondents. Other CDEs ranked in order of importance were Entomology (3.5), Crops Judging (3.4), Dairy Foods (3.4), Forestry (3.2), Cotton Classing (3.1), and Wool Judging (3.1).

Table 2.
Importance Of CDEs

Name of CDE	M	SD
Ag. Mechanics	4.34	.77
Ag. Sales	3.85	.88
Cotton Classing	3.07	1.10
Crops Judging	3.43	.93
Dairy Cattle Judging	3.76	.86
Dairy Foods	3.38	.99
Entomology	3.51	1.04
Farm Business Management	4.08	.85
Forestry	3.17	1.23
Horse Judging	3.85	.98
Horticulture	3.93	.84
Land Judging	4.04	.89
Livestock Judging	4.41	.74
Meats Judging	4.19	.77
Poultry Judging	3.87	.91
Range & Pasture Judging	3.93	.94
Range & Pasture Plant ID	3.93	.97
Tractor Mechanics	3.93	.93
Wool Judging	3.10	1.03

Competence of Events

Respondents were given the same lists of events to indicate their perceived level of competence (Table 3) in training for the various events based on 5 = very competent and 1 = not competent. Respondents indicated a high level (3.5 or higher) of confidence on five of the seven LDEs: Chapter Conducting (4.1), FFA Creed (4.1) FFA Quiz (3.9) FFA Skills (3.8), and FFA Radio (3.6). The other LDEs in order of rating were: Public Relations (3.4), and Ag. Issues Forum (2.9).

Table 3
Competence of LDEs

Name of LDE	M	SD
Ag. Issues Forum	2.95	1.13
Chapter Conducting	4.05	.79
FFA Creed	4.05	.74
FFA Quiz	3.91	.80
FFA Radio	3.55	.92
FFA Skills	3.76	.92
Public Relations	3.35	1.15

Note: Higher mean indicates greater perceived competence

Only two of the nineteen CDEs (Table 4) rated 3.5 or higher in confidence levels: Livestock Judging (4.1) and Horse Judging (3.5). Rating 3.0 or higher were Ag. Mechanics (3.3), Dairy Cattle Judging (3.3) Land Judging (3.2), Meats Judging (3.2), Horticulture (3.0), and Poultry Judging (3.0). The remainder of the CDEs and their competence ratings in order are Farm Business Management (2.9), Range & Pasture Judging (2.9), Range & Pasture Plant ID (2.9), Ag. Sales (2.8), Dairy Foods (2.6), Tractor Mechanics (2.6), Crops Judging (2.4), Entomology (2.4), Cotton Classing (2.0), Forestry (2.0), and Wool Judging (1.9).

Table 4.
Competence of CDEs

Name of CDE	M	SD
Ag. Mechanics	3.28	1.054
Ag. Sales	2.80	1.135
Cotton Classing	1.99	1.133
Crops Judging	2.36	1.170
Dairy Cattle Judging	3.33	.991
Dairy Foods	2.61	.985
Entomology	2.37	1.183
Farm Business Management	2.87	1.143
Forestry	1.96	1.140
Horse Judging	3.53	1.223
Horticulture	2.99	1.168
Land Judging	3.16	1.151
Livestock Judging	4.11	.894
Meats Judging	3.20	1.344
Poultry Judging	3.00	1.147
Range & Pasture Judging	2.91	1.254
Range & Pasture Plant ID	2.88	1.241
Tractor Mechanics	2.64	1.165
Wool Judging	1.91	1.075

Familiarity with Events

Respondents were given the same lists of events, but this time were asked to indicate their level of familiarity with the events (based on 5 = very familiar and 1 = not familiar).

Most (six of seven) of the LDEs earned familiarity ratings of 3.5 or higher: Chapter Conducting (4.4), FFA Creed (4.3), FFA Quiz (4.1), FFA Skills (4.1), FFA Radio (4.0), and Public Relations (3.5). Public Relations (2.9) rated lowest in familiarity.

Three CDEs earned familiarity ratings higher than 3.5: Livestock Judging (4.5), Horse Judging (3.8), and Dairy Cattle Judging (3.7). The remainder of the events in order of familiarity ratings were: Ag. Mechanics (3.4), Meats Judging (3.4), Land Judging (3.3), Poultry Judging (3.2), Dairy Foods (3.1), Range & Pasture Plant ID (2.9), Horticulture (2.8), Range & Pasture Judging (2.8), Tractor Mechanics (2.8), Farm Business Management (2.7), Ag. Sales (2.6), Entomology (2.3), Crops Judging (2.2), Cotton Classing (2.1), Wool Judging (2.0), and Forestry (1.9).

Past Participation in Events

Respondents were asked to indicate whether they had participated in the various events. Yes/No questions were used to determine the responses.

Five of the seven LDEs had participation over 50%. The LDEs listed from highest past participation to lowest were FFA Creed (83.8%), Chapter Conducting (74.3%), FFA Radio (73.6%), FFA Quiz (71.2%), FFA Skills (58.1%), Public Relations (41.1%), and Ag. Issues Forum (27.4%).

Only four CDEs had participation over 50 percent: Livestock Judging (92.0%), Horse Judging (73.3%), Dairy Cattle Judging (65.3%), and Land Judging (50.7%). The remainder of CDEs in order of participation ranking were Poultry Judging (48.0%), Dairy Foods (38.7%), Meats Judging (38.7%), Ag. Mechanics (37.3%), Range & Pasture Plant ID (32.0%), Range & Pasture Judging (26.7%), Horticulture (25.3%), Farm Business Management (21.3%), Wool Judging (16.2%), Cotton Classing (14.7%), Forestry (14.7%), Ag. Sales (13.3%), Entomology (13.3%), Crops Judging (10.7%), and Tractor Mechanics (10.7%).

High School Exposure to Events

Respondents were asked to indicate the amount of high school exposure they had to the various events. They were given a scale of zero to four years they had been exposed to the events.

Ag. Issues Forum (2.4) and Chapter Conducting (2.4) rated highest in high school exposure, followed by FFA Creed (1.4), FFA Skills (1.2), FFA Quiz (1.1), FFA Radio (.93), and Public Relations (.35).

Only three CDEs showed high school exposure rates over one year: Livestock Judging (2.2), Dairy Cattle Judging (1.3), and Ag. Mechanics (1.2). Following these are Horse Judging (.99), Land Judging (.77), Poultry Judging (.60), Range & Pasture Plant ID (.51), Range & Pasture Judging (.48), Dairy Foods (.42), Farm Business Management (.39), Tractor Mechanics (.36), Ag. Sales (.34), Crops Judging (.33), Horticulture (.25), Forestry (.21), Wool Judging (.21), Entomology (.14), and Cotton Classing (.11).

University Exposure to Events

Given a similar scale, respondents were asked to indicate the number of university semesters they had been exposed to the various events.

Chapter Conducting (1.5) was indicated as the most exposed LDE at the university level followed by FFA Skills (.83) FFA Creed (.74), FFA Quiz (.73), FFA Radio (.65), Public Relations (.61), and Ag. Issues Forum (.43).

Livestock Judging (1.7), and by Ag. Mechanics (1.5) were shown to be the most exposed CDEs on the university level. Following these events in order were Meats Judging (.96), Horse Judging (.90), Dairy Cattle Judging (.85), Horticulture (.81), Poultry Judging (.75), Land Judging (.70), Range & Pasture Judging (.67), Range & Pasture Plant ID (.67), Farm Business Management (.66), Dairy Foods (.60), Tractor Mechanics (.56), Ag. Sales (.55), Entomology (.49), Crops Judging (.36), Wool Judging (.36), Forestry (.29), Cotton Classing (.16).

Relationships Between Teacher Background and Perceptionsof Teachers Toward Events

Statistical analyses were used on various teacher demographics: university of bachelor degree, university of master degree, area where respondent graduated high school; to compare them with respondents views of importance, competence, and familiarity to the events. Seventeen significant relationships were discovered.

Eleven of the relationships involved the FFA area where the respondents attended high school. FFA Area of high school seemed to affect competence of FFA Radio and Forestry; importance of Horticulture, Dairy Cattle Judging, Forestry, Poultry Judging, Range & Pasture Judging, Range & Pasture Plant ID; familiarity to Cotton Classing, Crops Judging, and Forestry. University where the respondents received their bachelor degrees seemed to cause four significant relationships: familiarity to Ag. Issues Forum, cotton classing, Forestry; and importance of crops

judging. University where respondents earned their master degrees seemed cause significant relationships in competence of Tractor Mechanics and familiarity with Forestry.

Conclusions

The following conclusions are based on interpretations of data presented in the study and are restricted only to the population surveyed. They are also limited to the limitations found in Chapter One of the study. The conclusions are as follows:

1. The average beginning agriscience teacher in Texas has been teaching agriscience for three years, 2.6 of these years have been in the schools where they are currently working.
2. Texas Tech University has placed more Texas agriscience teachers in the past five years than any other university in Texas. More master degrees have been earned by beginning agriscience teachers from Texas Tech in the past five years than from any other Texas university.
3. The average agriscience program with beginning teachers in Texas has an enrollment of 126.3 students, and most are instructed by teachers that attended high school in Texas FFA Area X.
4. Beginning agriscience teachers rate Chapter Conducting highest of the LDEs in terms of importance, competence and familiarity. Ag. Issues Forum is the LDE with which most beginning agriscience teacher place the least amount of importance as well as having the least competence and familiarity.
5. Beginning agriscience teachers consider Livestock Judging to be the most popular CDE in Texas. Depending on geographic areas in which beginning teachers had completed either high school or university training, Forestry and Cotton Classing are the events which are considered least in terms of familiarity, importance and competence.
6. No significant relationship occurred between familiarity with events and perceived importance of events by respondents.

Recommendations

The following recommendations are made by the researchers as a result of having conducted this study.

1. Teacher educator programs in agricultural education should implement classes specifically designed to address training for and participation in LDEs and CDEs in order to better prepare beginning agriscience teachers.
2. Agriscience teachers have more responsibilities in terms of the number of events offered compared to the number of agriscience teachers in average programs. Teacher educator programs in agricultural education should appropriate time during student teaching blocks to prepare them for all aspects of their career duties as they begin their student teaching.
3. Agricultural education teacher education programs should spend an equal amount of time on each of the LDEs and CDEs regardless of location. This will better prepare agriscience teachers for employment regardless of the location they go to teach.
4. Teacher education curriculum for agriscience teachers should contain classes which include information about the CDEs.
5. Further studies should be conducted to determine the reason why the two least populated areas in terms of state FFA student membership produced most of the beginning agriscience teachers in Texas.
6. Studies similar to this should be conducted in other areas of the agriscience teachers' responsibilities, i.e., SAEs, record books, livestock shows, etc. in order to verify the findings of this study.
7. Studies similar to this should be conducted in other states in order to verify the findings of this study.

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DIMENSIONS OF CRITICAL THINKING

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Abstract

Critical thinking is a skill that most faculty members would readily agree is important for students to develop. Unfortunately, many of our students have poorly developed critical thinking skills (Rudd, Baker, Hoover, Gregg, 1999). Perhaps the problem is rooted in us, the faculty. Do faculty members understand the concept of critical thinking well enough to teach students to think critically in and about the discipline being studied? This paper is an attempt to define critical thinking for college of agriculture faculty members and to offer a primer for discussion of strategies to teach students to think critically in agricultural disciplines.

Teaching students to remember factual information and return it in the form of an examination is the prevalent teaching mode employed in secondary and post-secondary institutions today. Teaching thinking skills is a difficult and much different endeavor. Teaching to promote thinking takes more time to prepare, is difficult to plan, and limits the amount of content "taught." Teachers can no longer be information givers. Students must learn thinking and reasoning skills to reach their fullest potential in today's society (Meyers, 1986).

The more information is better attitude unfortunately prevails in modern education. That is unfortunate considering that factual matter has a relatively short life span with students (Terezini, Springer, Pascarella, & Nora, 1993). When coupled with the fact that information learned today quickly becomes outdated, is it any wonder that our students struggle when they reach the work place? Good thinking skills will not develop on their own, they must be taught (Beyer, 1987). Teaching students to think must be a priority of our schools today.

The term critical thinking is common in educational, psychological, and philosophical, circles today. Employers, parents, administrators, and students themselves want critical thinking skills developed in today's graduate. Developing critical thinking skills is not a new idea. Osborne (1932 p.402) stated that "…it is assumed that development of thought power is one of the major aims of education." Dressel and Mayhew (1954) believed that educational institutions were responsible for teaching students to go beyond the simple mental activities of recall and restatement of ideas and facts to the higher level skills and habits involved in critical thinking.

Sutton and de Oliveira (1995) asserted that although students complete basic courses they have only a superficial understanding of what they have learned. In fact, few students are taught the skills needed to examine principles, values and facts.

Purpose / Methods / Procedures

Critical thinking skills in agricultural audiences have not been widely studied. Rudd, Baker, Hoover, & Gregg (1999) found that a disproportionate number of students sampled in the College of Agriculture at the University of Florida had a low disposition for critical thinking (when compared to the national data set). In the same study (Rudd et.al., 1999) found no correlation between learning style and critical thinking (as measured by the California Critical Thinking Disposition Instrument). Torres & Cano (1995) found a moderately positive relationship between students' ability to think critically (as determined by the Developing Cognitive Abilities Test) and students' learning style. In a study conducted by Whittington, Stup, Bish and Allen (1997), a relationship between the level of cognitive thinking required on the part of students and critical thinking was hypothesized. Although Torres and Cano proposed a conceptual framework for addressing cognitive ability, and Whittington et. al. postulated a relationship between the cognitive level of instruction and critical thinking, a working definition of "critical thinking" for agricultural students remains elusive.

The purpose of this study was to clarify the concept of critical thinking for agricultural education audiences. In an effort to clarify the concept of critical thinking for agricultural educators, the researchers conducted an extensive literature review within the context of agricultural education, philosophy, and psychology. The authors have attempted in the descriptive and interpretive discussion that follows to present multiple views of critical thinking and to propose critical thinking dimensions, drawn from the literature, that can be utilized in agricultural education.

Findings

Critical Thinking Defined

To date, much work has been completed in multiple disciplines in the name of critical thinking A great deal of this work not only leaves one wondering how it is measured, but also leaves one groping for a clear definition of critical thinking. Paul (1995) wrote that the "master of critical thinking" uses a set of intellectual standards while thinking. These standards guide the thinking process as well as help individuals heighten their ability to think critically. Thinking about thinking for the purpose of improving the thought process is at the heart of critical thinking (Paul, 1995).

Halpern (1996 p.5) defined critical thinking as "…the use of cognitive skills or strategies that increase the probability of a desirable outcome." Other definitions include: the formation of logical inferences (Simon & Kaplan, 1989), developing careful and logical reasoning (Stahl & Stahl, 1991), deciding what action to take or what to believe through reasonable reflective thinking (Ennis, 1991), and purposeful determination of whether to accept, reject, or suspend judgement (Moore & Parker, 1994). Burden and Byrd (1994) categorize critical thinking as a higher-order thinking activity that requires a set of cognitive skills. In a comprehensive attempt to define critical thinking, Pascarella and Terezini (1991) compiled the following,

> critical thinking has been defined and measured in a number of ways but typically involves the individual's ability to do some or all of the following: identify central issues and assumptions in an argument, recognize important relationships, make correct inferences from data, deduce conclusions from information or data provided, interpret whether conclusions are warranted on the basis of the data given, and evaluate evidence or authority." (p. 118).

Crunkilton (1996) presented a pragmatic approach to promoting critical thinking in students through conditions necessary for thinking. The first condition is having something to think about such as a person, an object, a situation, problem or process. Crunkilton's second condition is having something to think with, such as background knowledge and resources (maps, charts, notes, computers). The third condition is having ways in which to think. In other words, students need thinking structures to guide the thinking process. Examples include comparing, estimating, evaluating, problem solving and interpreting. The final condition is a reason to think. Reasons to think vary from thinking to resolve a controversy, to solving a problem, to satisfying an interest, or completing an assigned task.

Some clarity in defining critical thinking was achieved when a group of leading researchers with expertise in the field was asked to define critical thinking through a Delphi study in 1990 (Facione). They hypothesized that there is a set of intellectual virtues or habits of mind that reflect one's disposition to think critically. These virtues are identified below in the Delphi consensus statement (page 2):

> The ideal critical thinker is habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgements, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit.

Critical Thinking Traits and Processes

In a 1987 comprehensive review of existing literature, Beyer posited that critical thinking requires a set of skills and approaches to be effective. A delineation of cognitive operations was offered by Beyer (1987) that included thinking strategies, critical thinking skills, and micro-thinking skills. His thinking strategies included problem solving, decision making, and conceptualizing. Examples of micro-thinking skills included recall, interpretation, application, synthesis, evaluation, reasoning, and extrapolation. Beyer's proposed the following as critical thinking skills:

Distinguishing between verifiable facts and value claims

1. Distinguishing relevant from irrelevant information, claims, and reasons;
2. Determining factual accuracy of a statement;
3. Determining credibility of a source;
4. Identifying ambiguous claims or arguments;
5. Identifying unstated assumptions;
6. Detecting bias;
7. Identifying logical fallacies;
8. Recognizing logical inconsistencies in a line of reasoning;
9. Determining the strength of an argument or claim.

According to Facione (1990), critical thinkers also possess a set of affective dispositions that enable them to seek to address situations that require critical thinking. Although a person can have the cognitive skills to think critically, they are more effective thinkers if they exhibit the affective dispositions listed in Table 1.

In an effort to clarify the process of critical thinking, Paul (1995) wrote that critical thinking is a unique and purposeful form of thinking that is practiced systematically and purposefully. The thinker imposes standards and criteria on the thinking process and uses them to construct thinking. Table 2 summarizes Paul's operational definition of critical thinking.

Paul (1995) further refined critical thinking by identifying three thought traits and / or processes possessed by the critical thinker. They are elements of reasoning, traits of reasoning, and reasoning standards.

Elements of reasoning consist of seven components that help guide the reasoning process. These components include the purpose of the thinking or the question at hand, information and or facts about the question, assumptions made about the question, interpretation of the facts and data collected, theories and concepts related to the question, and inclusion of other points of view. Finally, an assessment of the conclusions is drawn with emphasis on implications and consequences of the decisions reached as a result of the thinking process (Figure 1).

Table 1
Affective Dispositions of Critical Thinking

Approaches to Life in General

- Inquisitiveness with regard to a wide range of issues
- Concern to become and remain well-informed
- Alertness to opportunities to use critical thinking
- Trust in the process of reasoned inquiry
- Self-confidence in one's ability to reason
- Open-mindedness regarding divergent views
- Flexibility in considering alternatives and opinions
- Understanding of the opinions of others
- Fair-mindedness in appraising reasoning
- Honesty in facing one's own biases, prejudices, stereotypes, egocentric and sociocentric tendencies
- Prudence in suspending, making or altering judgements
- Willingness to reconsider and revise views where honest reflection suggests change is warranted.

Approaches to Specific Issues, Questions, or Problems

- Clarity in stating the question or concern
- Orderliness in working with complexity
- Diligence in seeking relevant information
- Reasonableness in selecting and applying criteria
- Care in focusing attention on the concern at hand
- Persistence though difficulties are encountered
- Precision to the degree permitted by the subject and the circumstances

(Facione, 1990)

Table 2
What is Critical Thinking

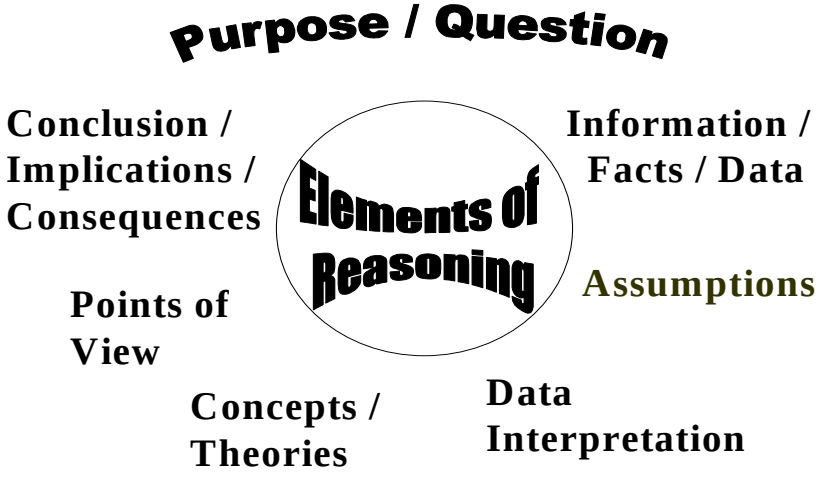
A unique kind of purposeful thinking	In any subject area or topic whether academic or practical, requiring intellectual training for the mind, akin to physical training for the body
In which the thinker systematically and habitually	Actively develops traits such as intellectual integrity, intellectual humility, fairmindedness, intellectual empathy, and intellectual courage.
Imposes criteria and intellectual standards upon the thinking	Identifies the criteria of solid reasoning, such as precision, relevance, depth, accuracy, sufficiency, and establishes clear standards by which the effectiveness of the thinking will be assessed.
Taking charge of the construction of thinking	Awareness of elements of thought such as assumptions and point of view that are present in all well-reasoned thinking, A conscious, active, and disciplined effort to address each element is displayed.
Guiding the construction of the thinking according to the standards	Continually assessing the course of construction during the process. Adjusting, adapting, and improving using criteria and standards.
Assessing the effectiveness of the thinking according to the purpose, criteria, and standards	Deliberately assessing the thinking to determine its strengths and limitations according to the defining purpose, criteria, and standards. Studying the implications for further thinking and improvement.

Paul (1995, p21).

Traits of critical thinkers include independent thinking, intellectual empathy, intellectual humility, courage, integrity, perseverance, intellectual curiosity, faith in reason, intellectual civility, and intellectual responsibility. These traits are not only present in critical thinkers, they are consciously utilized to guide the thinking process (Paul, 1995).

Standards that guide thinking include clarity in the thought process; accurate, precise, and relevant thinking, utilizing information that is directly related to the thinking situation; deep thinking; and broad thinking. These standards can guide the critical thinker to a thinking product or decision that is not clouded by irrelevant information and has been investigated fully.

Figure 1. Elements of Reasoning



Although thinking critically utilizes higher-order thinking, critical thinking and higher-order thinking are not equivalent terms. Critical thinking is not a "catch-all" category for higher-order thinking. It is one of a family of closely related forms of higher-order thinking. Others include problem solving, creative thinking, and decision-making (Facione, 1990). The skills and sub-skills identified by the Delphi group are listed in Table 3.

Facione (1990) used the information from the Delphi study to identify seven constructs of critical thinking. These constructs include analyticity, self-confidence, inquisitiveness, maturity, open-mindedness, systematicity, and truth-seeking.

Analyticity targets the disposition of being alert to potentially problematic situations, anticipating possible results or consequences, and prizing the application of reason and the use of evidence, even if the problem at hand turns out to be challenging or difficult. The analytically inclined person is alert to potential difficulties, either conceptual or behavioral, and consistently looks to anticipatory intervention, reason giving, and fact-finding as effective ways to resolve matters.

Table 3
Consensus List of Critical Thinking Cognitive Skills and Sub-Skills

Skill	Sub-Skill
Interpretation	Categorization
	Decoding Significance
	Clarifying Meaning
Analysis	Examining Ideas
	Identifying Arguments
	Analyzing Arguments
Evaluation	Assessing Claims
	Assessing Arguments
Inference	Querying Evidence
	Conjecturing Alternatives
	Drawing Conclusions
Explanation	Stating Results
	Justifying Procedures
	Presenting Arguments
Self-Regulation	Self-Examination
	Self-Correction

(Facione, 1990)

Self-confidence refers to the level of trust one places in one's own reasoning process. Critically thinking self-confident persons trust themselves to make good judgements and believe that others trust them as well, since they believe that others look to them to resolve problems, decide what to do, and bring reasonable closure to inquiry.

The inquisitive person is one who values being well informed, wants to know how things work, and values learning even if the immediate payoff is not directly evident. This person seeks knowledge without provocation for the intrinsic benefit of knowing.

Maturity addresses cognitive maturity and epistemic development. Mature thinkers are disposed to approach problems, inquiry, and decision making with a sense that some problems are ill-structured, some situations have more than one plausible option. Mature thinkers also realize that judgements based on standards, contexts, and evidence often must be made without having the benefit of knowing all information about the situation.

Open-mindedness is a construct that targets the disposition of being tolerant of divergent views with sensitivity to the possibility of one's own bias. The open-minded person respects the rights of others to differing opinions.

Systematicity targets the disposition to being organized, orderly, focused, and diligent in inquiry. No particular kind of organization (i.e. linear or nonlinear) is given priority. The systematic person strives to approach specific issues, questions or problems in an orderly, focused, and diligent way.

Truth-seeking thinkers are those eager to seek the truth, who are courageous about asking questions, and honest and objective about pursuing inquiry even if the findings do not support one's interests or one's preconceived opinions. The truth-seeker would rather pursue the truth than win the argument.

Results / Conclusions / Implications

Individuals who can think critically are invaluable as employees, leaders, and members of society. Increasing the number and quality of critical thinkers in agriculture will be a great asset to the industry. Unfortunately, our discipline lacks a cohesive definition of critical thinking. How can we teach our students to think critically if we cannot define critical thinking?

Critical thinking is a broader concept than has been addressed in the agricultural education literature to date. Critical thinking is not equivalent to problem solving or cognition. Professionals in agricultural education need to look outside of the profession to begin to learn about this complex concept.

The authors hope that this paper will lead to additional scholarly inquiry in and about critical thinking with agricultural audiences. If the profession wishes to move forward with scholarly inquiry in and about critical thinking, we must reach agreement on a definition for critical thinking. The authors would propose the following definition, based on this literature review, as a starting point for critical thinking discussion:

Critical thinking is a reasoned, purposive, and introspective approach to solving problems or addressing questions, with incomplete evidence and information, and for which an incontrovertible solution is unlikely.

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PART-TIME FARMING ACTIVITIES CONDUCTED BY TEACHERS OF YOUNG FARMERS IN GEORGIA

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Abstract

This descriptive, correlational study involved teachers, supervisors and chapter presidents in the Georgia Young Farmer program. The primary purpose was to determine the nature and extent of part-time farming activities conducted by teachers of Young Farmers and the perceived effect these activities had on Young Farmer programs. A mailed questionnaire was used to collect data. The instrument yielded a .81 reliability using Cronbach's Alpha. A comparison of early and late respondents found no significant differences. Teachers of Young Farmers in Georgia were married, averaged 42 years of age, and had a masters degree. Chapter presidents averaged 34 years of age, were married, had high school as their highest educational level, and had farmed about 16 years. Vocational supervisors were 49 years of age, married, and had a Specialist degree; only one-third had farming experience. Over one-half of the teachers were actively farming, with a majority having livestock and crops. Nine out of ten indicated that they intended to continue. Emotional, financial and educational reasons were given for continuing to farm. Over 80 per cent of the supervisors and chapter presidents whose teachers engaged in part-time farming indicated that these activities had a positive effect on the working relationship between Young Farmer teachers and chapter members. Less than one-third of the presidents and one-half of the supervisors whose teachers did not farm thought farming would have a positive effect. Over three-fourths of the chapter presidents agreed that Young Farmer teachers should be encouraged to farm part-time, while only 40% of supervisors agreed. There was a significant difference between teachers and supervisors/chapter presidents regarding the negative effect farming activities could have on working relationships "...because these activities limit the amount of time that the teacher has to work with members." Nearly all supervisors and chapter presidents gave their Young Farmer teacher high ratings for meeting the needs of chapter members. Age was the only demographic characteristic that affected ratings of statements about part-time farming activities conducted by teachers. Increased dialogue between teachers, presidents and supervisors was recommended, along with inservice meetings for teachers on the topic.

Introduction

In 1997, full-time Young Farmer teachers, their vocational supervisors, and their local chapter presidents were surveyed seeking information pertaining to their farming experience and their perceptions of Young Farmer teacher part-time farming activities. This information was assessed to determine the effect of these part-time farming activities on local Young Farmer chapters. There has been no research done to determine the extent of farming activities by Georgia Young Farmer teachers and the effect that these activities have on the teacher's ability to meet the needs of local chapter members.

Nationally, some research has been conducted involving different aspects of the Young and Adult Agricultural Education programs. An extensive study of the history of the Young Farmer program in Georgia (Boatright, 1993) and the views and characteristics of the membership in the National Young Farmer Educational Association (Carpentier & Iverson,1992) are examples of this research. Bruening and Radhakirshna (1991) assessed the needs and practices of Young/Adult Farmer teachers and Steakley and Webb (1973) conducted a study to identify characteristics that contributed to the most successful Young Farmer chapters in Texas. Part-time farming activities by Young Farmer teachers were not mentioned in any of these studies.

Martin (1987) used a survey to assess the current educational programming being offered to young and adult farmers in Iowa. The assessment centered on programs being offered, the degree of importance, and the quality of programs as perceived by farmers. Smith and Kahler (1982) conducted a study of factors which influenced participation of adult farmers in educational programs. Neither of these studies mentioned the extent or effect that farming activities had on the working relationship between the Young Farmer teacher and local chapter members.

There has been considerable research performed which addressed the feelings and attitudes of teachers in general as they relate to part-time work or "moonlighting". Research by Pearson (1994), Raffel and Groff (1990), Bell and Roach (1989), Wisniewski and Kleine (1984), and Henderson (1982) indicated that the need to supplement salaries and/or raise the standard of living are major factors why teachers have second jobs. This study indicates that some Young Farmer teachers have part-time farming activities mainly for financial reasons, but most have emotional reasons for this part-time work. Physical and educational reasons are also given as to why they farm part-time.

Ballou (1995) indicated that moonlighting teachers do not appear to shortchange students when preparing lessons, grading papers, or assigning homework. Phipps (1980) stated that persons who plan to teach agriculture should have a background of experience in the agriculture occupation they will be teaching.

At the time of this study, there were 53 active Young Farmer programs in the state with full-time teachers. Two counties had more than one active program (Weeks, 1996).

Purpose and Objectives

The primary purpose of the study was to determine the nature and extent of part-time farming activities by Young Farmer teachers and the perceived effect these farming activities had on Young Farmer programs. Specific objectives were to:

1. Determine the demographic characteristics of respondents.
2. Ascertain perceptions of Young Farmer teachers, supervisors and chapter presidents regarding effects, advantages and disadvantages of farming activities pursued by teachers of Young Farmers of Georgia.
3. Compare the ratings that teachers, chaper presidents and vocational supervisors gave a set of seven attitudinal statements about the farming activities of Young Farmer teachers.
4. Determine chapter presidents' and vocational supervisors' ratings of the performance of Young Farmer teachers.
5. Analyze how respondents' characteristics affected attitudes toward farming activities engaged in by teachers of Young Farmers of Georgia.

Procedures

This was a descriptive, correlational study involving teachers', supervisors', and chapter presidents' perceptions of part-time farming activities of the Young Farmer teachers in Georgia. An extensive review of literature revealed only a few references to part-time employment or "moonlighting" by teachers. These references were not specific to agriculture or Young Farmer teachers, therefore, the researchers used their own experiences and contacts within the Georgia Young Farmer association to design this study. A draft instrument was reviewed for face validity by the teacher educators at the University of Georgia. The instrument was submitted, along with a human subjects review form, to The University of Georgia Office of the Vice President for Research on August 9, 1996. The instrument was approved in early September, 1996. An extension was granted on January 6, 1997, to facilitate followup. The names and addresses of supervisors and presidents were secured at a Young Farmer in-service meeting. The original instrument was sent to teachers, supervisors, and presidents on August 12, 1997. A follow-up post card was sent after 10 days. Another follow-up attempt was made later in the Fall at a state-wide teachers meeting. Three additional responses were obtained from this follow-up. Data collection ended in November, 1997.

When late responders were compared to the earlier responders, no significant differences were observed, therefore, late responders--and by inference, non-respondents--were considered to be part of the same population (Miller & Smith, 1983), thus all responses could be combined for analysis. A total of 14 presidents, out of 53 (26.4%); 31 teachers, out of 51 (60.8%); and 25 supervisors, out of 49 (51%) responded, for a total of 70 respondents who provided useable data. This represented 45.8% of the 153 individuals who made up the population. The data were transferred from the instruments to the Word Perfect word-processing program, and analyzed at the Academic Computing Center at The University of Georgia. Primarily descriptive statistics were used, including count, means, frequencies, percentages, and standard deviations. In addition, t-tests and analysis of variance were used to determine differences between groups of respondents. Also, Cronbach's Alpha Reliability Coefficient was used to determine reliability of the seven Likert-type attitudinal variables; which achieved a moderately strong alpha of .81.

Findings

Demographics

Most Young Farmer teachers responding to the study were married (97%) and had an average age of 42 years. Over one-half (55%) of the Young Farmer teachers had a Master's degree and most (87%) were interested in the study, as indicated by their request for the results.

Chapter presidents responding to this study had an average age of 34 years. Most (77%) of the chapter presidents were married, over one-half (62%) reported high school as their highest educational level, and they had an average of between 16 and 17 years of farming experience. Fifty percent of the chapter presidents responding wanted the results of this study.

Vocational supervisors responding had an average age of 49 years. Most supervisors (96%) were married with 65% having a Specialist degree as their highest educational level. Two-thirds (68%) of the supervisors had no farming experience. Those supervisors with farming experience (32%) had an average of 28 years involved in some form of farming. Most (72%) of the supervisors wanted a copy of the results of this study. These data may be viewed in Table 1.

Table 1
Demographic Characteristics of Respondents (N=70)

Category	Teacher (n-31)	Supervisor (n=25)	President (n=14)
Age			
M	42.3	48.7	33.6
S.D.	6.81	6.26	8.32
Range	25-55	37-60	25-53
Highest Education Level			
High School	-	-	8
Technical School -		-	1
Bachelors Degree	1	1	4
Masters Degree	17	3	-
Specialist Degree	11	15	-
Doctorate	2	4	-
Marital Status			
Single	1	1	3
Married	30	22	10
Current Residence			
Farm	14	-	14
Non-farm	17		-
Years Experience in Farming	23.8*	28 (n=8)	16.5
Mean Years of Teaching Agriculture	15.9	-	-
Mean Years of Teaching Young Farmers	9.3	-	-
Interest in Study Results	27	18	7

*Note: Seventeen teachers (55%) were actively farming at the time of the study. Sixteen (94.1%) intended to continue. Nearly three-fourths (12 or 70.6%) of the Young Farmer teachers with part-time farming activities had livestock and 10 or 58.8% had farming activities involving crops.

When chapter presidents and vocational supervisors were asked if the Young Farmer teacher at their school engaged in part-time farming activities, 71% of the chapter presidents responded yes, 21% answered no, and 7% did not know. Vocational supervisors responded with 36% answering yes, 48% responding no, and 16% did not know. These data can be viewed in Table 2.

When the 16 Young Farmer teachers were asked why they will continue to engage in part-time farming activities, responses were grouped into four categories: financial, emotional, physical, and educational. Nearly one-half (7 or 43.8%) of the Young Farmer teachers gave emotional reasons for continuing part-time farming activities. Some examples that were categorized as emotional were reasons such as “children enjoy showing cattle”; “teaches children responsibility and work ethics”; “makes teacher fit in with others”; and “therapy”. Nearly one-third (5 or 31.3%) of the teachers gave financial reasons for continuing part-time farming activities. Two respondents (12.5%) gave physical and educational reasons for continuing part-time farming. The one respondent who indicated that he would discontinue farming, gave two reasons: time involved (“takes away from job and family which are more important”) and “not making any money for the amount of time involved”.

Table 2.
Responses of Study Participants Regarding Farming Activities of Teachers (N=70)

Response	Teacher		Supervisor		President		Overall	
	n	%	n	%	n	%	n	%
Yes	17	54.8	9	36.0	10	71.4	36	51.4
No	14	45.2	12	48.0	3	21.4	29	41.4
Don't Know	-	-	4	16.0	1	7.1	5	7.1

Perceptions of respondents regarding effects, advantages and disadvantages of farming activities

One of the objectives of the study was to determine the perceptions that vocational supervisors and chapter presidents had of the effect that part-time farming activities have on the working relationship between Young Farmer teachers and local chapter members. For purposes of analysis, responses were divided into two groups of vocational supervisors and two groups of chapter presidents. Vocational supervisors and chapter presidents who indicated that their Young Farmer teacher engaged in part-time farming activities were summarized separately from those that answered that their teacher did not have or that they did not know if their teacher engaged in farming activities. Responses could be Positive, Negative, or No Effect.

Eight out of nine (88.9%) of the vocational supervisors and nine out of eleven (81.8%) of the chapter presidents with teachers that had part-time farming activities indicated that these farming activities had a positive effect on the working relationship between Young Farmer teachers and local chapter members.

Just 5 out of 17 (29.4%) of the vocational supervisors and 2 out of 4 (50%) of the chapter presidents with teachers that did not have part-time farming activities or did not know if the teacher had farming activities indicated that they believe that these activities would have a positive effect on the working relationship between Young Farmer teachers and local chapter members. Moreover, almost one-half (8 or 47.1%) of these vocational supervisors and one-fourth of the chapter presidents thought the effect would be negative. These data may be viewed in Table 3.

Chapter presidents, vocational supervisors, and Young Farmer teachers were asked to give three reasons why Young Farmer teachers should be encouraged to engage in part-time farming activities. A combination of responses were found for most frequent first, second, and third answers. Respondents indicated that the major reason for encouraging Young Farmer teachers to farm was "To have a first-hand knowledge of a farming enterprise"(18 or 33.3%). The next most popular belief was that "Experiencing the problems of farming by Young Farmer teachers enables them to sympathize with the farmers that they work with" (8 or 16%). The major reason given for discouraging farming activities of Young Farmer teachers was "Requires time and effort that could be put into the job of teaching and advising the Young Farmer program (22 or 45.8%). The next most mentioned reason for discouraging teachers from farming was that the farming activities "Often get out of hand, size-wise, and can become the major priority" (5 or 10.4%).

Table 3.
Perceived Effect of Young Farmer teachers' Farming Activities

Response	Supervisors		Chapter Presidents	
	n	%	n	%
	Respondents whose teachers farm			
Positive	8	88.9	9	81.8
Negative	–	—	1	9.1
No effect	1	11.1	1	9.1
	Respondents whose teachers do not farm			
Positive	5	29.4	2	50.0
Negative	8	47.1	1	25.0
No Effect	4	23.5	1	25.0

Respondent Perceptions of Attitudinal Items about Farming Activities of Teachers

Six attitudinal statements were presented to chapter presidents, vocational supervisors, and Young Farmer teachers. A Likert-type scale of 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree was used for the participants to use. In order to discuss the findings, answers of Strongly Disagree and Disagree were combined as a disagree response. A like grouping of Strongly Agree and Agree are reported as an agree response. There were no significant differences in how the three groups responded to five of the six statements. These data may be perused in Table 4.

Over three-fourths (77%) of the chapter presidents responding agreed that Young Farmer teachers should be encouraged to have part-time farming activities. However, 44% of the vocational supervisors participating in the study disagreed, while 40% agreed that Young Farmer teachers should be encouraged to have part-time farming activities;16% were undecided about the statement. Over one-half (53%) of the Young Farmer teachers responding agreed and 36% disagreed with this statement. When all the responses were combined from the three groups, 53% agreed and 34% disagreed with the statement that Young Farmer teachers should be encouraged to have part-time farming activities ($\underline{M}$=3.21).

Over two-thirds (67%) of the chapter presidents involved in the study disagreed and only 8% agreed with the statement that Young Farmer teachers should be discouraged from having part-time farming activities. Almost one-half (48%) of the vocational supervisors disagreed with this statement and 36% agreed. Two-thirds (63%) of the Young Farmer teachers responding disagreed with the statement that Young Farmer teachers should be discouraged from having part-time farming activities, while 23% agreed. When all responses were combined there was 58% disagreement and 25% agreement with the statement ($\underline{M}$=2.48).

All of the chapter presidents participating in the study agreed with the statement, "Young Farmer teachers can better relate to the problems and successes of local chapter members if they have similar farming activities". More than one-half (56%) of the vocational supervisors agreed while 32% disagreed. Over three-fourths (77%) of the Young Farmer teachers agreed with this statement and 13% disagreed. The combination of responses by participants shows that 74% agreed with the statement and 17% disagreed ($\underline{M}$=3.86).

Respondents were asked to respond to the statement, "If Young Farmer teachers have a desire to have part-time farming activities, they should be encouraged to do so as long as the activities are limited to an average of less than forty hours per week". Two-thirds (67%) of the chapter presidents, 50% of the vocational supervisors, and 55% of

the Young Farmer teachers responding agreed with this statement; while 8% of the presidents, 25% of the supervisors, and 41% of the teachers disagreed. Chapter presidents and vocational supervisors both had an undecided rate of 25% while only 3% of the teachers were undecided. When all responses were combined, there was a 55% agreement, 29% disagreement, and a 15% undecided rate with the statement, for a mean of 3.42.

When asked to react to the statement, "The positive effects of part-time farming by Young Farmer teachers far outweigh the negative effects of these farming activities on local Young Farmer chapters" over one-half (58%) of the chapter presidents, 52% of the vocational supervisors, and 58% of the teachers responding agreed; just 8% of the presidents, 28% of the supervisors, and 26% of the Young Farmer teachers disagreed with the statement; however, 33% of the chapter presidents, 20% of the vocational supervisors, and 16% of the teachers were undecided. A combination of responses showed that 55% agreed, 24% disagreed, and 21% were undecided (M=3.47).

The study sought to determine the perceptions that Young Farmer teachers have about the statement, "Part-time farming activities by Young Farmer teachers can have a detrimental effect on the working relationship with Young Farmers because these activities will limit the time the teacher will have to work with chapter members". Young Farmer teachers responding were evenly divided with 42% in agreement and 42% disagreeing with the statement. Just 16% of the teachers were undecided. Three-fourths (75%) of the chapter presidents and 64% of the vocational supervisors agreed with this statement. However, 17% of the presidents and 16% of the supervisors disagreed with the statement; and 8% of the chapter presidents and 20% of the vocational supervisors were undecided. A combination of responses showed that 68% of the respondents agreed, 16% disagreed, and 16% were undecided about this statement. This was the only item where a significant difference ($p<.05$) was found between teachers, supervisors and presidents. These data may be seen in Table 4.

Table 4
Respondent Ratings of Attitudinal Statements about Teachers' Farming Activities

Statement	Teachers		Supervisors		Presidents	
	M	SD	M	SD	M	SD
Young Farmer teachers should be encouraged to have part-time farming activities.	3.2	1.32	3.0	1.46	3.8	1.01
Young Farmer teachers should be discouraged from engaging in part-time farming.	2.3	1.34	2.8	1.48	2.4	1.00
Young Farmer teachers can better relate to the problems and successes of their students if they have similar farming activities.	4.0	1.10	3.4	1.36	4.3	.48
Part-time farming activities can have a negative effect on the working relationship between YF teachers and enrollees because these activities limit the time that the teacher has to work with members.	3.0*	1.40	3.8	1.29	3.8	.97
If Young Farmer teachers have a desire to have part-time farming activities, they should be encouraged to do so as long as they average less than forty hours per week.	3.3	1.54	3.5	1.32	3.5	.90
The positive effects of part-time farming by YF teachers far outweigh the negative effects.	3.5	1.34	3.4	1.55	3.5	1.00

*Significant difference: $p \leq .05$

Performance Ratings of Teachers

Chapter presidents and vocational supervisors were asked to rate the performance of their Young Farmer teachers in meeting the needs of chapter members. A scale of 1 = Poor, up to 5 = Excellent was used to rate their performance. A large majority (11 or 84.7%) of the chapter presidents gave their Young Farmer teacher a rating of 4 or 5 (M=4.2; SD=1.14); 20 or 95.2% of the vocational supervisors responding gave their Young Farmer teacher a rating of 4 or 5 (M=4.6; SD=.60). A t-test revealed no significant difference between the subset ratings. Combining the responses shows 31 out of 33 (93.4%) giving ratings of 4 or 5 for the Young Farmer teachers in meeting the needs of chapter members.

Relationship of demographics to ratings of the attitudinal statements

Demographic characteristics were cross tabulated with the Likert-type items; t-tests and ANOVA were used to test of significance. Only the age of respondents was found to significantly affect their perceptions of part-time farming and its effect on local chapters.

The six attitudinal statements in the study that used the Likert-type scale for responses were analyzed by t-test for age differences of respondents. There was a significant difference noted on the item, "Young Farmer teachers should be discouraged from engaging in part-time farming activities". Both the forty-and-under age group and the over-forty group disagreed with the statement, but the over-forty age group disagreed to a lesser extent. The researchers noted no significant differences by age group in the responses for the remaining statements.

Conclusions

Based on the findings, the following general conclusions can be drawn:

Over one-half of the full-time Young Farmer teachers in Georgia engage in part-time farming activities; and almost all plan to continue these activities. There are more part-time farming activities involving livestock than crops.

Emotional factors are the main reason why Young Farmer teachers continue part-time farming activities. Financial factors were the second most frequent reason given. This is different from the findings of Pearson (1994), Raffel and Groff (1990), Bell and Roach (1989), Wisniewski and Kleine (1984), and Henderson (1982) who indicated that the need to supplement salaries and/or raise the standard of living are major factors why teachers have second jobs.

Most chapter presidents and supervisors feel that farming activities by Young Farmer teachers have a positive effect on the working relationship between the teacher and chapter members. Vocational supervisors whose teachers do not farm are more likely to think that these activities have a negative effect on the working relationship between the teacher and chapter members.

Young Farmer teachers, supervisors and chapter presidents believe that farming gives the teacher first-hand knowledge of farming enterprises. However, when asked why Young Farmer teachers should be discouraged from having part-time farming activities, a majority of teachers, supervisors and chapter presidents will likely give the reason that it requires time and effort that could be put into the job of teaching and advising.

Most teachers, supervisors and chapter presidents in Georgia believe that Young Farmer teachers should be encouraged to have part-time farming activities, in order to better relate to the problems and successes of local Young Farmers.

Chapter presidents and vocational supervisors agree that farming activities by Young Farmer teachers can have a negative effect on the working relationship with chapter members if forty or more hours are spent per week on these activities. Thus, most program participants will probably agree that if Young Farmer teachers have a desire to have part-time farming activities, they should be encouraged to do so as long as the activities are limited to an average of less than forty hours per week. Furthermore, teachers, supervisors and chapter presidents agree that the positive effects of part-time farming by Young Farmer teachers far outweigh the negative effects of these farming activities on local Young Farmer chapters.

Young Farmer teachers in Georgia are highly rated by chapter presidents and vocational supervisors for meeting the needs of local chapter members.

Older (over forty years of age) program participants are more likely to agree with the statement, "Young Farmer teachers should be discouraged from engaging in part-time farming activities".

Recommendations

The following recommendations can be made as a result of this study:

There should be more dialogue between Young Farmer teachers, chapter presidents, and vocational supervisors concerning farming activities conducted by Young Farmer teachers.

Inservice meetings with Young Farmer teachers should be conducted to explore and discuss the results of this study.

Guidelines should be developed stressing the positive aspects of part-time farming by Young Farmer teachers with a discussion of possible detrimental effects on local chapters if too much time is spent in these activities.

Similar studies should be conducted in other states with Young Farmer programs to determine if views and perceptions are the similar.

Suggestions for Further Study

1. A replication of this study should be made in Georgia in five years to determine changes over to time.
2. 2. Young farmer teachers should be surveyed to determine their perceptions of the statement, "Farming activities by Young Farmer teachers can have a negative effect on the working relationship with chapter members if forty or more hours are spent per week on these activities."
3. A study should be made of financial benefits of part-time farming to teachers of Young Farmers, as compared to other jobs or professional activities.
4. A study of regular teachers of agriculture should be conducted to determine if there are any differences from respondents in this study.
5. Program leaders should explore why vocational supervisors who had a Young Farmer teacher doing part-time farming activities were more positive about the activity than those with Young Farmer teachers who did not farm.
6. A study should be made to determine the effects of farming experience by vocational supervisors on their attitudes toward Young Farmer teachers' part-time farming activities.

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AN ASSESSMENT OF STUDENT AGRICULTURAL LITERACY KNOWLEDGE BASED ON THE FOOD AND FIBER SYSTEMS LITERACY FRAMEWORK

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Abstract

Over 11 years ago, agricultural literacy was nationally recognized as a need for every K –12 student (NRC, 1988), but in an already overloaded curriculum an appropriate and un-intrusive method of incorporation was needed. The Food and Fiber Systems Literacy (FFSL) Framework was designed to make connections to agricultural concepts through existing curricula. The purpose of this quasi-experimental study was to assess change in student knowledge after infusing the FFSL Framework in core academic subjects (Igo, Leising, and Frick, 1999; see also Igo & Leising, 1999). The treatment group was composed of 2 kindergarten-through-twelfth-grade schools in Montana and Oklahoma. A school in Nebraska was used as the control. Pretest and posttest mean score comparisons by grade groupings and the 5 thematic areas in the FFSL Framework resulted in significant knowledge gains in 3 of the grade groupings for the treatment group. No significant gains came from the control group. Three thematic areas yielded the most statistically significant knowledge gains in the treatment group: Understanding Agriculture; History, Culture, and Geography; and Science and Environment. The study concluded that the FFSL Framework can be used effectively to infuse instruction about agriculture in the schools studied.

Introduction

Urbanization and the ever-increasing roles of technology in people's lives continue to distance people from their agricultural roots. With nearly 20% of the labor force in America working in agricultural related industries (Petrulis, Green, Hines, Nolan and Sommer, 1987), the need for literacy about agriculture is greater than it has ever been.

In 1988, the National Research Council's Committee on Agricultural Education in Secondary Schools proposed that an agriculturally literate person would understand the Food and Fiber System in relation to its history, economic, social, and environmental significance (National Research Council, [NRC] 1988). The committee also recommended that "all students should receive at least some systematic instruction about agriculture beginning in kindergarten or first grade and continuing through twelfth grade" (NRC, 1988, p.10).

Frick, in 1990, reported one of the first conclusive agricultural literacy definitions: "Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system... An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p.52).

Much of the agriculture literacy research has been focused on instructional material assessment. In evaluating the Georgia Agriculture in the Classroom program, Herren and Oakley (1995) concluded the materials were effective with both urban and rural students. Swortzel (1996) reported an Ohio study assessing fourth-graders knowledge of animal agriculture. A pretest/posttest design was used and a statistically significant difference was shown between the two test scores with greater gains for students living in urban areas. Trexlar (1997) concluded the introduction of an agriculturally based science curriculum "did not alter or negatively effect student perceptions of science, agriculture, or their agri-science knowledge level" (p.19).

Nunnery (1996) noted the necessity for building a literacy framework for understanding agriculture's perspectives and viewpoints. Leising and Zilbert (1994) approached agricultural literacy from this angle. They developed a systematic curriculum framework identifying what students should know or be able to do. The Food and Fiber Systems Literacy Framework explained what an agriculturally literate high school graduate should comprehend. Using a series of standards in five thematic areas, the framework delineated the necessary components for understanding the way food and fiber systems relate to daily life. Breaking the standards into grade-grouped benchmarks, K-1, 2-3, 4-5, 6-8, the framework provided a systematic means of addressing agricultural literacy.

One point of contention was the most appropriate and least intrusive way to incorporate instruction into an already overloaded curriculum (Law, 1990). The Food and Fiber Systems Literacy Framework (FFSL) was designed to make connections to agricultural concepts through existing curriculum. Through case studies, Igo, Leising and Frick found that education about agriculture could be infused into core academic learning. They reported that students already had some knowledge about agriculture, but that by infusing instruction on food and fiber into the academic core curriculum knowledge about agriculture increased significantly (Igo, Leising, and Frick, 1999; see also Igo & Leising, 1999).

Experimental or quasi-experimental research designs were not used in previous studies to control for specific variables. Therefore, in the second year of the Food and Fiber Project evaluation a quasi-experimental research design was employed.

Purpose and Objectives

The purpose of this study was to assess food and fiber systems knowledge of selected students in kindergarten through eighth grade before and after receiving instruction based upon the Food and Fiber Systems Literacy Framework Standards and Benchmarks. For the treated and control groups of this research, the specific objectives included:

Compare differences by grade grouping (K-1, 2-3, 4-5, 6-8) for the treatment group and control group in student knowledge about agriculture before and after instruction based upon the FFSL Framework.

Compare differences by grade grouping for the treatment group and control group in student knowledge about agriculture before and after instruction based upon the five thematic areas of the FFSL Framework.

Determine if a relationship existed between the differences in student knowledge about agriculture before and after instruction based upon the FFSL Framework and the number of teacher-reported instructional connections to the Framework.

Methods and Procedures

This study is a variation of the quasi-experimental nonequivalent control group design described by Campbell and Stanley (1963). The treatment group was composed of 21 classrooms in kindergarten through eighth grade from one school in Oklahoma and one school in Montana. A total of eight classes in Montana and 13 classes in Oklahoma composed the treatment group. Both schools were part of the Food and Fibers Systems Literacy Project. These school sites were chosen based on geographic diversity, school size and teacher willingness to infuse food and fiber systems literacy in kindergarten through eighth grade.

The control group was a school in Nebraska. The school was chosen because it was a rural school with social/economic characteristics and size similar to the treatment schools. Also, the school was willing to involve kindergarten-through-eighth-grade students and teachers in the study. A total of seven classes composed the control group.

Instrumentation

To control for existing knowledge of food and fiber systems and to determine similarity, students in the treatment and control groups were administered the same pretest at the beginning of the school year. The pretest and posttest instruments were the same. They were developed by the researchers for measuring food and fiber systems knowledge for each grade grouping in the Food and Fiber Systems Literacy Framework; K-1, 2-3, 4-5 and 6-8. Questions on each instrument were based on the grade-grouped benchmarks. The K-1 and 2-3 instruments included 16 and 21 items respectively. Both primarily used a format consisting of questions to be read by the teacher followed by a series of illustrations from which the students were to select the correct answer or answers. The K-1 instrument responses were entirely pictures, while the 2-3 instrument used picture and simple text responses. The 4-5 and 6-8 grade level instruments contained 35 and 30 text-responses respectively. The instruments had been used by the researchers in earlier studies and had reliability coefficients ranging from 0.7763 to 0.9469.

Treatment

The treatment group consisted of two schools, each with students enrolled in grades K-8 that were part of the Food and Fiber Systems Literacy Project. Teachers from these schools were prepared to infuse the Food and Fiber Systems Literacy Standards and Benchmarks into core academic subjects by participating in the l997-l998 two-phase training. Phase I training at each site involved an overview of the Project, followed by orientation to the Framework, Standards and Benchmarks and the introduction of the supporting lessons and activities. In addition, Phase I involved teachers in hands-on activities. Phase II training included time for teachers to become familiar with the Project web site, including instruction on submitting electronic reports to the Project staff. The majority of Phase II was spent in helping teachers plan instructional time throughout the academic year to address food and fiber systems concepts. In l998-l999, the teachers received an update of the project and time was spent with each teacher in planning and encouraging them to address the appropriate Standards and Benchmarks in their instruction.

Data Collection

The pretest was given to the treatment group and control group during September, l998 prior to any food and fiber systems instruction. Teachers administered the pretests in their classrooms. The instruments were collected by building principals and returned to the researcher by mail.

Infusion of Food and Fiber Systems Literacy Standards and Benchmarks for the treatment group took place during the l998-l999 academic year (September through April). The posttest was administered to the treatment and control

groups during early May, l999. Teachers administered the instrument in their classrooms. The principal collected the completed instruments and forwarded them to the researchers.

Teachers in the treatment group provided feedback regarding the connections made to the Framework throughout the project year. They indicated the theme, standards and benchmarks addressed. Teachers submitted feedback electronically or through the mail to the researchers.

Analysis of Data

After administration, the completed tests were scored and coded into a Microsoft™ Excel spreadsheet for analysis. Means and percentages were computed by grade-level grouping for the test scores from both groups. Analysis of variance procedures were performed using SAS version 6.11 to determine differences in pretest and posttest knowledge scores. The analyses included the General Linear Model's procedure and computation of Least Squares Means to delineate differences by theme area of the Food and Fiber Systems Literacy Framework. A Pearson's Product Moment Correlation was computed to assess relationships between pre- and posttest differences and the number of teacher reported instructional connections to the framework.

Results/Findings

Pretest and Posttest Grade Grouping Analysis

The pretest and posttest food and fiber knowledge levels for the treatment group and the control group are reported in Table 1. The mean test scores recorded for each grade grouping in the table indicated statistically significant differences between pretest and posttest knowledge scores, as determined by Analysis of Variance. The mean score for grade grouping 2-3 of the treated group increased by over 15 points, yielding statistical significance at the 0.05 level. The treatment group in grade groupings 4-5 and 6-8 also yielded 0.05 level significance for the differences between the pretest and posttest scores. Only the K-1grade grouping failed to show significance. The control group failed to show significant differences between the mean scores of the pretest and posttest for any of the four grade groupings.

It must be noted that the control group obtained higher mean scores in the pretest for every grade grouping than did the treatment group. In two grade groupings, K-1 and 2-3, the control group also scored higher than the treatment group for the posttest. It must also be noted, however, that in spite of having higher agricultural knowledge pretest mean scores than the treatment group, the control group failed to obtain significant increases in its posttest food and fiber knowledge scores, while the treatment group showed significant differences between the pretest and posttest mean scores in three of the four grade groupings.

Table 1.
F-Value Comparison of Food and Fiber Knowledge Pretest and Posttest Differences for the Treatment Group and Control Group

	Treatment				Control			
Grade	Pretest Mean	Posttest Mean	F-value	p	Pretest Mean	Posttest Mean	F-value	p
K-1	41.89	51.10	4.73	0.0606	43.38	47.43	0.45	0.5197
2-3	78.72	94.13	17.28	0.0014*	84.82	98.06	4.33	0.0611
4-5	24.36	28.21	17.51	0.0032*	25.17	26.16	0.50	0.4946
6-8	22.42	28.31	15.57	0.0064*	23.88	26.0	0.36	0.5567

*$p<0.05$

Thematic Area Analysis

The Food and Fiber Systems Literacy Framework was organized around five thematic areas: Understanding Agriculture; History, Culture, and Geography; Science and Environment; Business and Economics; and Food, Nutrition and Health. Table 2 provides the F-value comparison of the pretest and posttest score differences by grade groupings within theme areas for the treatment group and control group. Three thematic areas yielded the most statistically significant differences in the treatment group: Understanding Agriculture; History, Culture, and Geography; and Science and Environment. In each of the three thematic areas statistical significance appeared within the 2-3, 4-5, and the 6-8 grade groupings. The treatment group also registered statistically significant differences for two grade groupings in the Business and Economics theme (2-3 and 4-5); and for two grade groupings in the Food, Nutrition, and Health theme (K-1 and 2-3).

Table 2.
F-Value Comparison of Composite Pretest and Posttest Differences Within Theme Areas For Treatment and Control Groups

Themes and Grade Groupings	Treatment F-value	p	Control F-value	p
Understanding Agriculture				
K-1	2.46	0.1546	0.01	0.9204
2-3	5.68	0.0354*	0.15	0.7076
4-5	13.12	0.0108*	0.61	0.4547
6-8	18.10	0.0082*	0.01	0.9346
History, Culture, and Geography				
K-1	2.79	0.1328	0.22	0.6482
2-3	13.54	0.0033*	2.36	0.1535
4-5	12.29	0.0068*	0.28	0.6088
6-8	10.09	0.0186*	0.86	0.3653
Science and Environment				
K-1	1.38	0.2723	0.17	0.6898
2-3	10.09	0.0083*	8.19	0.0155*
4-5	6.02	0.0147*	0.81	0.3675
6-8	34.52	0.0183*	0.18	0.6729
Business and Economics				
K-1	0.59	0.4675	0.88	0.3750
2-3	24.75	0.0003*	16.35	0.0020*
4-5	5.28	0.0468*	0.05	0.8216
6-8	0.62	0.4583	0.24	0.6323
Food, Nutrition, and Health				
K-1	19.71	0.0020*	7.41	0.0232*
2-3	16.25	0.0018*	0.10	0.7567
4-5	0.72	0.3954	0.36	0.5512
6-8	5.78	0.0734	0.02	0.8808

*$p<0.05$

The control group showed no statistical differences between the pretest and posttest scores for any of the grade groupings in the first two thematic groups: Understanding Agriculture; and History, Culture, and Geography. The control group did, however, show a statistical difference in a single grade grouping for each of the last three thematic areas: Science and Environment (grade group 2-3); Business and Economics (grade group 2-3); and Food, Nutrition, and Health (grade group K-1).

Relationship Between Student Knowledge and Teacher Connections

Pearson's Product Moment Correlation Coefficient was computed using SAS to assess whether a relationship existed between the difference in pretest and posttest knowledge scores and the number of instructional connections that teachers made to food and fiber systems. Those instructional connections were based upon feedback provided by the teachers within the treatment group as a part of the Food and Fiber Systems Literacy Project. Table 3 summarizes the result of the analysis. Unlike the previous year of this study, the sites in the treatment group failed to show a statistically significant correlation between the test score differences and the number of instructional connections made by teachers.

Table 3.
Correlation Of Differences in Pretest and Posttest Scores to Instructional Connections at the Treatment Site

Site	n	Reported Connections	Pearson r	P
Treatment Group	21	143.8	0.1637	0.3154

*$p<0.05$

Conclusions

The conclusions are based on the findings and were not to be generalized beyond the population of this study.

Students had some knowledge of food and fiber systems prior to the study. The Nebraska control group possessed more knowledge at the beginning of the study compared to the Oklahoma and Montana treatment group.

The Oklahoma/Montana treatment group increased student knowledge about agriculture by infusing instruction based upon the Food and Fiber Systems Literacy Framework Standards and Benchmarks.

Student knowledge increased most frequently within three themes: Understanding Agriculture; History, Culture and Geography; Science and Environment. This conclusion was also reached in the first year of the project.

No relationship existed between the number of connections teachers made to the Food and Fiber Systems Literacy Framework and increases in student knowledge. However, in the first year of this study, a significant relationship existed between student knowledge and the number of teacher connections to the Framework.

Recommendations

Based upon the conclusions and major findings of this research, the following recommendations were made:

Further research is needed to understand why no significant increase in pre- and posttest knowledge score differences in the K-1 grade grouping occurred for the themes, Understanding Agriculture; History, Culture and Geography; Science and Environment; and Business and Economics.

Additional research is needed to understand how teacher behavior in the classroom impacts acquisition of agricultural knowledge by students. Conflicting findings in this paper regarding the relationship between student knowledge and the number of teacher reported connections to the Food and Fiber Systems Literacy Framework provides a basis for further study.

Food and Fiber Systems Literacy Standards and Benchmarks and evaluation instruments should be made available to educators and practitioners. Through implementation, it will become clearer if this systematic approach to agricultural literacy will be workable in school districts.

There is a need to field-test the Food and Fiber Systems Literacy Standards and Benchmarks for grades 9-12 in whole-school settings. Field-testing will help to develop an understanding of how to implement food and fiber literacy across disciplines and through departments.

Implications

The Food and Fiber Systems Literacy Framework can be used effectively to guide instruction about agriculture in grades K-8. The opportunity exists for further dialogue about agricultural literacy and the use of standards and benchmarks to assess student progress. Discussions among agricultural literacy professionals, agriculture industry leaders, agriculture educators, curriculum specialists, and local and state education leaders must focus on reaching consensus about the definition and scope of agricultural literacy instruction. The Food and Fiber Systems Literacy Framework provides a model and starting point for discussion.

This study used the whole-school setting to implement food and fiber systems literacy instruction. The project learned that by involving an entire school a synergy among teachers, administrators, students and parents was created. This synergy may lead to greater overall student achievement and increase the sustainability of agricultural literacy in the school curriculum.

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ADMINISTRATOR SATISFACTION WITH FIRST-YEAR AGRICULTURE TEACHERS

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Abstract

Many believe that society is caught up in an epidemic of quality. Businesses are scrambling to not only meet, but to exceed customer expectations. At the same time, education is being encouraged to act more like business. The purpose of this study was to assess the satisfaction of public school administrators (our customers) with first-year teachers (our product). Results indicate that administrators are generally pleased with the first-year teachers from our institution. The vast majority of the administrators indicated the overall performance of the teachers was good to excellent. Still, the results of this study raise some concerns. The researchers concluded that improvements need to be made in the areas of: 1) Clearly defining expected behavior of students; 2) adjusting instruction based on monitoring; 3) establishing closure; 4) having all students conduct meaningful SAEs, and 5) teachers taking part in school and community activities.

Introduction

For years, customer satisfaction has been a major concern of companies in America. Businesses ranging from Southwest Airlines to Xerox and from Chrysler to Coca-cola have invested millions of dollars in making sure their products and services meet their customers' needs. As of late, it has become even more important. Vavra, (1997) stated, "at the end of the 1990s most American businesses will accord the measurement of customer satisfaction a high priority" (p. 3). Hanan and Karp, (1989) reinforced the value of customer satisfaction saying, "The satisfied customer is always the bottom line" (p. xi).

John Dewey (1938) and countless other educational reformers have concluded that educational institutions need to operate more like successful businesses. Public schools as well as higher education institutions have been urged to emulate the way major corporations structure their administration, develop their products, and evaluate their clients or customers. If such advice is followed, working toward customer satisfaction should also be a priority for educational programs. As Vavra (1997) stated, customer satisfaction is critical because it has a long reaching impact on the current and future viability of any organization.

With that thought in mind, who are the "customers" of teacher education programs in agricultural education? Initially, you might say that the client group is composed of the students who take our classes, participate in our departmental clubs, and eventually, are conferred degrees from our programs. However, we would argue that our students are our "products." Young people come into teacher education programs as a raw good and are then processed, through coursework, extracurricular activities, student teaching, and other learning experiences into a useful product – so we hope. Therefore, the true clients of teacher education programs in agricultural education are school administrators who hire our graduates.

In order to satisfy customers, two things must be true about product quality: 1) it must meet the customer's specifications: and, 2) it must meet the customer's expectations consistently (Hanan & Karp, 1989). One of the basics of the Total Quality Management movement is product worthiness. Deming's quality improvement process is based upon consumer information and feedback (Vavra, 1997). It is critical, then, for teacher education programs in agricultural education to gather information about their graduates from those who employ them – public school administrators.

First-year teachers do not always teach as they were taught to teach. For example, McKee and Warmbrod (1992), and Cano and Garton (1996) found that student teachers and first-year teachers failed to use the problem solving approach to teaching to the level it was emphasized during their preparation program. In fact, Cano and Garton (1996) concluded that the student teachers in their study spent less than one-fifth of their instructional time using the problem solving approach. Because of this and other possible differences between preparation and practice, it is important to gather input from the school administrators who work with new teachers.

The first year in the profession is a challenging, even trying time for most teachers. It is a continuation of the new teacher's education. Wong (1998) stated that the first-year can make or break a young teacher. Roth (1994) reinforced this idea when he said, " The preparation of teachers is not isolated from the condition of schools. Schools serve as a fertile ground for testing theory in practice" (p. 264).

For this reason, researchers and other authors suggest the relationship between teacher education programs and schools should be closer than that of businesses and their clients. Goodlad (1991) stated that they should be "jointed together" in a mission to prepare teachers. Driscoll and Levneh (1994) supported this idea by saying "There must be a connection between the content and process of teacher education and the needs and concerns of schools" (p. 59). Following the model of successful businesses, this connection should include the evaluation of teachers by administrators for the benefit of teacher education programs.

Purpose and Objectives

The purpose of this research was to determine school administrators' satisfaction with first-year teachers who graduated from the agricultural education program at Oklahoma State University.

The following objectives were formulated to accomplish this purpose:

Determine the extent to which school administrators are satisfied with the ability of their first-year teachers to meet the minimum competencies for agriculture teachers.

Determine the extent to which school administrators are satisfied with their first-year teacher's performance related to supervised agricultural experience programs, student organizations, and school and community relations.

Methods

During the 1998-99 academic year, 21 graduates of Oklahoma State University began their teaching career in agricultural education. Seventeen of these new teachers were hired to teach in Oklahoma, two in Kansas, one in California and one in Colorado. The population for this study was composed of the administrator who was responsible for supervision of each of these first-year teachers. In most cases the administrator was a principal.

The instrument used was a combination of the Oklahoma Minimum Criteria for Effective Teaching Performance developed by the Oklahoma State Department of Education, (1992) and items developed by the researchers. The state criteria were composed of two areas, Practice and Products. Within the Practice area, there were two sections, Teacher Management Indicators (four items) and Teacher Instructional Indicators (twelve items). Three items were included in the Products area. These 19 criteria have been adopted as the basis for evaluation of teachers in the state of Oklahoma.

Three additional sets of subject specific criteria were developed by the researchers to be included in the instrument. Criteria were developed for Supervised Agricultural Experience Projects (3 items), FFA (4 items), and School and Community (3 items).

A four-point Likert-type scale was provided for response to each of the 29 criteria items. The scale was: 4 = excellent; 3 = good; 2 = fair; 1 = poor. The real limits of the scale were used to categorize the mean responses.

Four other items were included on the questionnaire to gather information about the respondents. Data were gathered about the administrators' gender, administrative experience and teaching expertise.

The mailed questionnaire was assessed for validity by a panel of teacher educators and graduate students – several of whom were former agriculture teachers on the secondary level. Useable instruments were returned from 16 of the 21 administrators resulting in a response rate of 76%.

Data were analyzed with the Data Analysis pack for Microsoft Excel 97. A grand mean was calculated for each of the six minimum criteria areas and for all of the criteria items combined.

Results

Each of the 16 respondents was a male. The years of experience as an administrator ranged from 1 to 23 years with a mean of 13 years. The mean for experience at the current school was 7 years. Seven (43.75%) of the administrators reported to have teaching expertise in social studies. Two (12.50%) indicated their expertise was in a vocational education area.

The administrators rated each of the items composing the Management Indicators of the criteria at the "good" level. The most highly rated indicator was related to the teacher establishing a positive learning environment with a mean of 3.13. The lowest rated indicator was related to the teacher's ability to maintain discipline in the classroom (2.94). However, this item had the highest standard deviation (1.06) of this group of items and the second highest of all of the 29 items included in the study. These data are displayed in Table 1.

Table 2 shows how the administrators rated the teachers on Teacher Instructional Indicators. The administrators indicated that the teachers were "good" at all 12 of the items in this section of the criteria. The most highly rated item was "Models: the teacher demonstrates the desired skills" with a mean rating of 3.31. The teachers were also rated high for requiring students to practice newly learned skills (3.19), communicating instructional objectives (3.13), supervising practice of newly learned skills (3.13), and involving all learners (3.13). The lowest rated items was related to the teacher's ability to adjust their teaching based on feedback from monitoring and their providing for guided and independent practice of newly learned skills (2.88).

Table 1.
Administrator Satisfaction With First-Year Teachers Related to Teacher Management

Indicators	Mean*	SD
Learning Environment: the teacher establishes rapport with students and provides a pleasant, safe, and orderly climate conducive to learning	3.13	0.89
Preparation: the teacher plans for delivery of the lesson relative to short-term and long-term objectives	3.00	0.82
Routine: the teacher uses minimum class time for non-instructional routines thus maximizing the time on task	3.00	0.82
Discipline: the teacher clearly defines expected behavior (encourages positive behavior and controls negative behavior)	2.94	1.06

* Scale: 4 = excellent; 3 = good; 2 = fair; 1 = poor.

Table 2.
Administrator Satisfaction with First-Year Teachers Related to Teacher Instruction

Indicators	Mean*	SD
Models: the teacher demonstrates the desired skills.	3.31	0.79
Provides for Independent Practice: the teacher requires students to practice newly learned skills while under the direct supervision of the teacher.	3.19	0.66
Establishes Objectives: the teacher communicates the instructional objectives to students.	3.13	0.72
Guides Practice: the teacher requires all students to practice newly learned skills while under the direct supervision of the teacher.	3.13	0.72
Involves All Learners: the teacher uses signaled responses, questioning techniques, and/or guided practices to involve all students.	3.13	0.81
Explains Directions: the teacher gives directions that are clearly stated and related to the learning objectives.	3.06	0.68
Stresses Sequence: the teacher shows how the present topic is related to those topics that have been taught or that will be taught.	3.06	0.68
Relates Objectives: the teacher relates subject topics to existing student experiences.	3.06	0.68
Monitors: the teacher checks to determine if students are progressing toward stated objectives.	3.06	0.77
Explains Content: the teacher teaches the objectives through a variety of methods.	3.06	0.93
Establishes Closure: the teacher summarizes and fits into context what has been taught.	2.94	0.68
Adjusts Based On Monitoring: the teacher changes instruction based on the results of monitoring.	2.88	0.81

* Scale: 4 = excellent; 3 = good; 2 = fair; 1 = poor.

The administrators evaluated three "product" indicators. Again, the administrators reported that the new teachers' performance was good for each of the items in this section. As shown in Table 3, the lowest rated item of the three was the teachers' use of daily lesson plans (2.94). A mean rating of 3.06 was given for indicators related to the teachers' maintaining a written record of student progress and their use of fair grading practices.

Table 3.
Administrator Satisfaction with First-Year Teachers Related to Products of Teaching

Indicators	Mean*	SD
Student Files: the teacher maintains a written record of student progress.	3.06	0.44
Grading Patterns: the teacher utilizes grading patterns that are fairly administered and based on identified criteria.	3.06	0.57
Lesson Plans: the teacher writes daily lesson plans designed to achieve the identified objectives.	2.94	0.77

* Scale: 4 = excellent; 3 = good; 2 = fair; 1 = poor.

Three indicators were included to assess the administrators' satisfaction with first-year teachers' work related to Supervised Agricultural Experience programs. The item "All students conduct meaningful Supervised Agricultural Education Programs (projects)" was rated lowest of the group with a mean of 2.88. The highest rated item was related to the teacher providing adequate supervision of the SAEs (3.13). These data are presented in Table 4.

Table 4.
Administrator Satisfaction with First-Year Teachers Related to Supervised Agricultural Experience Programs

Indicators	Mean*	SD
Teacher provides adequate supervision to student's projects.	3.13	0.81
Teacher requires students to maintain project record books.	3.00	0.73
All students conduct meaningful Supervised Agricultural Education Programs (projects).	2.88	0.81

* Scale: 4 = excellent; 3 = good; 2 = fair; 1 = poor.

All four of the items related to the teachers' work with the student organization, FFA, had a mean above the mid-point of the "good" classification. The most highly rated item with a mean of 3.38, was "FFA activities are of sound educational value to students." This item tied for the most highly rated of all of the 29 items in the study. The teacher's involving all students in the FFA was also rated highly with a mean of 3.25. The lowest rated item form the group was "FFA activities are communicated to faculty, administration, and the community" (3.06).

Table 5
Administrator Satisfaction with First-Year Teachers Related the Student Organization

Indicators	Mean*	SD
FFA activities are of sound educational value to students.	3.38	0.62
Teacher involves all students in activities of the FFA.	3.25	0.66
FFA activities are well planned.	3.19	0.66
FFA activities are communicated to faculty, administration, and the community.	3.06	0.77

* Scale: 4 = excellent; 3 = good; 2 = fair; 1 = poor.

The administrators rated two of the items listed among the school and community involvement indicators below the mid-point of the "good" classification. The teacher's involvement in community activities rated the lowest of all of the 29 items in the study with a mean of 2.81. This item also had the highest standard deviation (1.11) of all of the items in the study. A mean rating of 2.88 was calculated for the teacher's involvement in school activities other than those related to agricultural education. In contrast, a mean rating of 3.38, tied for the highest rating for any items in the study, was found for the teacher maintaining positive relations with other school employees. These data are displayed in Table 6.

Table 6
Administrator Satisfaction with First Year Teacher's School and Community Involvement

Indicators	Mean*	SD
Teacher maintains positive relations with other school employees.	3.38	0.62
Teacher is involved in non-aged related school activities.	2.88	0.89
Teacher is involved in community activities.	2.81	0.62

* Scale: 4 = excellent; 3 = good; 2 = fair; 1 = poor.

A rating for each of the six groupings of the criteria items was calculated. In comparing the means for these items, the administrators reported being most satisfied with the first-year teachers' performance as the advisor of the FFA chapter (3.22). While all of the means were at or above the mid-point of the good classification of the scale (see Figure 1), the lowest rated area was related to the teachers' performance with SAE programs (3.00).

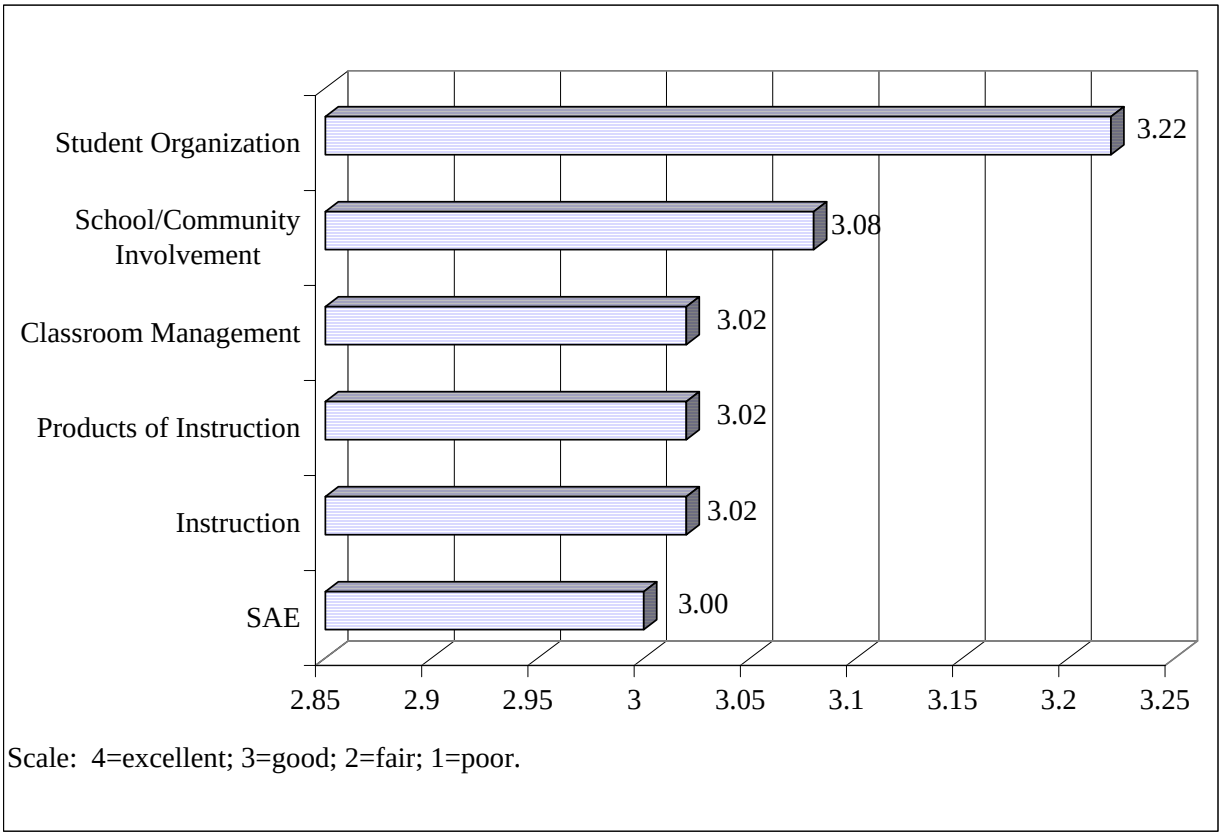

Figure 1. Administrator overall satisfaction with first-year teachers for each of the criteria groups.

The administrators' overall satisfaction with the first-year teachers in their employ was calculated by combining the rating from all 29 indicators. The means ranged from 4.00 to 1.50 with a mean of means at 3.07. The overall performance of five first-year teachers was rated as "excellent," nine were rated as "good" and two were rated as "fair."

Conclusions and Implications

Administrators are satisfied with the preparation of first-year agriculture teachers from Oklahoma State University. The mean for each of the 29 items included in the evaluation was in the "good" category. The vast majority of the administrators indicated the overall performance of the teachers was good to excellent. Still, the results of this study raise some concerns for our teacher education program.

In our program, we strive to produce "excellent" teachers. Through course offerings and structured experiences, our program addresses each of items on the criteria by which these teachers were evaluated. When the administrators' rate our graduates at less than excellent for any item, we know we have room for improvement. Of particular interest

are those criteria on which the mean rating was below 3.00. From the results of this study, our program needs to focus on the following areas to improve our product, first-year agricultural education teachers:

1. Clearly define expected behavior of students including encouraging positive behavior and controlling negative behaviors
2. Adjust instruction based on monitoring students
3. Establish closure to lessons
4. Have all students conduct meaningful supervised agricultural experiences
5. Take part in school and community activities other than those involving the agricultural education program.

While our graduates seem to be doing very well in their roll as advisor to the FFA, this research raises concerns about how our graduates value and use supervised agricultural experiences to enhance their teaching program.

This study serves as a positive first step toward evaluating the satisfaction of administrators and other stakeholders with graduates of our teacher education program. More work should be conducted using a variety of research techniques to assure the program is meeting the needs of our graduates and those with whom they work.

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IMPACT OF A PROFESSIONAL DEVELOPMENT WORKSHOP ON THE TEACHING OF A SECONDARY COURSE IN AGRICULTURAL COMMUNICATIONS AND LEADERSHIP

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Abstract

This study examined the impact of a secondary agricultural education workshop on the subject matter content of a new course in agricultural communications and leadership. About one-half of the teachers attended a summer workshop designed to help them with content and delivery of the course. Student enrolled in the course tended to be upperclassmen. Males and females were more equally represented in the population as compared to the enrollment in other agricultural education classes throughout the state. Findings indicate that teachers who attended the workshop scheduled more days for teaching communication theory. Teachers who did not attend the workshop tended to devote more days to teaching public speaking and parliamentary procedure. Results indicate that professional development workshops can have a significant impact on the time teachers devote to specific content areas and the selection of content in a secondary agricultural education course.

Introduction/Theoretical Framework

When the National Research Council's Committee on Secondary Agricultural Education (1988) announced its findings; debate erupted on the impact of the multitude of recommendations aimed at transforming Agricultural Education. Perhaps no recommendation has had a more widespread impact that this: "Major revisions are needed within vocational agriculture. The relevance and scope of curriculum . . . must be broadened." (p. 4). Specifically, the report called for a more flexible curriculum, saying the curriculum had not kept up with changes in modern agriculture.

While curricular changes were already beginning in some states, the "green-book" became the catalyst for many states and individual teachers to re-examine their course offerings and instructional content. Specialized courses in natural resources, principles of technology, and aquaculture quickly replaced Vocational Agriculture I - IV and in some cases specialized courses were further condensed to a single semester (Norris & Briers, 1988). Some early curricular changes were in title only, but over time, substantive changes have been major in what is being taught in secondary agricultural education.

Terry (1996) pointed out that agricultural communications is an important part of agricultural education's mission because it stresses the "about" agriculture segment of the profession. Terry's research revealed that agricultural communications graduates at the collegiate level should have competence in advertising, photography, public relations, public speaking, and telecommunications as part of their communications component. The National FFA Organization has also embraced agricultural communications, adding it to its growing list of proficiency awards, this year Agricultural Communications was added as a Career Development Event (National FFA, 1998).

Although leadership education has been a mainstay and, for some, the reason for the student organization's existence, leadership education as a subject matter course is only recently gaining acceptance. Texas introduced a specialized semester course AGSCI 312 Personal Leadership Skill Development (Norris and Briers, 1988). Brown and Fritz (1994) found that leadership education courses at the post-secondary level as offered through the agricultural education discipline have been well received. The researchers determined that leadership courses are a product that enjoys substantial consumer satisfaction and meets a growing demand.

At a time when teachers are being asked to change the focus of their programs, many complain that they lack the experience and training to change. Teachers of agriculture continually want and need in-service education, particularly in technical subject matter (Barrick, Ladewig, and Hedges, 1983). Logically, this need is more pronounced when the teachers are asked to teach new subject matter or subject matter in which they have had little previous training. Moman (1998) found that professional development workshops with science and agriculture teachers were effective at increasing the collaboration between the two teacher groups.

Much of what we know about the efficiency of professional development programs in education is based on anecdotes and on reports from teachers, principal investigators, and program directors involved with the programs themselves (National Research Council, 1996). The teachers feel they enhanced their content knowledge and are more comfortable in using inquiry-based methods of instruction in their classrooms as a result of professional development. This kind of subjective information is important and useful, but the overwhelming majority of programs that were investigated by the National Research Council (1996) have no formal devices for determining effectiveness of programs by evaluating how students fared after their teachers participated in professional development programs.

Ultimately, an evaluation mechanism is needed to be designed in order to collect longitudinal data to measure effects of professional development programs for teachers on their students, including how they learn and make

decisions beyond high school. Acquiring such data will require tenacity to collect and analyze comparable data over periods of 5-10 years (National Research Council, 1996).

The National Research Council (1996) found a lack of overall program evaluations connecting teacher participation in professional development with improvement of teaching skills or students' performance. To determine the ultimate impact of a program, long-term evaluation is needed to keep track of program participants and how they embody new information and methods into their classroom activities.

The Oklahoma Department of Vocational and Technical Education's Division of Agricultural Education (1996) authorized seven new course offerings for the 1997-98 academic year. One of the courses was entitled Agricultural Communications/Leadership. Because this course offering was directly related to the Department's agricultural communications and agricultural education undergraduate majors, departmental faculty proposed two; two-day summer workshops for teachers considering teaching the course. The proposal was accepted for funding and in June 1997, Departmental faculty and staff sponsored workshops on Agricultural Communications/Leadership to a total of 45 teachers.

The workshop was split into four segments on communications-related topics and four segments on leadership-oriented topics. Communications topics included preparing newsletters, photography, video production, and writing press releases. Leadership segments included strategic planning, leadership styles, creative problem solving, and human motivation. Time was also devoted to planning for a secondary course and Internet resources. A packet of sample instructional materials from various commercial and public sources was given to each participant as well as a copy of the leadership textbook from Delmar Publishing Co.

On site evaluations by the participants were very positive. However, that assessment provided no insight to the impact the workshop had on how the participants went about teaching the course.

Purpose and Objectives

The purpose of this study was to determine the impact of a professional development workshop for agricultural education teachers and assess the instruction given in a new secondary agricultural education course. Specifically, the objectives were to:

1. Demographically describe students enrolled in the Agricultural Communications and Leadership course.
2. Describe the course content.
3. Compare the course content offered by teachers who attended the professional development workshop to the content offered by teachers who did not attend the workshop.
4. Describe FFA activities completed as a part of the course.
5. Describe curriculum resources used by teachers.

Methods and Procedures

As a final activity of each workshop, teachers participated in an activity aimed at developing the content of a secondary course. Using the nominal group technique (Ford & Nemiroff, 1975), workshop participants brainstormed and prioritized curriculum concepts for the course. The nominal group process is a series of five steps.

Step #1 - Pre-meeting details - Where groups are subdivided and the problem mutually agreed upon,

Step #2 - Silent generation of ideas - Group members silently and independently brainstorm on possible solutions to problem.

Step #3 - Round robin listing - Without discussion each group member presents his/her ideas to the group recorder until all items have been listed.

Step #4 - Discussion - Group recorder leads group discussion of recorded ideas for clarification, elaboration, and evaluation. No items are eliminated from the list.

Step #5 - Ranking - Without further discussion or interaction individual group members are asked to select the ten most important items on the list and rank them. The process may be repeated to further narrow the list.

Common problems that groups encounter include arriving at conclusions without considering all information, individual domination of the group, and variations of status among group members. Nominal group technique helps to circumvent those problems by allowing all ideas to be revealed (in writing) and having all minority opinions represented and tolerated. Results of the nominal group technique are shown in Table 1 with lower scores indicating a higher ranking.

The researcher used the results of the Nominal Group Technique to develop a list of nineteen curriculum areas that teachers might include in a course. The survey instrument asked teachers to recorded the days of instruction devoted to a particular concept area for the fall semester and the days they anticipated devoting time to that concept for the

spring 1998 semester. Demographic information on students enrolled in the course was sought. There were four open-ended questions concerning the teachers' experience with the new course. Faculty and staff who conducted the professional development workshop assisted in the content and design of the instrument. The instrument was piloted on a group of former secondary teachers and modifications were made to reflect possible block scheduling assignments.

Table 1.
Workshop Participants Ranking of Course Concepts Using Nominal Group Technique

Workshop #1	N=29	Workshop #2	N=16
Concept	Score	Concept	Score
Goal Setting	138	Mechanics of Public Speaking	49
Multimedia Communication	154	Citizenship	73
Advanced Public Speaking	174	Goal Setting	77
Professionalism	176	Self-Concept	80
Citizenship	192	Leadership Styles	85
Personal Development	192	Job Interviewing Skills	85
Leadership Activities	201	Letter Writing	86
Interview Skills	211	Time Management	89
Careers in Communications	221	Ethics	92
Photography	225	Decision Making	94
Group Discussions	228	Nonverbal Communications	94
Time Management	229	History of Communications	101
Agriculture Promotion	230	Internet Applications	104
Interaction w/ Com. Leader	233	Group Dynamics	105
Writing Skills	233	Resume Development	109
Motivation	235	Vocabulary Building	111
Parliamentary Procedure	247	Parliamentary Procedure	118
Research Techniques	250	Etiquette	123
FFA Stuff	250	Researching Techniques	123
Computer Applications	260	Photography	126
Portfolios	260	Advertising/Promotion	141
Letter Writing	261		
Creating Newsletters	264		
Telephone Skills	264		
Video Production	269		
Organizational Dynamics	271		

On November 1, 1997 the state Department of Vocational and Technical provided a list of 30 teachers who reported teaching the course entitled Agricultural Communications and Leadership for the 1997-98 academic year. These 30 teachers represented the population of the study. By October 1 of each year Vocational Teachers are required to report to the state agency the classes they are teaching. Cross-referencing the list with that of the summer workshop showed that about half of those teaching the course had not participated in the summer workshop.

Table 2.
Response Rate of Teachers

	Population	Respondents
Teachers offering Ag Com/Leadership Course who attended professional development workshop	13	9 (69%)
Teachers offering Ag Com/Leadership Course who did not attend professional development workshop	17	8 (47%)
Total	30	17 (57%)

The survey instrument was printed on 11" x 17" paper and folded to form a four-page booklet. Instruments were color-coded to indicate attendance at the summer workshop. The questionnaire was mailed in mid-January to the 30 teachers who had self-identified as teaching the course. By mid-February, twelve questionnaires had been returned and a second mailing was sent to those who had not responded. This mailing yielded two additional returns and on March 1 a third mailing was spent to the non-respondents which yielded an additional return for a total of 15 returned questionnaires. Response results can be seen in Table 2. A telephone follow up of three non-respondents

revealed that some instructors were not in fact teaching the Agricultural Communications and Leadership course. Reasons given were administrative changes, teacher change, and inadequate teacher preparation time.

Results/Findings

Objective one was to describe demographically the secondary students enrolled in the Agricultural Communications/Leadership course. Figure 1 illustrates the classification levels of students enrolled in the Agricultural Communications and Leadership course. The course was made up of mostly juniors and seniors (70%). Although Agriscience I is a prerequisite to all other Agricultural Education courses, six freshman were enrolled in the Agricultural Communications and Leadership course.

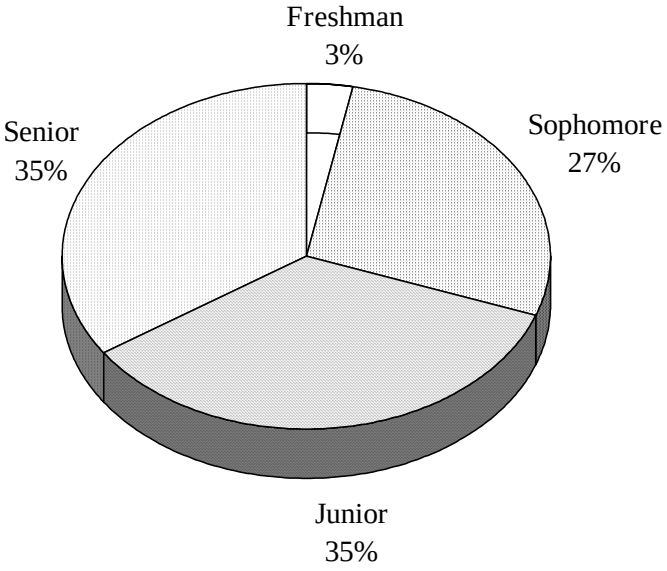

Figure 1. Students enrolled in Ag Com/Leadership by classification

Table 3 describes further demographic information based on gender, FFA leadership, and ethnicity. Male students made up a majority of the class, but enrollment in the Agricultural Communications and Leadership course was far more gender neutral than enrollment in all High School Agricultural Education Programs in the state. In terms of ethnicity, almost 80% of the students were White and the teacher described about 17% as being Native American. Enrollment by ethnicity was in line with the state averages. Two foreign exchange students were enrolled and categorized as "other".

All teachers reported FFA officers enrolled in the course with a range from three to seven. Although non-FFA officers outnumber FFA officers almost two to one, it should be noted that the mean FFA officers enrolled (4.35) is from a maximum of seven FFA officers. Mean class size (12.96) was slightly higher than mean class size for all high school agricultural education programs (12.30).

Table 3.
Demographics of Students Enrolled in Agricultural Communications/Leadership Course

Variable		N	Mean	%	State Avg.	Range	SD
Gender							
	Male	123	7.69	58%	72%	3 - 14	3.60
	Female	88	5.50	42%	28%	1 - 10	2.80
Ethnicity							
	White	175	10.35	80%	79%	6 - 18	3.48
	Native American	38	2.24	17%	17%	0 - 10	3.40
	Hispanic	2	.12	1%	2%	0 - 2	.33
	Asian-American	2	.12	1%	0%	0 - 2	.33
	African American	2	.12	1%	3%	0 - 2	.33
	Other	2	.12	1%	---	0 - 2	.33
FFA							
	Local FFA Officer	74	4.35	33%		3 - 7	1.41
	Non-FFA Officer	144	8.47	67%		2 - 20	5.44
Class Enrollment		218	12.82		12.30	6 - 24	5.38

Objective two was to describe the content of the Agricultural Communications and Leadership course. Teachers were asked to record the number of days that were spent on a topic in the fall semester and the number of days planned for instruction on the topic in the spring semester. Table 4 reveals that teachers devoted more days to parliamentary procedure and public speaking than other topics.

Table 4.
Days Spent Teaching Subject Area in Fall 1997 and Days Planned for Spring 1998

Subject Area	Teaching Days Fall		Days Planned Spring	
	Workshop	No Workshop	Workshop	No Workshop
Public Speaking	8.50	16.25	13.63	13.57
Newsletters	8.50	9.38	5.00	5.00
Photography	8.38	1.25	4.75	2.14
Parliamentary Procedure	6.50	8.75	6.25	14.43
Research Techniques	6.50	6.75	5.13	4.86
Motivation	5.00	5.25	2.88	1.71
Job Skills	5.00	3.38	6.13	18.57
Leadership Styles	4.88	3.13	1.75	3.00
Letter Writing	4.88	3.50	3.50	3.14
Advertising/Promotion	4.63	1.88	3.63	2.43
Internet Applications	4.63	2.00	7.50	0.71
Citizenship	3.88	3.75	1.63	3.86
Goal setting	3.25	7.00	2.75	2.14
Decision Making	3.25	1.25	1.25	2.14
Video Production	2.00	1.25	6.25	3.29
Time Management	1.63	2.25	2.75	3.57
Non-Verbal Comm.	1.25	1.13	2.75	1.43
Etiquette	0.75	3.00	6.13	1.71
Self Concept	0.63	2.50	4.88	2.00
Other	2.50	3.13	1.88	0.71

Objective three was to compare teachers who attended the professional development workshop to those who did not. Topics were clustered into the general areas of leadership, communications, Internet-related, public speaking, parliamentary procedure, and job skills. Research techniques were included with public speaking because it was believed that students were researching materials for speech material. Table 5 shows the topics as categorized. Topics identified as "other" included word-processing, college entrance requirements, and current events.

Table 5.
Subject Matter Areas of Communications and Leadership as Categorized

Categorization of Course content areas					
Communications	Public Speaking	Leadership	Internet Applications	Parliamentary Procedure	Job Skills
Advertising/ Promotion	Public Speaking	Decision Making	Internet Applications	Parliamentary Procedure	Resume Development
Nonverbal Communications	Research Techniques	Leadership Styles			Interview Skills
Video Production		Motivation			Etiquette
Photography		Self-Concept			
Letter Writing		Time Management			
Newsletters		Goal Setting			
		Citizenship			

Table 6 shows that teachers who attended the professional development workshop taught a significantly higher number of days on communications and Internet applications. Those teachers also taught a significantly fewer number of days on public speaking than did teachers who did not attend the workshop.

Table 6.
Days Spent (or Planned) Teaching Subject Area

Subject Area	Mean Teaching Days		
	Workshop	No Workshop	Probability
Communications Advertising/Promotion Letter Writing, Newsletters Nonverbal Communications, Photography, Video Production	27.44	17.93	.039*
Leadership Citizenship, Decision Making Goal Setting, Leadership Styles Motivation, Self-Concept Time Management	18.20	16.19	.374
Public Speaking Public Speaking Research Techniques	15.00	32.27	.012*
Job Skills Etiquette Interviewing skills	13.31	18.67	.209
Parliamentary Procedure	5.75	11.40	.086
Internet Applications	5.13	1.40	.006*

*p<.05

The fourth objective was to determine the FFA activities undertaken by the class. There seemed to be little variation between the activities listed for teachers who attended the professional development workshop and those who had not. Major points made by the respondents are summarized as follows.

Workshop Attendees

- Sponsored local leadership workshop, FFA committee chairs were in class
- Prepare FFA speeches, FFA photography contest
- Maintained chapter homepage, published chapter newsletter
- Sponsor chapter speech contest, class members participated in speech contest
- Planned FFA chapter banquet
- Prepared press releases for newspaper
- Produced video for banquet, edited county (livestock) show book

Workshop Nonattendees

- Prepared education booth for fair, prepared newspaper articles
- Prepared banquet programs, meeting agendas, (prepared contest teams in parliamentary procedure and speech)
- School announcements, chapter scrapbook, school news on school's cable TV, letter writing.
- Flyers for FFA labor auctions, newspaper articles
- Chapter newsletter
- Prepared local radio program
- The fifth objective was to describe the curriculum materials used by teachers. As with FFA activities, no appreciable differences were found between the two groups of teachers. Both groups used textbooks, but few used bound-curriculum materials.

Workshop Attendees

- Leadership: Personal Development and Career Success (Delmar) (6)
- National FFA videos
- Microsoft Windows 95 tutorial
- online resources
- College leadership course materials (2)
- Developing Leadership and Personal Skills (Interstate) (3)
- (CIMC, Oklahoma) Sales and Service Core Curriculum
- Materials from OSU Workshop

Workshop Non-attendees

- Leadership: Personal Development and Career Success (Delmar) (3)
- (TAMU) Instructional Materials Service booklets
- Roberts Rules of Order (2)
- Developing Leadership and Personal Skills (Interstate) (4)
- National FFA resources
- Claris Works, Netscape
- Internet resources
- OSU Agricultural Communications course notes
- State winning public speaking manuscripts
- Leadership materials from Troy Hinkle (undergraduate AgEd student)
- Nothing from CIMC (Oklahoma)

Conclusions

The purpose of this study was to determine the impact of a professional development workshop for agricultural education teachers and assess the instruction given in a new secondary agricultural education course. Students enrolled in the Agricultural Communications/Leadership course were much like other agricultural education students in terms of ethnicity and enrollment. Females were represented at a much higher number than in other agricultural education courses and this course tended to attract students who were serving as FFA chapter officers. Enrollment in this upper-division course attracted sophomores, juniors, and seniors evenly.

Agricultural Education teachers devoted most of their instructional time to public speaking, parliamentary procedure, preparing newsletters, and research. Little instructional time was devoted to decision-making, time management, self-concept, and non-verbal communications. Teachers who attended the professional development workshop taught a significantly higher number of days on communications and Internet applications. Those teachers also taught a significantly fewer number of days in the public speaking than did teachers who did not attend the workshop. Teachers from both groups devoted about the same instructional time to leadership topics. It can be concluded that the professional development workshop was effective in influencing teachers to incorporate communications and Internet resources and in minimizing devotion to parliamentary procedure.

Teachers were effective in incorporating appropriate FFA activities into the Agricultural Communications/Leadership course. Teachers reported preparing FFA news releases, maintaining chapter homepages, developing FFA chapter newsletters, and radio and cable access television programs.

Curriculum materials used by teachers included leadership and communications textbooks specifically geared to secondary agricultural education and materials from college coursework in agricultural leadership and communications.

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FFA STATUS OF SELECTEDAGRICULTURAL EDUCATION ENROLLEES IN OKLAHOMA

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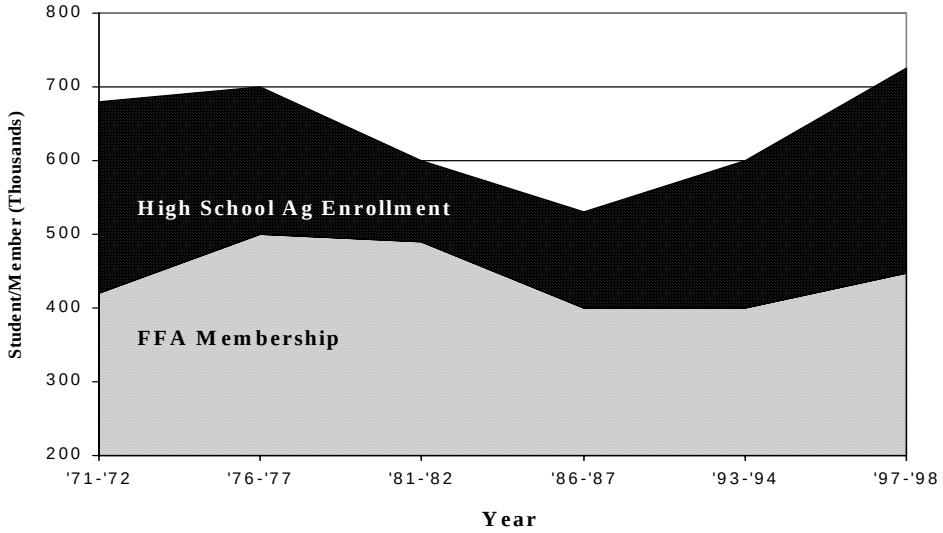
Abstract

Scope and Method of Study: The purpose of this study was to describe traditional and non-traditional Agricultural Education enrollees and the degree to which these groups participate in the Agricultural Education program. Participants in the study included 393 junior and senior agricultural education enrollees at selected secondary high schools in Oklahoma. Selected schools contained multiple teachers with horticulture or natural resources being taught. Non-traditional enrollees were defined as those students who enrolled in an Agricultural Education course for the first time as a junior or senior while traditional enrollees were those students who had previous years in Agricultural Education. Students completed a questionnaire regarding demographic information, FFA activities and supervised agricultural experienced programs. Descriptive statistics and T-tests were utilized to describe and compare groups. Findings and Conclusions: Demographically, traditional enrollees tended to be male and from rural areas while non-traditional enrollees were either male or female and from urban areas. Differences were seen in FFA activity involvement as more than 35% of traditional enrollees were involved in 8-15 activities while more than 50% of non-traditional enrollees were involved in no FFA activities. Traditional enrollees with higher grade point averages were more likely to be involved in a greater number of FFA activities. This was not true for non-traditional enrollees. Majorities of both groups were found not to have supervised agricultural experience programs or record books. Point of enrollment was found to be a factor in students level of involvement in FFA and SAE activities.

Introduction



While expanded course offerings in areas like Horticulture and Natural Resources have increased Agricultural Education enrollments in the 1990s, student organization membership in the FFA has continued to decrease (National FFA Organization, 1999). Likewise, supervised agricultural experiences continue to decrease. A recent study by the National FFA Organization estimated that roughly half of students enrolled in Agricultural Education courses maintain an SAE or claim membership in the FFA (National FFA Organization, 1999). Figure 1 depicts the upward trends in enrollment with decreases in percentage of FFA membership.

Figure 1.
Trends in Agricultural Education enrollment and FFA membership.

Secondary Agricultural Education programs in the United States were originally directed to educate young men who aspired to be farmers. Students entered as freshmen and completed Vocational Agriculture I-IV where they were exposed to the gamut of farming principles, techniques, and related skills. Today, Agricultural Education courses are designed for young women and men who aspire to the broad career areas found in agriculture (National Research Council, 1988).

With current course offerings varying from Animal Science to Floral Design, the Agricultural Education enrollees come with new perspectives (Hoover & Scanlon, 1991). Fewer students now complete four years of agricultural training as they were in the past (Marshall, Herring, & Briers, 1992). Many now enter as juniors or seniors and seek courses that match their specific interests. With this flexible entrance to the program comes new obstacles for Agricultural Education as teachers struggle to reach new groups of students who come to their programs with vastly different expectations (Marshall, Herring, & Briers, 1992). The influx of more non-traditional students into Agricultural Education programs may result in students who enroll for specific courses, but are not interested in FFA or SAE activities.

Theoretical Framework

The national report, Understanding Agriculture: New Directions for Education (National Research Council, 1988) continues to shape the future of Agricultural Education. By determining that education in agriculture and about agriculture were important to the future of the agricultural industry, agricultural literacy efforts began through schools and state governments. Additionally, recommendations included expanding the FFA to reflect more diverse populations of students, broadening agricultural emphasis from the terms "farming" and "farmer", and expanding Supervised Agricultural Experiences to include projects unrelated to production enterprises.

Figure 2 depicts the latest model for Agricultural Education, developed by The Council (National FFA Organization, 1992). Classroom and laboratory instruction in agriculture is reinforced through application of skills and competencies learned in the classroom through SAE, FFA activities, and improvement projects. Incentives for increased participation occur through contests, awards and degrees. These applied skills lead to employment or additional education for the student who ultimately prepares for a career. All areas are applied within the context of the school and community.

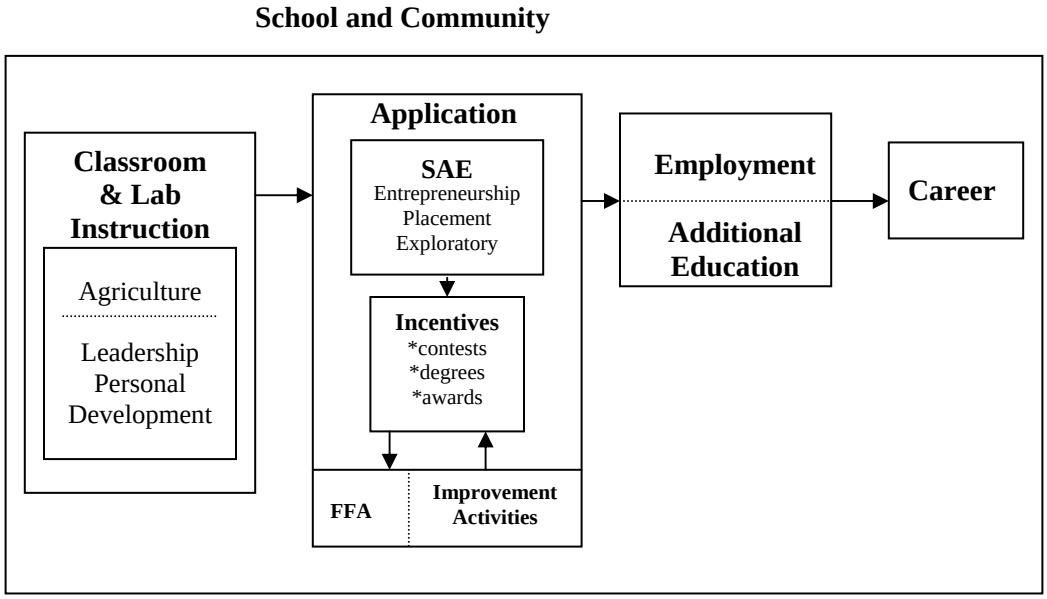


Figure 2.
The Agricultural Education model.

Moore explained the application element of the model, SAEs, as a way to help students gain experience rather than only learning theory (National FFA Organization, 1999). To fulfill the occupational and experiential needs of students, several types of SAEs are available and outlined in the National FFA Organization Manual each year (Cheek, 1994). Currently, three types of SAEs are available: entrepreneur, placement, and exploratory. These allow students to own projects or businesses, work in agri-business, or explore various areas of interest.

Supporters of SAE's suggest that these activities may improve student achievement though some obstacles exist. Long and Israelsen (1983) found a strong relationship between teacher emphasis and student achievement. Osborne (1988) also identified several obstacles to conducting quality SAE programs. These included: lack of student motivation, limited student opportunities, lack of teacher time, poor student record keeping practices, inadequate financial resources and facilities, and low parent interest. Dyer and Osborne (1996) concluded that SAE programs lacked definition, focus, and direction. The authors suggested that though new curricula have emerged, SAE programs have changed little.

Additionally, the FFA component of the Agricultural Education Model extends learning beyond the classroom, providing its members opportunities to further improve agricultural skills and develop agricultural leadership, cooperation, and citizenship (Townsend and Carter, 1983). Perhaps it is the development of these leadership skills that sets FFA apart as the most beneficial component of the program (Wingenbach & Kahler, 1997). Furthermore, several studies have concluded that the leadership competencies developed through FFA are beneficial to students (Carter & Townsend, 1983; Cheek, 1994), finding that individuals who participated more in FFA activities had more contacts with others and as a result broadened their frame of reference for comparison of their own self-perceived personal development.

Though the benefits of student involvement in SAE's and FFA activities appears to be positive, a National FFA study (1999) indicated that over half of all Agricultural Education enrollees are not FFA members while an even larger percentage do not have SAE's. One possible reason for the surge in enrollment and declines in FFA and SAE activities may be due to influxes of non-traditional students who enroll for the diversified courses now offered in Agricultural Education programs (Marshall, Herring, & Briers, 1992). Similar findings were evident in a study by Sproles (1987) where females completing traditionally male vocational programs were studied. Fraze and Briers (1987) found that "completers," those students completing a sequence of Agricultural Education courses, tended to enter occupations at a significantly higher rate when participating in a balanced program of FFA and SAE activities.

Purpose/Objectives

The purpose of this study was to describe traditional and non-traditional Agricultural Education enrollees and the degree to which these groups participate in the Agricultural Education program. To accomplish this purpose, the following objectives were developed:

1. Compare selected characteristics of traditional and non-traditional Agricultural Education enrollees.
2. Compare traditional and non-traditional enrollees' participation in SAE activities.
3. Compare traditional and non-traditional enrollees' participation in FFA activities.

Methods/Procedures

The population consisted of junior and senior students enrolled in selected Agricultural Education programs in the Spring of 1999 in Oklahoma. A school profile was developed in order to select Agricultural Education departments in Oklahoma to participate in the study. The profile included schools with multiple teachers in the department and a non-traditional area (Horticulture or Natural Resources) being taught. This list was narrowed based on the likelihood of obtaining students enrolling in Agricultural Education for the first time as a junior or senior. The researcher was assisted by the staff in the Agricultural Education Division at the Oklahoma Department of Vocational and Technical Education and Agricultural Education Faculty at Oklahoma State University in determining multiple teacher departments which fit the profile. This resulted in the selection of eight schools.

The researcher developed a questionnaire to achieve the objectives of the study. After the instrument was formulated, additions, deletions and corrections were solicited from the Agricultural Education faculty at Oklahoma State University and the supervisory staff at the Oklahoma Department of Vocational and Technical Education. Suggested changes were made and the instrument was prepared for field-testing. Additionally, state supervisory staff suggested personal visits would provide more realistic data.

A pilot study was conducted in a local school, not part of the study population. Modifications concerning instructions were made based on the results of the pilot study. Initially, each selected school was contacted by a letter from Dr. Eddie Smith, the state program leader for the Agricultural Education Division of the Oklahoma Department of Vocational Technical Education, stating the purpose, importance, and procedure of the study. A follow up phone call was made to a teacher at each school to inquire concerning their willingness to participate.

Once confirmation was made and questions concerning procedures were answered, schools were visited by the researcher or an assistant. Each junior and senior in Agricultural Education classes that day was asked to complete the instrument after being read a disclosure statement. Questionnaires were collected and returned by the researcher or assistant visiting each school. All schools were visited in the month of April, 1999.

Collected data were first separated by school. School data were then separated into two groups: 1) those taking an Agricultural Education class for the first time as a junior or senior and 2) those who were previously enrolled in Agricultural Education. Throughout the remainder of this study, those juniors and seniors taking their first Agricultural Education course as a junior or senior will be referred to as "non-traditional" and those juniors and seniors who had previous years of Agricultural Education will be referred to as "traditional."

Descriptive statistics, correlations, and t-tests were used to accomplish the analysis of the data (Pedhazur, 1982). The demographic portions of the instrument dealt with nominal data so frequencies and percentages were utilized. T-tests between traditional and non-traditional groups were used to determine if differences were statistically significant. An alpha level of .01 was selected as the significance level. Correlations were evaluated based on level of significance and strength of the relationship.

Results/Findings

Eight schools were found to fit the established school profile, being a multi-teacher department while teaching an expanded course offering of Horticulture or Natural Resources and being likely to have juniors and/or seniors as first time enrollees. This provided 393 useable questionnaires with 190 traditional and 203 non-traditional students. 15 questionnaires were determined not to be useable because an entire category of information or more was missing.

Comparison of Selected Characteristics

Differences were present in the gender of traditional and non-traditional enrollees. With slightly more than one-third of the traditional enrollees, and one-half of the non-traditional enrollees being female.

Place of residence for traditional and non-traditional enrollees did differ significantly (P(t)=.00000) with a larger percentage of non-traditional enrollees (60.10%) living in the city compared to 40.53% for traditional enrollees. Fewer than 10 percent of non-traditional enrollees lived on farms compared to 25.26% of the traditional enrollees. However, plans after graduation did not differ significantly for traditional and non-traditional enrollees.

Career intentions related to an agricultural career differed for traditional and non-traditional enrollees. Of the traditional enrollees, 40.00% reported career intentions related to agriculture compared to only 16.26% for non-traditional enrollees; only 25.26% of traditional enrollees reported career intentions other than agriculture while non-traditional enrollees reported 56.16%.

Differences between traditional and non-traditional enrollees' academic performance were not seen (Table 1). Those slight differences present were not statistically significant at α=.01.

Table 1.
Academic Performance of Traditional and Non-Traditional Enrollees

Grade	Traditional		Non-Traditional	
	N	%	N	%
A's	15	7.89	33	16.26
A's & B's	83	43.68	101	49.75
B's	19	10.00	4	1.97
B's & C's	54	28.42	39	19.21
C's	8	4.21	11	5.42
C's & D's	7	3.68	12	5.91
D's or Below	2	1.05	2	.99
Overall Academic Index		3.04		3.15

P(t)=0.108

With regard to activities, traditional and non-traditional enrollees were very similar (Table 2). No statistically significant difference was found in the number of activities traditional and non-traditional enrollees were involved.

Table 2.
Academic Performance of Traditional and Non-Traditional Enrollees
Activities of Traditional and Non-Traditional Enrollees

Activity	Traditional		Non-Traditional	
	N	%	N	%
FFA	182	95.79	133	65.52
Athletics	87	45.79	109	53.69
Honor Society	33	16.84	56	27.59
Church Group	49	25.79	70	34.48
Band	29	15.26	43	21.18
Vocational Club	34	17.89	32	15.76
Student Council	25	13.16	38	18.72
Language Club	18	9.47	44	21.67
FHA	21	11.05	32	15.76
4-H	32	16.84	3	1.48
Debate	12	6.32	26	12.81
Newspaper	11	5.79	26	12.81
Cheerleading	8	4.21	18	8.87
Hobby Club	8	4.21	14	6.90
Boy/Girl Scouts	17	8.95	9	4.43
Other Club/Organization	30	15.79	21	10.34
Mean # of Organizations	3.14		3.32	

P(t)=0.355

With regard to correlated variables (Table 3), differences were found in the strength of the correlation between Academic Performance and Organization Involvement as this relationship appeared to be stronger for non-traditional enrollees (r=.47).

Table 3.
Correlations Between Academic Performance and Organization Involvement for Traditional and Non-Traditional Enrollees

Variable	Traditional Correlation	Non-Traditional Correlation
Academic Performance/Organization Involvement	.32*	.47*

*Significant *r* at α=.01

Few differences were found in the Agricultural Education course enrollment of traditional and non-traditional enrollees. However, a larger proportion, 66.10%, of non-traditional enrollees took Horticulture as compared to 31.05% of traditional enrollees. A greater percentage (8.95%) of traditional enrollees were enrolled in multiple courses concurrently, compared to only 2.46% of non-traditional enrollees.

Participation in FFA Activities

Responses to a statement regarding FFA membership revealed differences between traditional and non-traditional enrollees (Table 4). Though the majority of both groups were members, a disparate number of non-traditional enrollees were not members (31.03%).

Table 4.
FFA Membership of Traditional and Non-Traditional Enrollees

Membership	Traditional		Non-Traditional	
	N	%	N	%
Member	169	88.94	128	63.05
Not a Member	13	6.84	63	31.03
Unsure	2	1.05	7	3.45
No Response	6	3.16	5	2.46

Table 5 displays the frequency and percentage of FFA activities traditional and non-traditional enrollees were involved. Overall, a greater percentage of traditional enrollees were involved in all activities as compared to non-traditional enrollees. It should also be noted that "FFA Livestock Shows and Fairs" ranked second in participation for traditional enrollees while less than ten percent of non-traditional enrollees participated in this activity. Additionally, the activity most participated in by both groups, "FFA Fundraising," was also disparate with 71.05% of traditional and 31.53% on non-traditional enrollees participating.

Table 5.
FFA Activities of Traditional and Non-Traditional Enrollees

Activity	Traditional		Non-Traditional	
	N	%	N	%
FFA Fundraising	135	71.05	64	31.53
FFA Field Trip	116	61.05	50	24.63
FFA Chapter Banquet	119	62.63	28	13.79
FFA Judging Contests	87	45.79	26	12.81
FFA Community Activities	95	50.00	23	11.33
FFA Committee Member	69	36.32	19	9.36
FFA Livestock Shows/Fairs	124	65.26	19	9.36
State FFA Convention	75	39.47	10	4.93
National FFA Convention	52	27.37	4	1.97
Made For Excellence Conference	30	15.70	4	1.97
FFA Alumni Camp	40	21.05	3	1.47
FFA Award Applications	72	37.89	3	1.47
FFA Chapter Officer	44	23.16	2	.99
FFA Leadership/Speaking Contests	52	27.37	2	.99
FFA Committee Chairperson	41	21.58	0	.00

Additional differences were seen in FFA Status (Table 6). The number of FFA activities traditional and non-traditional enrollees participated differed greatly with 14.21% of traditional and 51.23% of non-traditional enrollees involved in no activities. Also, 35.26% of traditional and .99% of non-traditional enrollees were involved at the Committed level.

Table 6.
FFA Status of Traditional and Non-Traditional Enrollees

Activity	Level	Traditional		Non-Traditional	
		N	%	N	%
None	(0)	27	14.21	104	51.23
Limited	(1-3)	40	21.05	73	35.96
Active	(4-7)	56	29.47	24	11.82
Committed	(8-15)	67	35.26	2	.99

Participation in SAE Activities

With regard to SAE Status, differences were again visible. Those enrollees reporting an SAE and record book were much higher for traditional (42.63%) than non-traditional (3.94%) enrollees. A much larger percentage of non-traditional enrollees (31.53%) reported an SAE but no record book as compared to traditional enrollees (10.00%). A large proportion of both traditional and non-traditional enrollees did not have an SAE with 47.37% of traditional and 64.53% of non-traditional.

Differences were also found in the types of SAEs of traditional and non-traditional enrollees (Table 7). Most (42.63%) traditional enrollees reported production SAEs (owning livestock, producing crops, etc.) while most (26.60%) non-traditional enrollees reported unpaid placement SAEs (having a plant to care for in the greenhouse). For both groups, the majority reported no SAE.

Table 7.
Types of SAEs of Traditional and Non-Traditional Enrollees

Type of SAE	Traditional		Non-Traditional	
	N	%	N	%
Production	81	42.63	7	3.45
Agribusiness	6	3.16	1	.49
Paid Placement	9	4.74	3	1.48
Unpaid Placement	4	2.11	54	26.60
None	90	47.37	131	64.53

Table 8 displays the relationship between SAE and FFA Status which was stronger for traditional enrollees (r=.61). A more prominent difference was seen in the relationship between Academic Performance and FFA Status as a statistically significant relationship existed for traditional enrollees that was not seen for non-traditional enrollees, though the practical difference was minimal.

Table 8.
Correlations Between Selected Variables for Traditional and Non-Traditional Enrollees

Variables	Traditional Correlation	Non-Traditional Correlation
SAE/FFA Status	.61*	.25*
Academic Performance/FFA Status	.24*	.16

*Significant *r* at α=.01

Conclusions/Recommendations/Implications

Based on the findings of this study the following conclusions were made:

Demographic characteristics of traditional and non-traditional were similar except in the areas of gender and place of residence. This finding concurred with previous research classifying both females and those from urban areas (Sproles, 1987) as non-traditional enrollees. For practical purposes, traditional and non-traditional enrollees were not different.

Traditional enrollees with higher academic performances were more likely to be involved in a greater number of FFA activities. This finding was not true for non-traditional enrollees indicating that point of entry, regardless of academic performance, was a factor in student involvement in activities.

Non-traditional enrollees were not members of FFA nor were they involved in FFA activities. Late entrance was determined to be a significant factor in students' lack of involvement in FFA activities. Previous research had not specified point of entry as a factor in students' involvement in student organizations.

SAE's are not the norm for traditional and non-traditional enrollees. This concurred with previous research in other states and nation wide (National FFA Organization, 1999). Regardless of the benefits of SAEs and FFA stated in the literature (Rawls, 1982; Carter & Townsend, 1983), students continue to pass through Agricultural Education programs without having SAEs or record books or being involved in FFA.

The reaction of Agricultural Educators to lack of FFA membership and declining Supervised Agricultural Experiences is to work harder at recruiting students and mandating these activities once students are enrolled. Trends over the last thirty years have indicated continued decreases in FFA membership and SAE involvement while total Agricultural Education enrollment has surged. The knee-jerk reaction of those closely associated to Agricultural Education might be to attack the "problem" with more stringent rules, regulations, and mandates. The profession may need to begin addressing questions concerning the fundamental elements of the Agricultural Education program.

Questions include:

1. Does the current Agricultural Education Model reflect today's Agricultural Education programs?
2. Is FFA and SAE involvement integral if only a small percentage of students participate in the full program?
3. How can pre-service Agriculture Education teachers best deal with the reality of declining FFA and SAE involvement?

The profession may be better served if the "problems" associated with Agricultural Education are viewed as "opportunities." The wake-up call may have arrived whereby serving ALL students' needs becomes the focus.

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USE OF DISTANCE LEARNING TECHNOLOGY TO TEACH A MULTIDISCIPLINARY COURSE:PHYTOCHEMICALS IN FRUITS AND VEGETABLES

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Abstract

Most of our universities are using, or exploring the use of, distance education as a delivery system for courses, degrees, and continuing education. *Phytochemicals in Fruits and Vegetables to Improve Human Health* was developed and delivered as a new graduate course in spring, 1999. Distance learning technology provided the conduit for interaction among 18 faculty/researchers across the nation and a diverse group of learners in 10 videoconferencing sites. Weekly topics and discussion were delivered via the Trans-Texas Videoconference Network (TTVN) with course handouts and PowerPoint slides available on a course Web site. Formative and summative evaluations were collected on-line and stored in a database. An external evaluator observed the course and kept a field journal, compiled numerical ratings, and completed the constant comparative method to integrate categories on all open-ended responses. The most beneficial component of the course was access to national experts/presentations and the relevancy of research applications to a geographically dispersed audience. Only through distance education was this approach possible. The initial evaluative results will be implemented for the revision of this course and practical recommendations will be shared.

Introduction: Why Distance Learning?

In *Reclaiming a Lost Heritage* (1995), John Campbell focuses on the value and necessity for education in a society that embraces democracy and free enterprise. "Technology has now changed or altered how people access, gather, analyze, present, transmit, and simulate information. Today's technologies provide the tools, applications, and processes that empower individuals of our information society" (See, 1994, p. 30). Advances in scientific developments, telecommunications, information processing, and dissemination technologies are accelerating knowledge generation and acquisition (Hefzallah, 1990). There is escalating awareness that our educational systems are facing inordinate difficulties in trying to meet the needs in our changing and increasingly technological society. In the next century, how will higher education institutions ensure access to lifelong learning?

Most of our universities are using, or exploring the use of, distance education as a delivery system for courses, degrees, and continuing education. Many question the "quality" and rigor of distance education and compare "traditional" classrooms to technology-mediated delivery. Many researchers argue that these comparative studies are of little or no value. The predominance of "no significant difference" findings has led them to conclude that delivery systems do not matter (Russell, 1996). "Comparative studies of mediated education do not address the question of quality of learning and teaching in the right frame. These studies are grounded in the mechanical view of mediated communication and the physical science paradigm of educational technology" (Saba, 1999, p. 29). Clark (1983) argued that media were mere vehicles used to deliver instruction and that it is the method rather than the media that affects learning. Research that considers the use of "systems approaches" to describe distance education and define a set of prescriptive principles for its effective use are necessary (Saba, 1999; Smith & Dillon, 1999a). "A systems theory of distance education helps us understand that 'distance' is not a product of geography, but rather it is a function of the relationship between structure and dialogue" (Smith & Dillon, 1999b).

Theoretical Framework: Why Phytochemicals?

Historically, consumption of certain fruits and vegetables was thought to prevent or cure ailments ranging from headaches to heart diseases. In fact, early medicine revolved largely around the prescription of specific plant food concoctions for certain health disorders (Darby, Ghalioungi & Grivetti, 1977; Kohman, 1947). In the history of mankind, there has always been the awareness that the composition and quality of the diet have a strong impact on maintaining good health. Parents encourage children to eat fruits and vegetables because they help the children "grow big and strong." However, only one percent of children from two to 19 years old meet the U.S. Department of Agriculture's dietary guidelines (Munoz, Krebs-Smith, Ballard-Barbash & Cleveland, 1997).

Until relatively recently, these attributes of fruits and vegetables were based more on metaphysical beliefs than on scientific evidence, but during the past decade many studies examined the relationship between the consumption of fruits and vegetables and human health. Besides being the main source of dietary fiber and vitamins, fruits and vegetables contain more useful compounds. They contain a myriad of phytochemicals or bioactive compounds shown to have anti-inflammatory, antioxidant, and healing effects. These include carotenoids, flavonols, flavones, tocopherol, selenium, phenols, protease inhibitors, organosulphur compounds, limonoids, and plant sterols (Potter & Steinmetz, 1996; Fahey, Zhang & Talalay, 1997).

Review of the epidemiological data, including both cohort and case-control studies of all cancer sites, strongly suggests that plant foods have the potential to prevent diseases. These plant foods include vegetables such as broccoli, onion, carrots, tomatoes, lettuce, celery, cucumber, endive, parsley, radish as well as citrus fruits, grape, coffee, and tea. For example, the protective role of carotenoid-rich fruits and vegetables in prevention of heart diseases, cancer, and advanced age-related macular degeneration is well documented (Gaziano, Manson, Branch, Colditz, Willet & Buring, 1995; Morris, Kritchevsky & Davis, 1994; Seddon, Ajani, Sperduto, Hiller, Blair, Burton, Farber, Gragoudas, Haller, Miller, Yannuzi, & Willet, 1994; Van Poppel, 1993). Even the aging process appears to be favorably influenced by increased intake of fruits and vegetables (Gerster, 1997). It has been established that the large intake of fruits and vegetables is associated with decreased incidence of cancer and mortality in several human cohort sites (Hiryama, 1985; Doll, 1990).

The National Academy of Science unraveled an important report on *Diet, Nutrition and Cancer* in 1992. This report emphasized the relationship between diet and cancer and offered specific dietary suggestions. The Surgeon General's Report on Nutrition and Health in 1988 revealed that five of every 10 deaths in the U.S. were attributed to diet-related diseases. The strategy in the war against human diseases needs to be revised. A major emphasis on prevention rather than cure needs to be implemented through education in agriculture and food science curricula. Even though we have evidence suggesting the importance of fruits and vegetables, there were no specific courses designed to teach students about the phytochemicals contained in fruits and vegetables.

Course Design and Delivery

In the fall of 1998, Texas A&M University-Kingville Citrus Center was awarded a USDA Challenge Grant to develop a new course: *Phytochemicals in Fruits and Vegetables to Improve Human Health*. This course, delivered in spring, 1999, was the first in the nation to combine experts from chemistry, plant physiology, horticulture, plant breeding, food science, plant pathology, biochemistry, postharvest physiology, and the medical sciences in the discussion of phytochemicals. Although it was designed as a graduate-level course, upper-level undergraduates and professionals in the field seeking continuing education credit also participated. Interaction among 18 instructors and 32 students at 10 videoconference locations was accomplished via an interactive video network supported through the Texas A&M University System. The Trans-Texas Videoconference Network (TTVN) has approximately 100 videoconference sites across Texas and at international locations in Mexico and Central America. It is a full-duplex system using dedicated T-1 circuits to transmit audio, video, and data. Phytochemical information was delivered through PowerPoint® presentations, slides, demonstrations, video clips, and discussion. Course handouts and PowerPoint were provided to learners on a course Web site (http://phytochemicals.tamu.edu).

A basic premise of the course design was to shift significantly away from the traditional lecture style by one instructor to a learning environment enhanced by distance education with several instructors. Many studies have shown that the lecture hall is not an effective learning environment (Laws, 1991) and that a mixture of discovery, Socratic dialogue (Hake, 1994) and lecture with the demonstration of experimental results increases understanding and retention. As described in *Everybody Counts*, the teacher's role should shift to that of consultant, moderator, and interlocutor, not just presenter and authority (National Research Council, 1989).

Course Objectives and Purpose of the Evaluative Study

The primary objective of the course was to provide opportunities for students to acquire interdisciplinary knowledge related to the effect of fruits and vegetables on human health. A second objective was to make students aware of careers in health-related interdisciplinary fields, and increase their knowledge and understanding of the relationships between research findings and the practical use of phytochemicals. The third objective was to analyze how well the course, as designed and delivered, met the first two objectives. What were the student perceptions of this multi-teacher, multi-location (distance education) approach?

Methods

There were 32 students enrolled in this course within three university systems—The Texas A&M University System, The University of Texas System, and Texas Tech University. Because of the unique challenges of a multidisciplinary approach coupled with the use of distance-learning technologies, educational evaluation (with both numerical and open-ended responses) was the method employed (Borg & Gall, 1989). A formative evaluation was administered to determine the effectiveness of the presenters, students' understanding of content presented, usefulness of supplemental materials, the quality of the videoconference transmission, and whether students perceived the "right mix" of interaction between the "lecture" and discussion components of the course. These data were collected through the course Web site and stored in a database; therefore, the number of responses for each topic varies. The means for the numerical ratings were calculated for each question. Student location was indicated to determine any differences between "local" and "remote" sites. Students were also asked for "responsive evaluation" (Stake, 1967) on the most and least beneficial aspects of each session.

At the conclusion of the course, an open-ended, on-line evaluation was collected for all students enrolled and standard course evaluation forms were administered at 2 sites (College Station and Weslaco). An external evaluator observed the course and kept a field journal about the learning environment, compiled numerical ratings, and used the constant comparative method to 1) compare incidents applicable to each category and 2) integrate categories on

all open-ended responses (Lincoln & Guba, 1985; Glasser & Strauss, 1967). All on-line responses were coded to ensure confidentiality and stored in a database on the server of the external evaluator.

Findings

The findings are divided into four sections: 1) *Formative Data* with numerical averages for each topic and integrated categories for all open-ended responses, 2) *Summative Data* of open-ended responses collected on-line at the completion of the course, 3*) Standard Course Evaluations* forms administered through The Texas A&M University System only, and 4) *Discussions of Results* drawn from the data analysis.

Formative Evaluation Numerical Ratings and Discussion of Open-Ended Responses

For each topic throughout the semester, students were asked to complete an on-line evaluation instrument (with 1 being the lowest and 5 the highest) for the following questions: 1) How would you rate this presenter (preparedness, enthusiasm, delivery techniques)?; 2) How well did you understand the content?; 3) Did the supplemental materials help (PowerPoint slides, other visuals, handouts)?; and 4) How would you rate the videoconference transmissions (audio, video, interaction with other sites, etc.)? The students were also asked, "Did the session have the right mix of lecture and discussion/interaction" and this could be indicated by a "yes" or "no" answer (see Table 1). Following these five questions, there were three open-ended questions: 1) What was the most beneficial part of the presentation? 2) What was the least beneficial part of the presentation? and 3) Other comments or recommendations.

Table 1.
Numerical Ratings on Formative Evaluation

Topic	Presenter Rating	Student Understanding	Supplemental Materials	VC Transmission	Right Mix % "yes"	Number of Respondents (n)
antioxidants	3.9	4.1	3.4	3.9	86%	7
beta-carotene	4.3	4.2	4.2	4.5	100%	11
cancer chemo-prevention	4.0	3.5	3.8	2.5	50%	4
carotenoids	4.6	4.2	4.5	3.8	100%	14
citrus limonoids	3.8	2.9	2.8	3.1	60%	15
community-based programs	3.8	4.3	3.3	3.4	88%	16
crucifers	3.8	3.8	3.4	2.4	82%	17
designer fruits	4.2	4.1	4.2	4.4	100%	9
diet & prostate	3.9	3.2	3.3	3.1	60%	10
flavonoids	4.4	4.0	4.2	3.8	80%	5
isoflavones	3.8	4.0	3.8	3.3	100%	8
myristicin	3.6	3.6	3.8	3.2	80%	5
nutrition & cancer	3.8	3.5	4.0	3.2	55%	28
onion & antiplatelet	4.7	4.5	4.4	4.1	100%	10
wine & health	4.4	4.4	4.5	4.3	91%	11
AVE %	**4.1**	**3.9**	**3.8**	**3.5**	**82%**	**11**

In addition to the numerical ratings, the open-ended responses were analyzed and integrated into the following six categories: 1) presenter qualities, 2) contributions to student understanding, 3) effectiveness of supplemental materials, 4) quality of videoconference transmission, 5) most beneficial, and 6) least beneficial aspects of the course. Student responses on presenter qualities included: clear pronunciation, detailed presentations, good discussion of complex subject matter; thorough coverage of content; interesting content; scientific application, outstanding preparation, excellent overview, willingness to answer questions, knowledgeable about subject matter, genuine interest, enthusiasm, humor, and using real research data to demonstrate principles. Students also commented that presentations that were fun to listen to, used discussion and had relevancy to "real-world" applications helped increase understanding of the course content. The use of slides, handouts, bar graphs, visual aids of actual objects, "lecture" notes/PowerPoint slides and video were appropriate and useful supplemental materials.

Although videoconferencing provided the conduit for the course delivery, there were some sites that were not connected the entire time of a particular class session and therefore missed a portion of the class. There were frequent audio difficulties, often caused by connection problems, a lack of facilitation/technician assistance at distance sites, misunderstandings about muting functions, and because some speakers did not speak directly into the microphones. Visuals were often hard to read on the TV monitors and students wanted to see more of the speaker rather than only the visuals during the presentations.

Overall, the most beneficial component of the course was the diversity of speakers/presentations and the relevancy of research applications. Some students did comment that there was too much detailed information (especially chemistry). The accents of some presenters were hard to understand and it was often hard to follow the "lecture" because PowerPoint slides were not in the same order as the presentation during delivery.

Some presentations were perceived to lack clear organization and appeared rushed, especially when there were two speakers for one class session. Speakers often prepared so much material that there was no time for breaks or class discussion, causing frustration and information overload.

Summative Evaluation Based upon Open-Ended Responses

At the conclusion of the course, students were asked to complete an on-line, open-ended, evaluation instrument. This summative evaluation included 8 questions and the opportunity to add additional comments and suggestions. There were 8 respondents who completed the summative evaluation. These questions and a summary of comments are documented in this section.

1. In your opinion, was distance education an effective way to deliver this course? Although students mentioned some obstacles to the videoconference delivery (especially audio as mentioned previously), students felt that it was interesting to have speakers from all over the nation and to be able to reach a diverse audience of learners. The interaction with multiple sites and diverse speakers and students was unique and a strength of the course. One student commented, "With the speakers being dispersed, this was the only way to offer a course of this type."
2. Should this type of technology be used in the future? Every respondent agreed—this technology allowed more speakers to come together and offer their knowledge and expertise to a wider audience.
3. If you took this course with an instructor in the traditional classroom, do you think you would have gained more knowledge? This question had a mixed response. Those who said, "yes" felt the course was too intense, especially in a three-hour, once-a-week format. They suggested a shorter time frame with more frequent meetings. The issue of "accents" of the speakers was mentioned as a barrier to learning, this being intensified by the audio difficulties experienced with videoconferencing. Those who answered, "no" once again emphasized the ability to garner knowledge from instructors all over the US with diverse research backgrounds compared to the knowledge base of one instructor in the traditional classroom.
4. Did the topics enhance your understanding of phytochemicals in fruits and vegetables? The answer unequivocally was "yes."
5. Were there topics needing to be covered that were not? Answers varied based upon the diverse nature of the student backgrounds. Topics mentioned were processing effects on each of the chemicals' dietary aspects, ethnobotanical or historical aspects, and less on specific foods and more on phytochemicals per se.
6. Were there any topics covered in too much detail? Many students mentioned that there was too much chemistry and biochemical structures. Some felt there was a bias toward citrus and others felt there was too much information on growing crops and plant disease rather then the aspects of phytochemicals in relation to health issues.
7. Would you recommend this course to others? Once again every respondent said "yes" but they did mention that perhaps it should be limited to graduate students or have a pre-requisite of biochemistry/chemistry.
8. What suggestions for improvement would you make? Answers varied and many have been mentioned previously: the course was too intense in a 3-hour block; need to have local facilitators; implement more written assignments and fewer exams; make sure speaker slides are in the order they will present and formatted for TV monitor display; provide technical support for correcting transmission difficulties; create a manual that lists foods and phytochemicals as a course reference; if the course continues to have a broad audience, then have less detailed content; provide streaming video of lectures over the Internet; and provide review questions before or right after the "lectures."

Standard Course Evaluation Results

Standard course evaluation forms were administered for The Texas A&M University System with 14 respondents -- Kingsville (Table 2) and College Station (Table 3). The instruments had different questions and will be discussed separately. Both forms used a 1-5 scale with 5 being the "best" or "strongly agree."

At Texas A&M University – Kingsville, the seven respondents were all graduate students with three indicating that this course would be used in their "major." The others listed it as an "elective" course.

There was also an open-ended question on the Texas A&M University - Kingsville form, "Please give your views on the quality of the learning experience in this course. In your comments, please include both strengths and weaknesses." Student responses were overwhelmingly positive. "There should be more courses like this! Not only the subject matter, but the format (teleconferencing links to multi-educational sites, with the experts in their fields)."

"This course was very informative. The material taught was very new…a new concept in the way scientists are approaching killer diseases. This is very exciting because scientists are starting to look around at our environment and are going back to plants for cures."

Several students mentioned the technical difficulties with the videoconferencing, but did not imply that it was a hindrance to learning. "There are still some technical problems regarding TTVN; if we can resolve that in the future it would be much better." "Once technical problems are worked out, there shouldn't be any more problems!"

Table 2.
Texas A&M University – Kingsville Student Evaluation Results

Question	Rating
This course promotes a challenging learning environment for students.	4.86
This course inspires high academic standards and goals in students.	4.71
An atmosphere of mutual respect and civility is encouraged in this course.	4.86
The subject matter in this course is presented in a clear and organized manner.	4.71
Tests and other requirements cover the course material as stated in the syllabus.	4.86
The grading system outlined in the syllabus is followed.	4.71
The instructor is accessible outside of class.	4.86
Lectures and discussions focus on the material outlined in the syllabus.	4.86
The results of tests and assignments are returned in a reasonable time.	4.86
The textbook(s) and/or other required materials contribute to my understanding of the subject.	4.86
Students are offered help and encouragement in this course.	4.71
A student's ability to think (analytically, critically, creatively, etc.) is enhanced by the experience of this course.	4.86

At Texas A&M University in College Station, the seven respondents were also all graduate students with a mix of those who took the course because it was required and those who chose it as an elective.

Students at Texas A&M University – College Station also had the option to provide additional comments. On the "most positive aspects of this course" several students commented on the ability to "know the newest knowledge and to know what the scientists are doing!" "Speakers shared the most updated information—I feel very informed." "The different instructors with different backgrounds made the course very interesting." On "how you would improve this course," students mentioned the need for a textbook or another reference and again mentioned some frustration with the videoconference delivery.

Table 3.
Texas A&M University – College Station Student Evaluation Results

Questions	Rating
I would take another course from this professor.	4.14
The instructor was consistently well prepared and well organized for class.	4.00
The exams/projects were presented and graded fairly.	4.71
Help was readily available for questions and/or homework outside of class.	4.29
The instructor stimulated my interest in the subject.	4.14
The instructor had a thorough knowledge of the subject.	4.29
The instructor kept students informed of their progress	4.43
The instructor treats students with respect.	4.57
Reading assignments and homework contributed positively to the learning experience.	4.57
I learned to apply principles from this course to new situations.	4.57

Discussion of Results

Evaluation data are commonly used in the constant revision, refinement, and improvement of courses. Embracing Farhad Saba's view of a "systems theory of distance education," researchers should consider the complexity of educational research and the use of a variety of data sources. Our attempt to capture the essence of the effectiveness of distance education as a delivery system when teaching complex content to a diverse audience is only scratching the surface! Yet, there are some obvious conclusions and "lessons learned" to help those who are using (or planning to use) distance education delivery systems.

Back to Our Objectives: We wanted students to acquire interdisciplinary knowledge related to the effect of fruits and vegetables on human health. 4 We wanted to make students aware of interdisciplinary career choices and increase their knowledge and understanding of the relationships between research findings and the practical use of phytochemicals. 4 We wanted to use distance education as a dissemination tool for the course content 4 and we wanted to evaluate the effectiveness of distance education as a delivery strategy.4 Student numerical ratings and comments support these findings. This multidisciplinary approach resulted in increased exposure to national expertise and instilled the value of interdisciplinary research. This could only be accomplished with distance education techniques.

Lessons Learned: Students liked the course and learned the material. The "quality" was comparable to on-campus teaching. In fact, there was no difference in comments or numerical ratings at "local" or "remote" sites. Although there were some technical difficulties, distance education was not a barrier to learning.

Things We Will Do Differently: Even with all the training and logistical planning to develop and deliver this course, reliance on presenters to provide appropriate visuals for videoconferencing was a problem. Now that we have the "content" collected, we plan to format correctly for distance education delivery and to develop more Web-based/CD-ROM components to the course. This should help correct many of the transmission difficulties due to videoconferencing to multiple locations. We will use the formative and summative data to revise the course for delivery in 2000.

Implications & Recommendations

Based upon Smith and Dillon's recent article in *The American Journal of Distance Education* (1999), can agricultural educators help define the "prescriptive principles" for effective use of distance education? Here are our recommendations to start this dialog.

METHODS: It is not the *media* that makes the difference, it is the *methods* employed. "Students learning at a distance have the potential to learn just as much and as well as students taught traditionally" (Schlosser & Anderson, 1994). The students enrolled in *Phytochemcials* learned the course material and met the course objectives. This course explored a variety of methods. Our profession needs to determine the *most effective* instructional methods for teaching agricultural content at a distance.

INSTRUCTIONAL DESIGN: This course used a multi-instructor, multi-site, multi-media format. We did not simply apply distance learning technologies to a traditional course (Schrum, 1996). Agricultural educators can help other content areas within our colleges and universities to design distance learning experiences that will maximize learning. We know that *interactive* environments improve retention and transfer. Our profession can be the leader in the design and adoption of student-centered instructional design models appropriate for distance education and other forms of experiential learning.

ASSESSMENT STRATEGIES: The educational evaluation technique, with both numerical means and open-ended responses, provided appropriate feedback for the revision and improvement of this course. By collecting data throughout the course or program, and asking questions that are content specific as well as "technology" specific, researchers are able to separate knowledge/skills acquisition from the distance education delivery system. Our profession needs to develop appropriate evaluation and outcome assessment mechanisms to determine "effectiveness" of delivery strategies.

TEAM APPROACHES: Teaching at a distance takes more preparation/development time and expertise. Our team included the logistical leader (planning the content and speakers), a dissemination specialist (designing the course Web site) and an evaluation specialist (designing and collecting the on-line data). Our profession needs to continue to embrace team approaches. None of us is as smart as all of us.

The most beneficial component of the course was the diversity of speakers/presentations and the relevancy of research applications to undergraduate, graduate, and continuing education students. Only through distance education was this approach possible. The initial evaluative results were useful for the future revision of this course and can be applied to other courses and programs.

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THE ATTITUDES AND PERCEPTIONS OF HIGH SCHOOL ADMINISTRATORS TOWARD AGRICULTURAL SCIENCE TEACHERS IN TEXAS

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Abstract

Attitudes and perceptions are key elements in the relationships between administrators and agricultural science teachers. Perceptions refer to an individual's current appraisal of an object, or program, as experienced in the immediate situation. Attitudes guide these appraisals, and current research states that attitudes do influence behavior (Luzar and Cosse, 1998). The major purpose of this study was to determine the attitudes and perceptions of high school administrators toward agricultural science teachers and agricultural science programs in Texas. A secondary purpose was to compare the administrators' perceptions to the agricultural science teachers' perceptions. The target population of this study was agricultural science teachers and high school administrators who were directly in charge of agricultural science programs in Texas. Administrators' attitudes and perceptions are influenced by what they see and hear. If the agricultural science teacher maintains a good level of communication with the administrator and keeps them informed regarding the agricultural science program and FFA events, the attitudes and perceptions should be good. If the agricultural science teacher does not make an effort to communicate, the administrator is left on their own to develop attitudes and perceptions, which will translate into knowledge and beliefs. The recommendations support strong communications between the agricultural science teacher and the administrator to help maintain and improve attitudes and perceptions, and the agricultural science teacher should take the active role of initiating communication with the administrator.

Introduction

A school is an organization of a specific type called a "social system." This means it is a set of components that interact to meet a goal held by people together (Fiordo, 1990). Teacher-principal relationships can affect performance outcomes (Thomas, 1997). How well they communicate and how positive their attitudes and perceptions are can certainly influence the quality of a school environment. With this in mind, the question arises how to improve and maintain good relations between these groups, specifically between administrators and agricultural science teachers in Texas.

To fully examine the relationship and discover the best ways to improve them, it is necessary to look at the attitudes, perceptions and communications between high school administrators and agricultural science teachers in Texas.

Literature Base

Attitudes and perceptions are key in the relationships between administrators and agricultural science teachers (Jewell, 1995). Perceptions refer to an individual's current appraisal of an object, or program, as experienced in the immediate situation. Attitudes guide these appraisals, and current research states that attitudes do influence behavior (Luzar and Cosse, 1998).

If a counselor or other administrator considers agricultural education to be moderately important, they may enroll students in agricultural education. However, if a counselor or principal does not have a good attitude or perception of agricultural education, they might not inform students of ways to enroll in agricultural education to help satisfy their graduation requirements. A study in Idaho found that 65% of state supervisors and 88% of secondary teachers agreed that many students were unable to enroll in agriculture education because of high school graduation requirements (Connors, 1998).

Jewell (1995) stated that school administrators have the authority and influence in programs and curricula at the school and school system levels; changes in agricultural education require their approval and support. Without that support, programs in those schools will not develop or grow.

Teacher-principal relationships can affect performance outcomes (Thomas, 1997). The key in this is communication of both goals and results and properly informing all parties of the criteria by which judgments will be made (Fiordo, 1990). The principal frequently monitors progress of both pupils and programs through interpretation of test results and observation of classrooms (Evers and Bacon, 1994). The principal has a critical effect on school climate and productivity by interactions with teachers. The relationship between the principals and teachers is considered to have the greatest effect on the quality of life in a school (Barth, 1984). Principals need to be aware of their role in fostering collegial, empowering relationships with all others in their school community (Petersen and Beekley, 1997).

Purpose and Objectives

The major purpose of this study was to determine the attitudes and perceptions of high school administrators toward agricultural science teachers and agricultural science programs in Texas. A secondary purpose was to compare the administrators' perceptions to the agricultural science teachers' perceptions as they relate to the their school's agriscience program.

The following research questions were developed to help provide a sound basis for this study.

1. What were the general demographic backgrounds of high school administrators and agricultural science teachers in Texas?
2. What were the attitudes toward agricultural science teachers held by high school administrators?
3. What were the attitudes of agricultural science teachers compared with the administrators' responses?
4. What were the attitudes toward agricultural science programs held by high school administrators?
5. What were the attitudes of agricultural science teachers compared to attitudes held by high school administrators toward the agricultural science program?
6. What were the types and channels of communications between high school administrators and agricultural science teachers in Texas?
7. How did communication affect the attitude of high school administrators toward the agricultural science teacher and agricultural science program?
8. What relationships exist between the variables?

Methods/Procedures

The target population of this study was agricultural science teachers and high school administrators in Texas who were directly in charge of agricultural science programs in Texas. In 1998, there were 1,460 agricultural science teachers in Texas (Texas FFA Association, 1998). Considering the costs and time requirements for a census of all agricultural science teachers in and administrators in Texas, it was determined that the population needed to be limited.

The sample consisted of 102 agricultural science teachers and 102 high school administrators from the state of Texas. The sample was a proportional random sample stratified by FFA areas. Agricultural science teachers and their immediate supervising administrators were randomly chosen based on the percentage of FFA chapters in each area in relation to that area's percentage of the total number of agricultural science teachers for Texas. Once the percentage of teachers was figured in relation to the entire state, it was then multiplied by .10 to give the exact number of teachers to be chosen from that area. Then that number was rounded upward, so that oversampling would help the response rate. Using suggestions from Borg and Gall (1994), it was a determined that the minimum response rate should be 70%.

There were 73 administrator questionnaires returned, for a response rate of 71.5%. There were 85 teacher surveys returned for an 83% response rate.

In an effort to control for nonresponse error, major portions of the Total Design Method (TDM) developed by Dillman (1978) were adopted for the cover letter and questionnaire. The instrument for the study was a five-part, mailed questionnaire. The survey was developed using a previous survey by Robert A. Martin, Emmanuel Nwozuzu, and Amy Gleason of Iowa State University (1985), a survey by Susanne M. Hunter et al. (1977), and questions designed by the researcher through questioning agricultural science teachers during a focus session in March 1998.

Section I dealt with attitudes and perceptions of the agricultural science program by using a four-point Likert-type scale that measured the level of agreement with given statements. There were no negative statements used, and a four signified strong agreement, a three indicated agreement, a two indicated disagreement, and a one indicated strong disagreement. Section II rated the agricultural science teacher on a scale of 1 to 10, with 1 being negative and 10 being positive. Section III included questions about communication using the 1 through 10 rating scale. One indicated a negative response, and 10 indicated a positive response. Section IV asked for demographic information, and section V allowed space for respondents to further express or add comments regarding the survey.

Survey instrument responses were transferred to coding sheets, which were used to construct data files. Statistical analysis of the data files was completed using SPSS for the Macintosh. Descriptive statistics were used to summarize the data pertaining to: (a) the agricultural science program, (b) the agricultural science teacher, (c) the communication channels, (d) the communication process, and (e) demographics. In order to determine if there was any difference in high school administrator responses and agricultural science teacher responses and whether the administrators' demographics had significance in affecting their responses, analysis of variance between

administrator responses and agricultural science teacher responses was used. In addition, a correlational matrix was developed to determine if significant relationships existed between selected variables.

Findings

Demographic Information

The majority of administrators (86.1%) were principals (Table 1). Approximately one of ten (9.7%) were career and technology directors. Two respondents chose other and listed their title as assistant principal. No superintendents were represented, and there was one non-response to the question.

Table 1.
Administrator Title

Title	Frequency	%
**Principal	62	86.1
Career and Technology Director	7	9.7
Superintendent	0	0
*Other	2	2.7
Total	71[a]	100.0

* Assistant Principal
** Two indicated being both principal and career and technology directors [a]=1 missing response

Respondents were asked to indicate how many years they had served as an administrator. Year groups were broken into six sections: less than one year, one to three years, four to seven years, eight to 11 years, 12 to 15 years, and 15 years or more. Three of the 72 administrators had been an administrator for less than one year (4.2%). The largest years of service for administrators was the "15 years or more" range with 18 respondents (25.0%). There were 15.3% of administrators in the ranges of one to three years and 12 to 15 years. In the range of four to seven years, there were 19.4%. In the range of eight to 11 years, there were 15 administrators for a total of 20.8%.

According to their responses, the most common response (41.7%) of administrators reported being athletic coaches prior to their current positions. Following this response was classroom teaching at 27.8%. Seven administrators reported being former agriscience teachers (9.7%). Fifteen administrators chose "other" as their position prior to their current administrative position (20.8%).

Responses to the question, "Were you ever a member of FFA?" revealed that less than one-half of administrators (38.9%) reported being members of FFA. The large majority of agricultural science teachers reported being former members of FFA, while 7.3% did not. In response to the question "Have your children ever been members of the FFA?", administrators reported that the majority (62.5%) of their children had not been members of the FFA. Three indicated their children were not old enough or that they did not have children (4.2%), and one-third responded that their children had been FFA members. Slightly over half of agricultural science teachers' children were members of the FFA with 53.7%.

Over one-half of the administrators responded that they had been members or volunteers of 4-H or other agriculturally-related group. Only 38.9% of administrators indicated that their children were members or volunteers for 4-H or other agriculturally related group. Just under one-half of the agricultural science teachers reported their children participated in other agriculturally-related groups.

Slightly over one-third of the administrators stated they had only worked with agriscience teachers for one to five years (34.7%). The next highest choice was six to 10 years (23.6%), and then, 11 to 15 years (22.2%). Seven administrators responded they had worked with agriscience teachers for 16 to 20 years, and seven administrators responded they had worked with agriscience teachers for over 20 years.

Attitudes Toward the Agricultural Science Teacher

Administrators were asked to respond to thirteen statements regarding the agricultural science teacher(s)' job performance. They were asked to rate these responses on a scale of 1 to 10, with 1 being a negative response and 10 being a positive response. Teachers were also asked to rate themselves on the statements. The mean scores of each group were compared at the .05 level to see if there were any significant differences. Only two statements were found to differ significantly at the .05 level (Table 2). One was "The agriscience teacher is able to choose her/his own courses or course offerings" (.00). The other statement was "The agriscience teacher is able to fairly evaluate student performance."

Table 2.
Perceptions of the Agricultural Science Teacher by Administrators and Teachers

	Mean		
Statements	Administrator	Teacher	All
The agriscience teacher is willing to work longer hours to improve and foster a superior program.	8.8	9.0	8.9
The agriscience teacher cooperates with other faculty and staff.	8.7	9.0	8.8
The agricultural science teacher follows the school's chain of command.	8.5	8.8	8.7
The agriscience teacher is professional.	8.4	8.8	8.6
The agriscience teacher is able to choose her/his own courses or course offerings.	8.0[a]	9.0[a]	8.5
The agriscience teacher is able to fairly evaluate student performance.	8.1[a]	8.7[a]	8.4
Rate the agriscience teacher in terms of serving as a FFA advisor.	8.4	8.4	8.3
The agricultural science teacher helps students with SAEPs.	7.7	8.3	8.0
The agriscience teacher is providing a good education to students.	7.8	7.8	7.8
Rate the agriscience teacher in terms of training teams for CDEs.	7.5	7.8	7.7
Rate the agriscience teacher's ability to help develop school rules and regulations.	7.4	7.9	7.7
The agriscience teacher places equal emphasis on all areas of his/her program.	7.5	7.8	7.7
Rate the agriscience teacher at training teams for LDEs.	7.5	7.6	7.6

[a] Differed significantly at the .05 level.

Attitudes and Perceptions of the Agricultural Science Program

The fourth research question determined the attitudes and perceptions of administrators toward the agricultural science program. Administrators and agriscience teachers were asked to rate 12 statements using a four-point Likert-type scale (4=strongly agree and 1=strongly disagree). The mean scores of administrator and agriscience teacher responses were compared at the .05 level to determine if there were any significant differences (Table 3).

Table 3
Perceptions of the Agricultural Science Program by Administrators and Teachers

	Mean		
Statements	Administrator	Teacher	All
The agriscience program is an important part of the school	83.7	3.7	3.7
The agriscience program is an important part of the community.	3.7	3.7	3.7
The high school agriscience program provides equal opportunities for all high school students.	3.5	3.6	3.6
The administrator's attendance is important at agricultural science activities and FFA events.	3.4	3.4	3.4
There are a number of agricultural science activities, other than FFA activities, outside of the classroom and laboratory that are co-curricular, such as field trips.	3.2	3.4	3.3
The administrator recognizes those students in the agricultural science program and FFA for their achievements, honors, and awards.	3.6[a]	3.1[a]	3.3
The administrator recognizes those students in the agricultural science program and FFA for their achievements, honors, and awards.	3.6[a]	3.1[a]	3.3
The administrator knows the duties of a FFA advisor.	3.4[a]	3.1[a]	3.3
The agriscience program places enough emphasis on actual classroom teaching.	3.12[a]	3.34[a]	3.2
The administrator knows what a LDE is.	3.18[a]	2.87[a]	3.0
The administrator knows what a CDE is.	3.1	2.8	2.9
The administrator knows what a SAEP is.	2.9	2.8	2.8

[a] Differed significantly at the .05 level.

Five statements were found to differ significantly at the .05 level. First was "The administrator places as much interest on the agricultural science program as other school programs." The next statement was "The administrator recognizes those students in the agricultural science program and FFA for their achievements, honors, and awards." The statement "The administrator knows the duties of a FFA advisor" also differed significantly. The statement "The agriscience program places enough emphasis on actual classroom teaching" was rated differently by teachers and administrators. The final statement to show significant difference at the .05 level was "The administrator knows what an LDE is."

Channels of Communication

Research question six focused on the channels administrators use to communicate with agricultural science teachers. The five channels included were "Face to Face," "Staff Meetings," "Telephone," "E-Mail/Memo," and "Other." Administrators and teachers were asked to choose the types of communication channels used by administrators at their schools. The mean scores were then compared to see if any significant differences existed at the .05 level. Only one channel of communication was found to have a significant difference at the .05 level. That was "E-Mail/Memo." Forty-one administrators responded that e-mail/memo was a channel of communication utilized (56.2%). Only 25 teachers indicated that e-mail/memo was used (30.5%). The most highly used channel of communication was "Face to Face", with a mean percentage of 98.1%. Next was "Staff Meetings" at 74.8% and "Telephone" at 66.5%. The lowest rated channel of communication was "Other" at 5.8%.

Communication Perceptions

The seventh research question asked if communication affected the attitudes toward the agricultural science teacher and program. Respondents were asked to rate six statements on a scale of one to ten, with one being the lowest or worst and ten being the highest or best. The mean scores were then compared at the .05 level to test for significant differences (Table 4). Two statements showed significance at the .05 level between administrators and agricultural science teachers. One was "The administrator is willing to allow the agriscience teacher to visit his/her office if they have a problem with their program." The other statement was "The agriscience teacher informs the administration of days that will be missed due to extracurricular activities."

Table 4
Communication Perceptions by Administrators and Teachers

	Mean		
Statements	Administrator	Teacher	All
Good communication between the administrator and the agriscience teacher is important.	9.6	9.7	9.7
The administrator is willing to allow the agriscience teacher to visit his/her office if they have a problem with their program.	9.7 [a]	9.1 [a]	9.4
The agriscience teacher informs the administration of days that will be missed due to extracurricular activities.	8.7 [a]	9.2 [a]	9.0
The agriscience teacher informs the administrator of awards and recognition the agriscience program or FFA chapter has received.	8.4	8.6	8.5
The administrator is a good listener.	8.2	8.6	8.4
The agriscience teacher is a good listener.	8.3	8.2	8.2

[a] Differed significantly at the .05 level.

Relationships Between Variables in the Study

The final objective of this study was to determine what relationships exist between the variables. A correlation matrix was developed to determine initial associations between the administrators' demographic variables in the study and the rating of the importance of the school program. None of the demographic variables were significantly related to the rating of the importance of the school program.

Conclusions/Recommendations

Conclusions

The following conclusions are based on interpretations of data presented in the study and are restricted to the populations surveyed. They also are subject to the limitations outlined in Chapter I of the study. The conclusions are as follows:

1. The large majority (86.1%) of administrators in charge of agricultural science programs in Texas are principals.
2. Over one-half of agricultural science teachers in Texas have been in this position for over 15 years. Only 25% of administrators have been involved in their positions for over 15 years.
3. Most administrators (87.5%) and agricultural science teachers (93.9%) in Texas are male.

4. Just under one-half of the administrators are former athletic coaches (41.7%), and only 9.7% are former agriscience teachers.
5. Most of the agriscience teachers are from rural backgrounds (64.6% farm or ranch and 17.1% rural but not farm or ranch). Slightly over one-half of the administrators are from rural backgrounds (37.5% farm or ranch and 15.3% rural but not farm or ranch).
6. Most agricultural science teachers are over 30 but under 50 years of age (64.6%). Most administrators are between the ages of 40 and 59 (76.4%).
7. Nearly all agriscience teachers hold a degree in agriculture or a closely related field (98.8%); the majority of administrators do not (76.4%).
8. Most agricultural science teachers were members of FFA (92.7%); most administrators were not (61.1%).
9. Agricultural science teachers' children tend to join FFA (53.7%). Only about one-third of administrators' children tend to join FFA (33.3%).
10. Agricultural science teachers also seemed to be involved in agriculturally- related groups other than FFA, such as 4-H or Young Farmers (87.7%). Of administrators, slightly over half (55.6%) also participated in agriculturally related groups, such as 4-H and Young Farmers.
11. Under one-half of agriscience teachers' children participated in agriculturally- related groups (46.3%). Of administrators, 38.9% responded that their children participated in agriculturally-related groups.
12. Most administrators have worked with agriscience teachers for less than 16 years (80.5%).
13. Administrators and agriscience teachers enjoy their jobs, with no respondents choosing disagree or strongly disagree.
14. Administrators have good attitudes and perceptions of the agriscience teachers, but administrators and teachers disagree that agriscience teachers are able to choose their own courses and offerings and on the agriscience teachers ability to fairly evaluate students.
15. The administrators had very good attitudes and perceptions of the agricultural science program.
16. Administrators rated themselves higher regarding their knowledge of LDEs, CDEs, and SAEPs in comparison to what agricultural science teachers perceived the administrator’s knowledge to be.
17. Agriscience teachers indicated that administrators did not recognize students in the agricultural science program as much as administrators indicated they did.
18. Administrators and agriscience teachers talk face-to-face and at staff meetings the most, and administrators and agriscience teachers agree that good communication is important, but there was significant difference on the statement regarding that the administrator's door was always open to agricultural science teachers.
19. There was a significant difference on the statement regarding the agricultural science teachers informing administrators about days to be missed due to extracurricular activities.

Recommendations

The following recommendations have been made by the investigator as a result of having made this study:

Agricultural science teachers need to communicate all aspects of the agricultural science program to administrators. Administrators felt they had fairly good knowledge of the agricultural science program, but agriscience teachers slightly disagreed. Therefore, it is the teacher's responsibility to insure that the administrator has the correct information regarding the program, especially LDEs, CDEs, SAEPs, and the duties of a FFA advisor. Most of the administrators were not members of FFA and did not have children in FFA; therefore, their only knowledge of the program comes from the teacher.

1. The agricultural science teacher needs to communicate with administrators regarding the uses of laboratory and co-curricular experiences. Administrators rated agriscience teachers slightly lower regarding actual classroom teaching and evaluating students. By explaining why the laboratory is important in agricultural education, teachers can help the administrators understand why the emphasis is not always on actual classroom teaching.
2. Agricultural science teachers should send written invitations to administrators regarding upcoming FFA and agricultural science activities and events. Administrators and agricultural science teachers agreed the administrators' attendance is important at these events. To insure that there is no confusion regarding the message, putting it in writing and hand delivering it can keep the details of the event clear, while indicating that his/her presence is desired. Agriscience teachers should also invite administrators to participate in FFA events and agricultural science activities. This will help communicate the agriscience teachers' desire for the administrator to be there, and it will help the administrator to feel welcome.

3. Agricultural science teachers should utilize the summer months to put FFA events and agricultural science activities on the school calendar. Also, they should submit tentative summer schedules to administrators, to explain what projects or plans they have for the summer. This will help protect and promote extended contracts.
4. The agricultural science teacher needs to inform the administrator of all awards and recognition the FFA chapter or agricultural science program has received. This can be accomplished through face to face communication, phone calls, staff meetings, or e-mails/memos. If the agriscience teacher does not inform the administrator, they will not be able to recognize those students.
5. There needs to be more research on the issue that administrators do not feel that agricultural science teachers spend enough time on actual classroom teaching.
6. There needs to be further research on how agricultural science teachers evaluate student performance, and why there is a significant difference between the two groups regarding the teachers' ability to fairly evaluate student performance.
7. There needs to be further research on the issue of teachers communicating electronically, either via e-mail or distance education.
8. There needs to be further research on why there is a significant difference between the administrator's perception of an open-door policy and agricultural science teachers' perceptions of an open-door policy.
9. There needs to be further research regarding why there is a significant difference between the two groups concerning agricultural science teachers choosing their own courses or course offerings.
10. Teacher education and in-services programs in Texas should prepare agriscience teachers to communicate with administrators. This can be done by demonstrating how to negotiate contracts, how to explain all aspects of the agricultural science program, or why agricultural education is important.

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COMPARISON OF PRIMARY VS SUPPLEMENTARY DELIVERY OF INSTRUCTION VIA THE WORLD WIDE WEB IN AN UNDERGRADUATE AGRICULTURAL COMMUNICATION COURSE: EFFECTS ON ACHIEVEMENT AND ATTITUDE

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Abstract

The purpose of this study was to determine the effectiveness of two methods of instruction in an undergraduate agricultural communication writing course on students' achievement and attitudes. The two methods of instruction were dependent Web-based instruction with a laboratory and fully developed Web-based instruction. Dependent Web-based courses have major components on the World Wide Web to assist classroom instruction. Fully developed Web-based courses offer the entire course on the World Wide Web. Students' achievement was measured from points obtained from: five major written assignments, one application question on the midterm examination, and a major class project. Students' attitude was determined from a semantic differential instrument developed to measure students' attitude toward writing, learning about writing, computers and the Internet. The experimentally accessible sample size was small (n = 32). The data collected to measure students' achievement and attitudes violated the assumption of normality and data was ranked according to the RT-1 method. A multivariate analysis of variance (MANOVA) was conducted on ranked data to determine the effect of method of instruction on achievement. A multivariate analysis of covariance (MANCOVA) was conducted on ranked data to determine the effect of method of instruction on students' attitude toward writing, learning about writing, computers, and the Internet. No statistically significant differences were found between method of instruction on students' achievement or attitudes.

Introduction and Theoretical Framework

For 50 years people have conceived of a universal information database that would link to other pieces of information for quick retrieval by the user. Only in the last few years, implementation of this idea has been realized through the use of the World Wide Web (abbreviated as WWW or Web) (Hughes, 1993). Owston (1997) stated that the Web has prompted teachers to rethink the nature of teaching and learning and boundaries associated with the classroom and class schedules.

According to Bridwell, Bretz, DeVries, King, and White (1996), learners' needs are changing because today's society is more mobile. To accommodate these changes in society, learning methods should become more portable and flexible. Martin (1995) noted that, as students change, then so must the courses which schools offer. Martin also suggested that educators can use computers and information technologies in innovative ways to enable course material to meet these changes.

Using the WWW and other Internet components has been a relatively new concept for educators. The WWW has allowed instructors to provide course material through multiple media (e.g., multimedia), supply links to many other resources related to the course, communicate electronically with students, obtain assignments electronically, and issue exams. Additionally, the WWW has opened up new resources that provide information to a wide audience (Oswton, 1997).

Types of Web-Based Instruction

There are many variations in terminology that describe types of Web-based instruction. Oregon State University (1996) defined four types of courses on the Web: fully developed, dependent, supplemental, and informational. A fully developed course offers the entire course on the Web; a dependent course offers major components of the course on the Web; supplemental courses include information on the Web that contain links to other related resources; and informational courses offer only course information on the Web. This study used two of the four types of Web-based instruction, dependent Web-based instruction and fully developed Web-based instruction.

The introduction of Web-based instruction has allowed instructors to present information through text, graphics, audio and video and allows learners to choose a variety of ways to pursue course material (Liu & Reed, 1994). Exploring the Web has inspired students to weigh evidence, filter information, and judge authenticity of data. The Web has also encouraged students to compare viewpoints, analyze and synthesize information, and develop opinions. Researchers have suggested that these activities play a role in development of critical thinking and problem solving skills. Educators, realizing the potential, have begun devising ways to capitalize on this technology (Owston, 1997).

To reinforce the use of computers in agricultural education classrooms, Nordheim and Connors (1997) investigated the utility of computers in the classroom as perceived by agriculture teachers. More than 81% believed that computers were essential to their agriculture classrooms. Eighty-five percent reported that computers made students more efficient. More than 85% felt that students should learn to use the Internet with 75% agreeing that the Internet should be used in agricultural classes.

During the spring semester of 1997, Roberts (1997) conducted a formal evaluation on students enrolled in AEE 3203 Introduction to Technical Writing in Agricommunication.

The responses to questions about demographics characteristics revealed that 67% of the participants ($\underline{n}$ = 47) had a computer at home and 48% had access to the Internet from home. Previous computer experience was also evaluated and found that 98% had used a word processor, 30% had used presentation graphics software and 30% had used some form of file transfer protocol.

The freedom of when and where to study and complete assignments appeal to many learners. By incorporating electronic chat lines and bulletin boards, students are also able to maintain direct communication with the instructor, obtain peer group support, and gain from questions asked by others (Webb, 1997). This learning environment relies on electronic communication which appeals to learners that are that are not comfortable with oral communication (Roberts, 1997).

Students' Achievement and Attitudes

A study conducted by Hart (1995) showed no evidence of increasing teaching effectiveness using dependent Web-based instruction. However, students indicated enjoyment in learning from the Web and that using the Web increased dissemination of information efficiency.

In a quasi-experimental study conducted by Day, Newman, and Raven (1996), student achievement and attitudes were compared using dependent Web-based instruction and traditional instruction in an undergraduate Introduction to Technical Writing in Agricommunication course taught at Mississippi State University. Students in the group receiving dependent Web-based instruction scored significantly higher on the technical report than those receiving traditional classroom instruction. Also, students in the group using dependent Web-based instruction showed improved attitudes toward writing, learning about writing and the Internet. No group differences were found on students' attitudes toward computers.

In a study by Goldberg (1997) students were divided into three groups in which three types of instruction were compared. Group one received online instruction only (no lectures); group two attended lectures and had no access to the online information; group three had access to both lectures and online information. Goldberg found no significant differences in academic performance between groups, however, the highest mean was in group three with group one and two performing roughly equal. The group receiving online instruction reported that extra motivation and responsibility were required and that they disliked not meeting with other students. However, 90% indicated they would take another course taught online and showed a high degree of satisfaction with the delivery technique (Goldberg).

Statement of the Problem

Advancements in communication technologies have created many challenges for educators. Faculty members and administrators have expressed concern about the effect technology advancements may have on providing quality education.

Many instructors that have explored educational applications of the WWW primarily describe observations of instructional effectiveness (Carvin, 1998; Corderoy, & Lefoe, 1997; Oswton, 1997). Others have addressed the issue of providing effective features in the Web site design (Comber, 1995; Martin, 1995; Gibson, 1997). Although, some studies have shown that distance learning through the WWW occurs at similar levels to that of traditional classroom learning (Goldberg, 1997), overall, little empirical documentation of the educational effectiveness has been available (Jacobson & Spiro, 1995).

Purpose

The purpose of this research was to compare the effectiveness of fully developed Web-based instruction and dependent Web-based instruction in an undergraduate technical writing course on students' achievement and attitudes. Therefore, the following null hypotheses were tested in this study:

H_o-1: For students in AEE 3203-Introduction to Technical Writing in Agricommunication, there will be no difference in group means between students taught using dependent Web-based instruction with a laboratory and those taught using fully developed Web-based instruction on points obtained from:

1. Written assignments
2. Technical report
3. Midterm Memo

H_o-2: For students in AEE 3203-Introduction to Technical Writing in Agricommunication, there will be no difference between students taught using dependent Web-based instruction and fully developed Web-based instruction on the following attitude scales:

1. Attitude toward writing
2. Attitude toward learning about writing
3. Attitude toward computers
4. Attitude toward the Internet

Implications

New developments in communications technologies have created a new environment for teachers and researchers alike. The potential for using the WWW in agricultural education is tremendous. Much attention has been directed to the technology itself; however, method of delivery, and the overall effect that Web-based instruction will have on distance education has created a great deal of interest. Therefore, it is important to identify obstacles and challenges that faculty members in colleges of agriculture will be faced with when incorporating electronic teaching technologies to ensure the success of distance education efforts.

Research Procedures Used

The design of this study was experimental. There were two groups that participated in the study. Students were randomly assigned to groups and groups were randomly assigned to treatments.The experimental group was assigned to fully developed Web-based instruction. The control group was assigned to dependent Web-based instruction.

Population and Sampling

The target population of the study was any undergraduate student choosing to enroll in AEE 3203-Introduction to Technical Writing in Agricommunication at Mississippi State University. Sections four (lecture) and five (lab) taught on Wednesdays, 5:00-7:50 and 8:00-8:50, respectively, were chosen for the experiment. The sample of subjects was drawn from students enrolled in AEE 3203-Introduction to Technical Writing in Agricommunications at MSU in the spring semester of 1998, and included 32 undergraduate students.

Description of Treatment

Both groups had access to the AEE 3203 Web site. The information provided on the AEE 3203 Web site included: PowerPoint® slides, outlines of PowerPoint® slides, RealAudio®/Video of lectures, assignments, score sheets, and syllabi. It also offered step by step instructions for many computer procedures necessary to complete assignments.

Control group. The method of instruction for the control group was dependent Web-based instruction. This type of instruction has been considered the traditional instruction method for the course and has been used since the summer term of 1995 (Day, 1996).

Students in the control group met in a traditional computer lab once per week for 100 minutes of lecture and 50 minutes of laboratory. The primary medium used during the lectures was outlines of course content in the form of PowerPoint® slides. Scored assignments were submitted to the instructor in hard copy format during regular class meetings.

In the lab sessions, students used computers to complete practice assignments that were modeled similar to the graded assignments. Upon completion of the lab assignment, each student received feedback from the instructor on the correctness of their assignment and made revisions accordingly.

Experimental Group. The method of instruction for the experimental group was fully developed Web-based instruction. This type of instruction had never been used or tested as a type of instruction for AEE 3203-Introduction to Technical Writing in Agricommunication at Mississippi State University.

Students in the experimental group were required to meet four times during the semester: (a) to review the syllabus and course requirements, (b) to take the written midterm examination, (c) to present their technical report topic, and (d) to take the written final examination. To ensure that students in the experimental group were accessing and reading the course material on the Web site, electronic reviews for each course unit were constructed and electronically submitted each week. Scored assignments were submitted to the instructor electronically according to syllabi deadlines. Although physical meetings with the instructor were allowed, the students were expected to use the 3203 Web site as the primary source for information and correspond electronically with the instructor.

The primary medium used to obtain information to complete practice lab assignments was the AEE 3203 Web site and pages specifically constructed for each lab assignment. As a reminder, students in the experimental group were sent an email message every Monday concerning the review and lab assignment for the week and the due dates. Students submitted lab assignments by attaching the document to an email message and sending it to the instructor. The instructor critiqued each assignment, made notations within the submitted document and returned it through an email attachment to the students for review.

Data Form and Collection

Achievement. To determine students' achievement, a posttest-only experimental design was used. The scores from five writing assignments given throughout the semester totaling 400 points, a technical report worth 250 points and an application question on the midterm (memo) worth 50 points were used to determine achievement.

Achievement was measured from writing assignments constructed by AEE 3203 instructors that incorporated performance-based, task-specific assessment. The assignments tested concepts taught during lecture and reinforced

during the laboratory. Composite scores from the assignments were used to determine the overall main effects of method of instruction on achievement.

Baker, O'Neil, and Linn (1994) defined performance-based assessment as a type of testing that allows students to demonstrate understanding and skill in applied, procedural, or open-ended settings. Performance-based assessment approaches offer effective strategies for generating useful assessments (Baker et al.) especially for task specific writing assessment (Dunbar, Koretz, & Hoover, 1991).

Attitude. The effect of method of instruction on students' attitude was investigated using a pretest-posttest control group design. Scores obtained from a semantic differential instrument given the first time the student attended class and last day of class were used to determine students' attitude toward writing, learning about writing, computers, and the Internet.

The semantic differential has been used regularly by psychologists because it is considered flexible in application and designed to measure a variable in human behavior, "meaning" (Snider & Osgood, 1969). Each instrument contained 10 sets of bipolar adjectives with a seven-space scale between for students to indicate where their feelings existed. The bipolar adjectives used in this instrument were based on Snider and Osgood's recommendations for coordinating variables that measure basic human judgements. All four instruments contained the same 10 sets of adjectives.

The content and face validity of the instruments were based on its ability to measure general attitudes toward a topic and established by graduate students and faculty in agricultural education. Reliability estimates for the semantic differential instrument was obtained through use of a pilot test conducted during the summer of 1995 in sessions of AEE 3203. Estimated internal consistency of total scores using Cronbach's alpha were .96 for the instrument developed to measure students' attitude toward computers, .81 for the instrument developed to measure students' attitude toward writing, .84 for the instrument developed to measure students' attitude toward the Internet, and .87 for the instrument developed to measure students' attitude toward learning about writing (Day, 1996).

A multivariate analysis of variance (MANOVA) was used to compare the effectiveness of the teaching method on student achievement. A multivariate analysis of covariance (MANCOVA) was used to compare teaching method on students' attitude toward writing, learning about writing, computers, and the Internet.

Findings

Thirty-two students consented to participate in the study. Students randomly assigned to dependent Web-based instruction (control group) totaled 16. The average age was 23 years (SD = 3.27) and included one female and 15 males. Students assigned to fully developed Web-based instruction (experimental group) also totaled 16. The average age was 22 years (SD = 2.54) and included two females and 14 males.

During the course of the semester, one student dropped out of the dependent Web-based course and two students dropped out of the fully developed Web-based course. Therefore, data analysis was conducted on 15 students in the dependent Web-based course and 14 students in the fully developed Web-based course.

The colleges that were represented in the control group after the drop outs were excluded from the data (n = 29) included seven students from College of Agriculture and Life Science (CALS), seven students from the College of Engineering (CE) and one student from the College of Forest Resources (CFR). The experimental group included one student from CALS, twelve students from CE and one student from CFR (Table 1).

Table 1.
Colleges Represented in the Study (n = 29)

	Control			Experimental		
Student Classification	CALS	CE	CFR	CALS	CE	CFR
Sophomores	1	0	1	0	1	0
Juniors	2	0	0	0	4	0
Seniors	4	7	0	1	7	1
Total	7	7	1	1	12	1

Note. CALS = College of Agriculture and Life Sciences, CE = College of Engineering, CFR = College of Forest Resources

Descriptive data of variables used to determine the effect of method of instruction on student achievement was summarized in Table 2 and include: (a) summed scores from five writing assignments, (b) scores on a technical report, and (c) scores from a memo on the midterm examination.

Students taught using dependent Web-based instruction (control) yielded a mean of 366.93 (SD = 19.52) out of a possible 400 on the writing assignment, 235.13 (SD = 11.27) out of 250 on the technical report, and 17.67 (SD = 1.45) out of a possible 20 on the midterm memo. Students taught using fully developed Web-based instruction (experimental) had a mean of 353.79 (SD = 20.42) out of a possible 400 on the writing assignments, 216.64 (SD = 26.34) out of 250 on the technical report and 16.57 (SD = 1.74) out of a possible 20 on the midterm memo.

Table 2
Descriptive Data from Raw Scores Used to Determine Effect of Teaching Method on Student Achievement

	Control			Experimental		
Variable	M	SD	n	M	SD	n
Writing assignments	366.93	19.52	15	353.79	20.42	14
Technical report	235.13	11.27	15	216.64	26.34	14
Midterm memo	17.67	1.45	15	16.57	1.74	14

Shapiro-Wilk tests of normality revealed that the scores on one variable used to access achievement, the technical report, violated the assumption of normality at the .05 *a priori* alpha level. Therefore, to correct the assumption problem of normality, the dependent variables used to measure achievement were converted to ranks using the RT-1 method as described by Conover and Iman (1981). The ranking conversion process was executed using SPSS 7.5® (Statistical Package for Social Science).

Test of H_o-1

The first null hypothesis that of no difference between method of instruction on students' achievement was determined from points obtained from written assignments, technical report, and a midterm memo given during the midterm examination. This hypothesis was tested by running a MANOVA on ranked scores at the *a priori* level of less than .05. The two levels of instruction were dependent Web-based instruction and fully developed Web-based instruction.

The MANOVA main effects test for teaching method yielded a Wilks' lambda of .73, F (3, 25) = 2.98 that was not significant at the *a priori* alpha level of <.05 (p = .05) (Table 3). The multivariate test of significance revealed no differences between the two methods of instruction therefore, the null hypothesis was retained.

Table 3
Summary Table for the Multivariate Test of Significance for Students' Achievement by Teaching Method

			Degrees of Freedom		
Test	Value	Exact F	Between Group	Within Group	Significance of F Statistic
Wilks' lambda	.73	2.98	3	25	.05

These results indicated that no statistically significant differences were found on the ranks of the scores from the three types of assignments, regardless of teaching method. Therefore, students enrolled in AEE 3203 fully developed Web-based course had similar achievement level to those enrolled in the dependent Web-based course.

Test of H_O-2

The second null hypothesis, that of no difference between method of instruction on students' attitude was determined from four sets of total points obtained from a semantic differential instrument designed to measure students' attitude toward writing, attitude toward learning about writing, attitude toward computers, and attitude toward the Internet.

The data collected from the semantic differential instrument designed to measure students' attitude toward writing, learning about writing, computers, and the Internet violated the assumptions of normality. Therefore, to correct the assumption problem of normality, the dependent variables used to measure achievement were converted to ranks using the RT-1 method as described by Conover and Iman (1981). The ranking conversion process was executed using SPSS 7.5® (Statistical Package for Social Science).

A MANCOVA was conducted on the ranks of scores to compare the groups on adjusted means on students' attitude toward writing, learning about writing, computers and the Internet. The MANCOVA yielded a Wilks' lambda of .96 F (4, 20) = .20 that was not statistically significant at the *a priori* alpha level of less than .05 (p = .94) (Table 4).

Table 4
Summary of Multivariate Analysis of Covariance Test of Significance for Students' Attitude by Teaching Method

			Degrees of Freedom		
Test	Value	Exact F	Between Group	Within Group	Significance of F Statistic
Wilks' lambda	.96	.20	4	20	.94

The results from the ranks of scores indicated that students' measured attitude toward writing, learning about writing, computers and the Internet was not statistically significantly influenced by teaching method. Therefore, students in the fully developed Web-based course had similar attitudes to those in the dependent Web-based course.

Conclusions

This research showed that students participating in the study were equally successful in terms of achievement, regardless of teaching method. The results are consistent with a similar study conducted by Goldberg (1997) that compared fully developed Web-based instruction, dependent Web-based instruction, and lectures without Web-based instruction. Goldberg's findings showed no statistically significant difference in academic performance, regardless of teaching method.

Recommendations

One of the advantages of providing instructional information on the World Wide Web is accessibility. That is, it makes education more attainable by people. The advantages of accessibility, along with the use of multimedia and interactive devices, offer many educational advantages.

Unlike traditional distance educational learning environments, the WWW can provide live and timely interactions between students and teachers. Interactive mechanisms on the WWW can help overcome the distance part of distance education by providing communication channels for students, regardless of location. Additionally, students living off campus relish the opportunity to take college credit courses without having to travel long distances. The WWW provides a learning environment that enables the distance learner to access course information at home, at any time, without interfering with other job or family commitments.

The WWW also offers advantages for high school students and adults seeking a high school diploma or equivalent. For high school students, the WWW could provide fully developed Web-based courses in subjects their own school doesn't offer. For adults, the WWW could provide courses to complete their high school education and prepare for the GED high school equivalency exam.

Colleges and universities have the responsibility of satisfying student needs. The additional information the WWW provides and the flexibility of accessing the information appeals to many students, particularly those from non-English speaking backgrounds. When course information is available on the WWW, students can practice, repeat, or make up lessons easier and turn in assignments without having to commute across campus'. Electronic communication with the instructor and other students also offers a tremendous advantage to college campus students and increasing student satisfaction and, possibly, motivation.

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LEADERSHIP STYLES OF FLORIDA'S COUNTY EXTENSION DIRECTORS

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Abstract

This study examined the leadership practices employed by Florida county extension directors (CEDs) using the Leadership Profiles Index. The purpose of this study was to identify leadership strengths and weaknesses and look for gender differences in CED leadership practices. The results of the study indicate that Florida CEDs were near the 50th percentile in four of five leadership practices. There were significant differences in male and female leadership in four of the five leadership practices measured. The author recommends examining other factors that may influence leadership style and providing inservice training for current CEDs and leadership preparation for new CEDs.

Introduction

Are effective county extension directors leaders or managers? Perhaps they should be a combination of the two! According to recent University of Florida position announcements, the roles of the "county extension director" include providing leadership for the county program, supervision and coordination of staff, developing and maintaining relationships with constituents, effective oral and written communication, maintaining advisory committees, ensuring availability of resources, planning, budgeting, managing personnel, and organization skills. Certainly there are a number of roles that county extension directors are expected to fill but are they adequately prepared to do so? County extension directors are often promoted to the position based on performance as a county extension agent, unfortunately that is not the lone criteria for being an effective county extension director (Lyles & Warmbrod, 1994).

Historically, training programs for extension administrators (including county extension directors) have included instruction in program planning, personnel management, resource allocation and budgeting, advisory committee organization and other managerial skills. At the same time, there has been a lack of training for extension administrators in leadership skill areas like participatory leadership, visioning, communication, innovation, empowerment, and constituent recognition.

One example of training provided for extension administrators is the Managerial Assessment of Proficiency (MAP) training program. The MAP program focuses on evaluation and ultimately development of management competencies, management styles, and personal values in extension administrators. MAP participants assess management behaviors, interpret their assessment, identify their strengths and weaknesses, and finally develop an individual plan for personal growth, training and development (Training House Inc. 1995). Although this training is beneficial for training in management, it seems to fall short on the leadership development needs of extension administrators.

Leadership can be defined in many situations and under varying circumstances. Yukl (1989) identified prevalent leadership theories and definitions based on the available literature in the field. Five areas surfaced, power and influence, trait approach, behavior approach, situational leadership, and an integrated approach. Easily identifiable and learnable characteristics were present in each. Leadership is "the art of mobilizing others to want to struggle for shared aspirations" (Kouzes and Posner, 1995, p.30)

Effective leaders possess a set of observable, learnable, practices that can change over time (Pozner & Kouzes, 1996). They can be developed and nurtured. In fact, Posner and Kouzes posit that exposure to leadership opportunities is the best way to develop these skills. Followers need direction, trust, and hope from their leaders (Bennis, 1994).

While there is evidence that supports differences in leadership behaviors in men and women, there is an equally compelling body of evidence that refutes leadership behavior differences between genders. Current research is not clear as to whether leadership differences exist between men and women (Park & Krishnan, 1997).

Management (as defined by Robbins and Cenzo, 1995) is "the process of getting activities completed efficiently with and through people (p.4)." A manager is simply a person who directs the activities of other people within an organization. Managers are primarily concerned with efficiency effectiveness. Efficiency in getting the most for the least input and effectiveness in doing things correctly (Robbins & Cenzo, 1995).

Much modern management theory can be traced to the work of French industrialist Henri Fayol who proposed that all managers perform the functions of planning, organization, commanding, coordinating, and controlling (Fayol, 1949). These original functions have been condensed to the basic four components of planning, organizing, leading, and controlling (Robbins and Cenzo, 1995). Although leading is included in the basic four components, it is in reality comprised of mostly managerial functions (completing activities with and through people) like directing personnel, selecting proper communication channels, resolving conflict and motivating people to be productive in their job. The primary function of the four managerial functions is to accomplish organizational goals.

Buford and Bedeian (1988) identified five management functions of extension administrators, including planning, organizing, staffing and human resource management, leading and influencing, and controlling. Leadership as defined by Buford and Bedeian in this model is more closely related to management than to leadership. Their definition is, "Leading and influencing is the process of inducing individuals or groups (peers, subordinates, and non-subordinates) to assist willingly and harmoniously in accomplishing organizational objectives (p.6)." The "influencing and inducing" to fulfill organizational goals is not in line with participatory leadership discussed earlier.

Some of the leadership literature attempts to bring management into the leadership realm. Fleishman, 1953, Halpin and Winer, 1957, and Hemphill and Coons, 1957, believed that leader effectiveness can be determined by two dimensions, their level of consideration toward their subordinates and by their initiating structure. Level of consideration includes being supportive, friendly, listening to subordinates, and treating subordinates as equals. Initiating structure is the leader's ability to meet deadlines, criticize poor work, evaluate performance, and keep subordinates on-task. Seevers, Graham, Gamon, and Conklin (1997) stress that although a directive leadership (management) is appropriate at times, a flexible, participative leadership style is necessary for today's extension administrators.

In his review of leadership literature, Stogdill (1974), divided leadership characteristics into two distinct categories, task related characteristics and social characteristics. Task related characteristics included a desire for achievement, being goal driven, enterprising, and responsible. Social characteristics entailed the leaders ability to enlist cooperation from others, nurture followers, be socially successful, and use tact and diplomacy. Buford and Bedeian (1988) propose that all extension administrators are involved in management and non-management activities.

Bennis & Nanus (1985) coined the popular quote that "Managers do things right. Leaders do the right things." Although this quote helps us to begin to differentiate between management skills and leadership skills, it attempts to separate the two as if one person cannot perform in both capacities. The author would suggest that there are two distinct skill areas needed to administer or direct an organization. One skill area can be classified as management and the other leadership. Certainly there are times when the lines between the two are difficult to differentiate. Effective administrators move from one skill area to the other with relative ease.

There are literally thousands of books and scholarly articles written that address leadership and management. Although they are treated as separate entities, effective administrators learn to be effective in both realms. Unfortunately competent managers with a high level of leadership skills are in short supply (Toney & Brown, 1997).

Purpose and Objectives

The effective county extension director is both manager and leader. Much has been written about management in extension yet little attention has been directed toward the equally important concept of leadership among extension administrators. The purpose of this study was to assess the leadership styles of Florida's county extension directors with a 360-degree methodology using the Leadership Profiles Index (LPI). The specific objectives of the study were to:

1. Determine the overall Leadership Profiles Index score of county extension directors and compare county extension director leadership profile practices with national percentile rankings from the LPI national database.
2. Compare male and female county extension directors leadership practice scores as identified by the LPI.

Methodology

A census of the 67 county extension directors (CED's) in Florida was conducted in the fall of 1998 to assess the interest in completing this study. Fifty-one of the 67 (76%) county extension directors participated in this study. The population studied consisted of 35 male and 16 female county extension directors.

The LPI designed by Posner and Kouzes was employed to assess the leadership styles of the participants. Five observers were selected to evaluate the CED's. They included their district extension director, another county director and three county agents of program assistants who worked with the county extension director on a regular basis. The county extension director selected the other CED and the agents or program assistants to evaluate their leadership style. This 360-degree method of analyzing leadership style has proven to be an effective way for leaders to gain a perspective of their leadership from those effected by it.

The LPI is the result of over 15 years of research in human leadership development conducted by the authors. At this time the researchers have evaluated over 12,000 individual leaders and have collected data from over 70,000 individual observers of leaders. Seevers et.al (1997) recognize the leadership practices measured by the LPI as necessary skills for extension administrators.

Kouzes and Posner began their look at leadership through conducting interviews with corporate leaders in the United States. Their initial sample of 1200 managers in middle to senior level positions represented a wide variety of public and private organizations and industries. From the initial research, five leadership practices were identified. They include challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart.

Leaders who are not bound by the status quo utilize the practice of challenging the process. These leaders are always looking for innovation and are not afraid to take risks in the organization. Leaders who display this trait know that failure is inevitable and approach failures as necessary learning experiences.

Leaders who inspire a shared vision are helping make the organization a reflection of the whole instead of an ideal of the leader. This practice includes an ability to see what can be while enlisting the creative energy of others to form the organization. Leaders who excel here are quiet persuaders and create a followership toward a common goal through their magnetism.

Enabling leaders give away power to their constituents so they can perform at their highest potential. Enablers foster collaboration and build teams in the organization. Leaders who enable others build trust in the organization and develop individual strengths to help others contribute to the organization.

Modeling the way includes following the same rules and guidelines set forth for everyone in the organization. Beyond that, leaders who model the way are continually setting the high standard for organizational performance by practicing what they espouse. Those who model the way help others through bureaucratic stumbling blocks and help others see their progress toward bigger goals.

When people are working hard to accomplish the organizations goals, leaders who encourage the heart will be able to get their constituents to put in the extra effort for success. Leaders who encourage the heart are never afraid to offer thanks or congratulations. They recognize individual contributions and celebrate organizational wins. Leaders who encourage the heart make everyone feel as if they are highly valued.

Each leadership practice had a set of two strategies. The strategies include searching for opportunities and experimenting and taking risks (challenging the process), envisioning the future and enlisting others (inspiring a shared vision), fostering collaboration and strengthening others (enabling others to act), setting the example and achieving small wins (modeling the way), and recognizing individual contributions and celebrating team accomplishments (encouraging the heart). These practices and strategies accounted for over 70% of the behaviors described in the leader interviews conducted by Kouzes and Posner.

The LPI is a set of 30 statements that describe leadership behaviors. The observer is asked to rate the leader on a 10 point Likert scale from almost always displaying the leader behavior to almost never displaying the behavior. Each of the five leadership practice has six behavioral statements associated with it. Allowing 10 points per question with six questions per practice (60 points maximum for each practice and 300 points total for the instrument scores).

Percentile rankings compiled for the LPI were used to provide a baseline of comparison for county cooperative extension directors. The instrument developers consider scores falling below the 30th percentile to indicate a low propensity to perform a particular practice while a score above the 70th percentile would indicate a high disposition toward exhibiting the practice. Scores in between the 30th and 70th percentile are considered moderate.

All of the LPI practice constructs have an internal validity above .80. The test / retest reliability of the LPI is over .90 for each of the leadership practice constructs. The face validity of the instrument was established through the research process in identifying the constructs to be measured. The instrument developers matched the practices with behaviors that reflect the practices to develop the instrument. Factor analysis was utilized to validate the statements associated with the leadership practices.

Instruments were sent directly to the evaluators. The researcher used the Dillman Total Design Method for mail surveys (Dillman, 1978) to collect data. The overall evaluator response rate for the 51 CED's used was 92% (235 out of 255).

Findings

Objective 1

The county extension directors mean scores for the five LPI leadership practices, were at or above the 50th percentile. The total mean score was 233.56 (SD = 25.49). Practice scores were in ranged from the 50th to the 60th percentile nationally. The practice of challenging the process had a mean score of 44.63 which placed it in the 50th percentile, while the practice of modeling the way rated at the 60th percentile nationally with a mean score of 48.71. See Table 1 for more information.

Table 1.
Leadership Profiles Inventory Scores and National Percentile Rankings

Practice	Mean Score (SD)	National Percentile
Challenging the process	44.63 (6.81)	50th
Inspiring a shared vision	43.47 (6.58)	53rd
Enabling others	50.01 (4.12)	55th
Modeling the way	48.71 (5.51)	60th
Encouraging others	46.75 (5.83)	52nd

Objective 2

One question addressed in this study was - do female and male county extension directors employ the same or different levels of the LPI leadership practices? Mean scores for men and women were significantly different (α<.05 apriori) in all practices with the exception of modeling the way. The overall score for the LPI was significantly different for men and women (α = .01) with men scoring an average of 227.55 (SD = 25.71) and women scoring an average of 246.72 (SD = 19.96) See Table 2 for details. A total of 300 points are possible on the LPI.

Table 2.
Gender Comparisons of Leadership Profiles Inventory Practices and Total Score

Practice	Female mean (SD)	Male mean (SD)	Significance
Challenging the process	47.78 (5.09)	43.10 (7.07)	.01
Inspiring a shared vision	46.93 (4.61)	41.89 (6.79)	.00
Enabling others	51.96 (3.44)	49.11 (4.14)	.02
Modeling the way	50.31 (5.21)	47.98 (5.55)	.16
Encouraging others	49.73 (4.70)	45.38 (5.84)	.01
Total score	246.72 (19.96)	227.55 (25.71)	.01

The women and men's leadership practices scores were compared to the national percentile rankings for comparison. The women were consistent in their scores with percentile rankings ranging from a low of 67th percentile for encouraging others to a high of 70th percentile for enabling others. The men had a wider range of scores from the 35th percentile for encouraging others to the 52nd percentile for modeling the way (Table 3).

Table 3
National Percentile Rankings by Gender

Practice	Female Percentile	Male Percentile
Challenging the process	69th	41st
Inspiring a shared vision	68th	46th
Enabling others	70th	47th
Modeling the way	69th	52nd
Encouraging others	67th	35th

Conclusions / Implications / Recommendations

This study assessed the leadership skills of county extension directors in Florida based on the Kouzes - Posner Leadership Profiles Inventory (LPI). The Kouzes - Posner model of leadership consists of five practices identified through extensive research with leaders in business, industry, and public service. The five practices are challenging the process, inspiring a shared vision, enabling others to act, modeling the way, and encouraging the heart.

As a whole, the Florida county extension directors LPI scores ranged from the 50th to the 60th percentile for all of the LPI leadership practices. The CED's were most proficient at modeling the way for their supervisors, co-workers and subordinates. Their lowest score was in the practice of challenging the process. Although these scores are in the moderate range of performance for the LPI leadership practices, there is room for improvement. The CED's should be offered professional development opportunities that will help them to develop each of these leadership skills to complement their management skills.

When comparing males and females, it is apparent that major differences in leadership practices exist. In fact, there is a statistically significant difference between men and women in four of the five leadership practices! The women had a tight range in their national percentile rankings (from the 67th to the 70th percentile) while the men were much lower, placing below the 50th percentile in all but one practice (modeling the way). Why do these differences exist? What specific actions or activities do the women practice that place them significantly higher than the men in the eyes of their supervisors, co-workers, and subordinates? More research is warranted to explore these gender differences in leadership practices.

More information about the county extension directors is needed to better understand the findings of this study. Does age, education, geographic location, time in the position, management skill, mentorship, leadership training and experience, or programmatic specialization influence leadership practices? What are the county extension directors' self-perceptions of their own leadership practices? Is there a relationship between the perceptions of supervisors, co-workers, and subordinates and the CED's perception of their leadership practices? More study is needed to understand the impact of leadership practices on extension administrator performance.

Extension administration involves a mix of management and leadership skills. Much effort is expended in developing extension administrators' management skills while little attention is given to the equally important set of leadership skills necessary for effective administration.

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EVALUATION OF THE FLORIDA LEADERSHIP PROGRAM FOR AGRICULTURE AND NATURAL RESOURCES

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Abstract

Alumni from the Florida Leadership Program for Agriculture and Natural Resources (FLPANR) were interviewed to evaluate the effectiveness of this program, and to determine if the program is meeting the goals and objectives it set forth. The FLPANR is an intensive two-year program, which is divided into nine seminar sessions that address local, regional, national, and international issues that have an impact on Florida agriculture and natural resources. The population for this study consisted of a purposefully selected sample of past participants who represented different classes of the program, different agriculturally oriented industries, and different regions of the state. In addition to the interviews program participants, their spouses, and a business associate were also interviewed. The participants, spouses, and associates indicated that networking, increased leadership skills, a broader perspective of Florida agriculture, an increased ability to identify and address issues, an increased appreciation of the diversity in people, and a basis to continue to learn and develop were the major benefits of this program. Based on the findings of this study, the researchers concluded that this program is equipping those in agriculture and natural resources with the skills and abilities necessary to be effective leaders in their representative industries now, and in the future.

Introduction

Leadership is not an innate characteristic, it can be developed through formal and informal training (Bolton, 1991). Leadership can also be developed through properly designed leadership programs (Earnest, 1996). Some basic questions need to be answered when developing leadership programs. If leadership is taught, what is the curriculum? If leadership is developed, what is the process? How is leadership acquired? How is the development of leadership fostered (Miller, 1967)?

Agricultural and natural resource leadership programs are designed to expand the horizons of young leaders involved in agricultural and natural resource pursuits, by exposing them to study and experiences. Participants are exposed to leadership development and gain a knowledge that is not readily acquired through day to day agricultural and related occupations. These leadership programs assume that skills, knowledge, and attitudes of a leader can be learned (Bolton, 1991).

The Florida Leadership Program for Agriculture and Natural Resources was officially implemented October 1, 1991 to provide future leaders in Florida agriculture and related areas with the skills necessary to achieve their leadership potential. The Florida Leadership Program for Agriculture and Natural Resources is closely patterned after successful programs in California, Arizona, Texas, Alabama, Michigan, Washington, and Ontario (Trotter, 1991).

The goal of the Florida Leadership Program is "to develop and refine the leadership capabilities of young leaders who in turn will be prepared to become increasingly involved in policy formation—be it policy that directly applies to all segments of Florida agriculture or public policy that will effect the future of Florida agriculture either in a direct of indirect manner" (Trotter, 1991).

The objectives for the Florida program were developed when the program was established, yet no evaluation has been done to see if the program is meeting its' objectives, which are as follows:

1. Develop a better understanding of people—themselves, fellow citizens, their environment and their personal and group aspirations.
2. Build an understanding of social, economic, and political systems in which people function.
3. Analyze complex issues facing people interested in areas related to agriculture, natural resources and rural communities.
4. Develop an understanding of the American political system and how to work within this system to effectively bring about change.
5. Improve inner-personal skills to more effectively work with people from diverse backgrounds.
6. Establish a basis for life-long development and growth.

Theoretical Framework

Chemers (1997) stated "a definition of leadership that would be widely accepted by the majority of theorists and researchers might say that 'leadership is a process of social influence in which one person is able to enlist the aid and support of others in the accomplishment of a common task'". Leaders have a multitude of functions, they must be able to offer direction and motivation, solve problems, analyze information, and inspire confidence in those around them (Chemers, 1997). How is leadership taught to individuals? Bolton (1991) suggested that leadership development is a culmination of many disciplines including: sociology, organizational development, educational leadership, and business management. Leadership development can enhance the ability of individuals to participate in groups and organizations and allows them to develop the necessary leadership skills to lead these groups (Dhanakumar et al., 1996). Leadership development is continuous throughout life, and because of this, it is often hard to identify and measure leadership characteristics and abilities (Brungardt, 1996).

"Agricultural leadership, as all leadership, rests on an ever increasing sense of reality, a searching for connections and relationships, an intellect which relates beliefs to the appropriate ends for human activity and the means to achieve such ends. The agriculture sector cannot, any less than others, escape the relatedness of aesthetic, intellectual, and moral values which are found in cultures other than its own. This is the essence of both leadership and public responsibility" (The Cooperative Extension Service [CES], 1965). This statement was made in a 1965 proposal to the Kellogg Foundation for a Farmer's Study Program on Agriculture's Role in an Industrializing Society. The program became known as the Kellogg Farmer's Study Program, and formed the basis for many of the existing agricultural leadership programs that began with funds from the Kellogg Foundation in North America.

Several states still follow a program that is a refinement of the original Kellogg Farmers' Study Program. These programs expose their participants to a broad range of state and national issues that are not sector-specific. Additionally, they strive to give their classes an overview of issues facing education, the environment, families, health care, the political system, and the urban populations of their state and nation (Johnson, 1998). The basis is that the participants must understand the larger society before they can be effective in dealing with other groups to address agricultural issues. Content areas are not approached as single entities; instead the programs are built on the interrelationship of subjects and their relationships to leadership (Andrews et al., 1985). Even though many of the programs are a current version of the original Kellogg Farmers' Study Program, they differ in some ways to meet the needs of the current generation of participants (Andrews et al., 1985).

Many agricultural leadership programs exist in North America as a result of the early work of the Kellogg Program. Although these programs differ in format and length, they are all basically geared towards the same agricultural-based audience. Program size varies with each state, with thirty participants per class being the average. Some programs make thirty the maximum goal, enrolling less in the program if qualified people to participate cannot be identified (Johnson, 1998). Most programs target participants in the 25-45 year old age range. Age limits are common with most programs, some do have an upper age limit, and most have a minimum age of twenty-five. Potential participants are often determined by sponsoring organizations (Johnson, 1998), nominations from industry representatives and active program alumni, and from recruitment.

There are many common goals of these agricultural leadership programs. Some of the common goals include: increase participant's understanding of political, social, and economic systems, develop personal skills, expand individual networks, become effective spokespeople for their industry, and develop future political, civic, and organizational leaders. The central focus of agricultural leadership programs is to "polish" demonstrated young leaders in a target population. Others wish to encourage and develop potential leaders (Johnson, 1998). Generally these leadership programs have two tasks: developing leadership skills in the participants, and enhancing their knowledge on topics that deal with food systems, policy-making, or international economic institutions (Johnson, 1998).

In his review of community leadership programs, Earnest (1996) found many benefits. Not surprisingly, one of the biggest benefits of these programs is increased leadership skills. Additional benefits of agricultural leadership programming is increased involvement in citizen and volunteer activities, increased confidence in the participants, and increased networking among participants. A broadened or different perspective was also reported. Johnson (1998), in his review of agriculturally based leadership programs stated that "every graduate from these agriculture leadership programs benefit from the networking that results from these programs". In their evaluation of the PRO-MISS Class II Cohen and Beaulieu (1994) found that the leadership program helped improve the participants' leadership skills on several different dimensions. In this study, the participants reported more confidence in their leadership skills after they completed the program, and as a group, they were more willing to use these skills to benefit their communities.

Measuring the success of leadership programs is a difficult undertaking. The program's goals must be clearly known for evaluation. Not every participant will run for public office, or excel in his or her industry. The Texas Agricultural Lifetime Leadership Program's web page realistically states that the results will not be known for ten years after its participants graduate (Johnson, 1998). In Bolton's (1991) study of a community-based leadership

program, it was found that participants gained in the knowledge of leadership skills, but they did not feel that the leadership course had greatly increased their confidence or ability to implement these skills.

Results of many of these leadership programs may not be known for many due to the lack of detailed evaluations and the fact that many of the changes the participants undergo are not seen until some time after program completion. Johnson (1998) states that "it is the leadership programs' longevity that give them their impressive potential for change. These programs produce graduates who are 'lifetime' leaders and learners".

Howell, Weir, and Cook (1982) provided theoretical considerations for leadership development programs. They stated that "leadership development programs were designed to help participants learn new behaviors and skills that would enable them to participate more effectively in public affairs". They explained that observed behavior changes could be explained by role, motivation, and social exchange theories which could be linked back to the educational components of the leadership development programs.

In addition to the theoretical considerations of these agriculture leadership programs, there are several specific program goals and components that are the basis for these programs, and the foundations for leadership development in the participants. These can be divided into the same categories as the instrument questions used to determine the effectiveness of this program, the categories are: people skills, policy development, analytical skills, and personal development. Found within these categories are many of the themes found in the evaluations of other programs, and themes that will hopefully be present in the findings of the evaluation conducted on the Florida Leadership Program for Agriculture and Natural Resources. These include: building of individual networks, increased leadership skills, broadened perspective of Florida Agriculture and natural resources, issue identification, working with a diversity of people, increased critical thinking skills, and the desire to continue to learn and develop. These can be taught through the structured seminar environment provided by the leadership programs, the travel throughout the state, region, nation, and world, and through the participants own personal interactions with people they have encountered through the program.

Purpose and Objectives of the Study

The Florida Leadership Program for Agriculture and Natural Resources began in 1991. Three classes of graduates have completed the program. Class IV began in the summer of 1999. At the end of each two-year class, participants are given an evaluation. The results of the evaluation are intended to improve the quality of the program. The current evaluation does not measure what participants gain from the program. To date, no study has been conducted to determine what participants are taking away from this two-year educational endeavor. Does the program meet its objectives? Do participants implement what they learn in their own life, and have they made personal and professional changes in their lives as a result of the program? The purpose of this study was to determine the extent to which objectives of the Florida Leadership Program for Agriculture and Natural Resources were met by its' participants.

The objectives of this study were to:

1. Assess the program's impacts on the participant as perceived by the participant,
2. Assess the program's impacts on the participant as perceived by the participant's spouse,assess the program's impacts on the participant as perceived by a third party who would be aware of changes in the individual, and compare common impacts among these three groups with the objectives of the program.

Methodology

The data collected from the interviews was qualitative in nature. The goal of qualitative analysis is to isolate and define categories during the research project, but also to expect that these categories will change during the course of the research (McCracken, 1988). Several other evaluations such as Dhanahkumar, Rossing, & Campbell's (1996) evaluation of the Wisconsin Rural Leaders Perspective Program, and Whent, Leising, & Tibbits' (1990) evaluation of the California Agriculture Leadership Program, gathered data using qualitative techniques.

Qualitative data or the use of interviews or focus groups provides depth and detail through the use of direct quotations and thorough descriptions of the program. These descriptions are collected as open-ended narrative without attempting to fit the descriptions into predetermined, standardized categories like choices that are found on questionnaires or tests (Patton, 1987). Patterns, themes, and categories emerge from the data rather then being decided upon prior to data collection (Patton, 1987).

The population of this study consisted of alumni from the first three classes of the program, their spouses (or significant individuals in their lives), and their employers or business partners. These three groups were used to achieve triangulation, Triangulation builds checks and balances into a design through the use of multiple data collection strategies; the triangulated design is aimed at increasing the rigor and strength of an evaluation. It also solves the problem of relying too much on any single data source or method and undermining the credibility of the findings of this method or source because of the weaknesses that may be found in a method or source (Patton, 1987).

Eight participants from each class were chosen based on their geographic distribution and commodity representation throughout Florida. The state was broken into four regions (North, East Central, West Central, and South), and two participants from each class were chosen for each region. The participants' spouses were interviewed to discuss whether or not the program has had an impact in the life of the participant, or on their life as the participants' spouse. The spouses were chosen because of their close proximity to the individual, and their ability to distinguish any inherent changes in the individual. The participants' employers were chosen because they have a vested interest in the success of the individual. Both will also be able to tell if the participant has implemented any changes in his/her life.

An interview questionnaire was used to gather data during the interview process. The use of the questionnaire ensures that the material is covered in the same order for each respondent (McCracken, 1988 & Patton, 1987). Patton (1987) stated that "the purpose of gathering responses to open-ended questions is to permit the evaluator to understand and capture the perspective of program participants without predetermining the perspective through prior selection of questionnaire categories". This questionnaire consisted of eight questions that were slightly altered for each group. These eight questions were derived from four constructs or areas, which were obtained from the objectives of the Florida Leadership Program and the original Kellogg Program. These four construct areas were identified as People Skills, Policy Development, Analytical Skills, and Personal Skills. Two questions per area were developed to assess knowledge that they gained in these four construct areas. The questions asked were relevant to what the participants learned, what their goals are, and what, if anything had they implemented from the program into their professional and personal lives. The questions used were as follows:

People Skills

1. How has the program helped you interact more effectively with people, both personally and professionally?
2. What were the most important leadership skills you either learned or refined during the two year program to help you lead people?

Political Development

1. What did you learn about the social, economic, and political influences that impact Florida agriculture and natural resources?
2. What did you learn about the American/Floridian political system?

Analytical Skills

1. How are you better able to identify issues facing Florida agriculture and natural resources?
2. How did the program help you use critical thinking skills in your day-to-day life? For example, determining truth in statements, examining sources of information, etc.

Personal Skills

1. Has this program provided a basis for you to continue to learn and develop? How are you going to do this?
2. What inter-personal skills did the program provide, or improve upon, that allow you to deal with people from diverse backgrounds more effectively?

A panel of experts composed of faculty from the Department of Agricultural Education and Communication and the Department of Food and Resource Economics reviewed the instrument to establish validity, and changes were made based on their recommendations. To insure reliability, the instrument was field-tested with a participant from the program, her husband, and her employer. No changes were made to the instrument after field testing.

Findings and Conclusions

After analyzing the responses from all three groups, common themes were found in the responses of all groups. These common themes are as follows (Figure 1-1):

People Skills. Networking was a theme found in the responses given by all three groups as an asset that allowed the participants to interact more effectively with people. Another prevalent theme is increased organization in the participants, and that the participants deal with people more effectively, due in large part to the MBTI. All three groups who were interviewed found better communication skills as increasing the participants' leadership skills.

Policy Development. Networking was a theme found in all three groups, this allows the participants to be more aware of the influences that affect Florida agriculture and natural resources. All three groups also felt that the participants had a broader perspective of the influences and issues that occur in their industry and other industries in Florida agriculture and natural resources. The participants increased their political savvy by becoming more comfortable working within the political system, being more actively involved in the political process, and having a greater understanding of the political process were all common themes found in all three groups.

Analytical Skills. Two common themes were networking and a broader perspective of Florida agriculture and natural resources. The broader perspective given to the participants, and the contacts and relationships that develop through the program allow the participants to better identify the issues that are facing Florida agriculture and natural resources. The participants' ability to think more critically since their participation in the program was a theme echoed by all three groups.

Personal Skills. All groups agreed that this program provided a basis for the participants to continue to learn and develop, and they all agreed that the participants would do this by their involvement in the alumni association, boards, organizations, and the such. All three groups also agreed that networking would aid in the participants' continued growth and development since they would remain in contact with people who would be close to issues they might not know about. Appreciating the diversity of people, where they are coming from, what they bring to the table, and why they think they way they do was a theme that all three groups commented on when discussing the participants abilities to deal more effectively with people from diverse backgrounds.

Implications, Recommendations, and Discussion

Many common themes were found in all three groups of interviews, these can be found in Figure 1-1. These themes can be closely related to the objectives set forth by the program. The major themes that emerged from these interviews are networking, a broader perspective of the issues, an increased knowledge of people's personalities, and a continued desire to learn and keep learning throughout their life. Although everyone interviewed had different answers, gave different examples, and had different thoughts and opinions about the participants and the program, these themes were found in almost all the interviews, whether it is the participant themselves, their spouse, or an associate.

Even though each participant came away from the two-year program with something different, they shared these commonalties, and felt these to be some of the most important aspects of the program. Every person interviewed mentioned networking, and as one stated, "networking is the key". If each participant walked away from this two-year program with nothing else, they had a diverse network of individuals who would be invaluable in the future, not only as support for agriculture and natural resource related issues, but as a group. These alumni have a very powerful voice in the industry.

One thing that was not mentioned in any of the interviews was the hardships of being away from home and from the business. Even though the program places a huge time commitment on the participant, their spouse, and their associate, not one mentioned that it was a negative about the program. In fact, many of them wished that the program were longer in length, some of the participants felt that the program was too short, and felt a void when the program was over. The time commitment is a hindrance to many who think about applying for the program, but it is obvious through these interviews that the time commitment is not a negative aspect of the program. Many of the interviewees thought it was a positive experience, because the participants learned that life can go on without them, businesses can run, the family can exist without the participant right there overseeing the operations. This was a validating experience for many of the spouses and associates who gained an increase in responsibility when the participant was gone; they learned that they could handle the increased responsibility. It was also important for the participant themselves, they learned that they did not have to "micro-manage", they did not have to have their hands in everything to make it work.

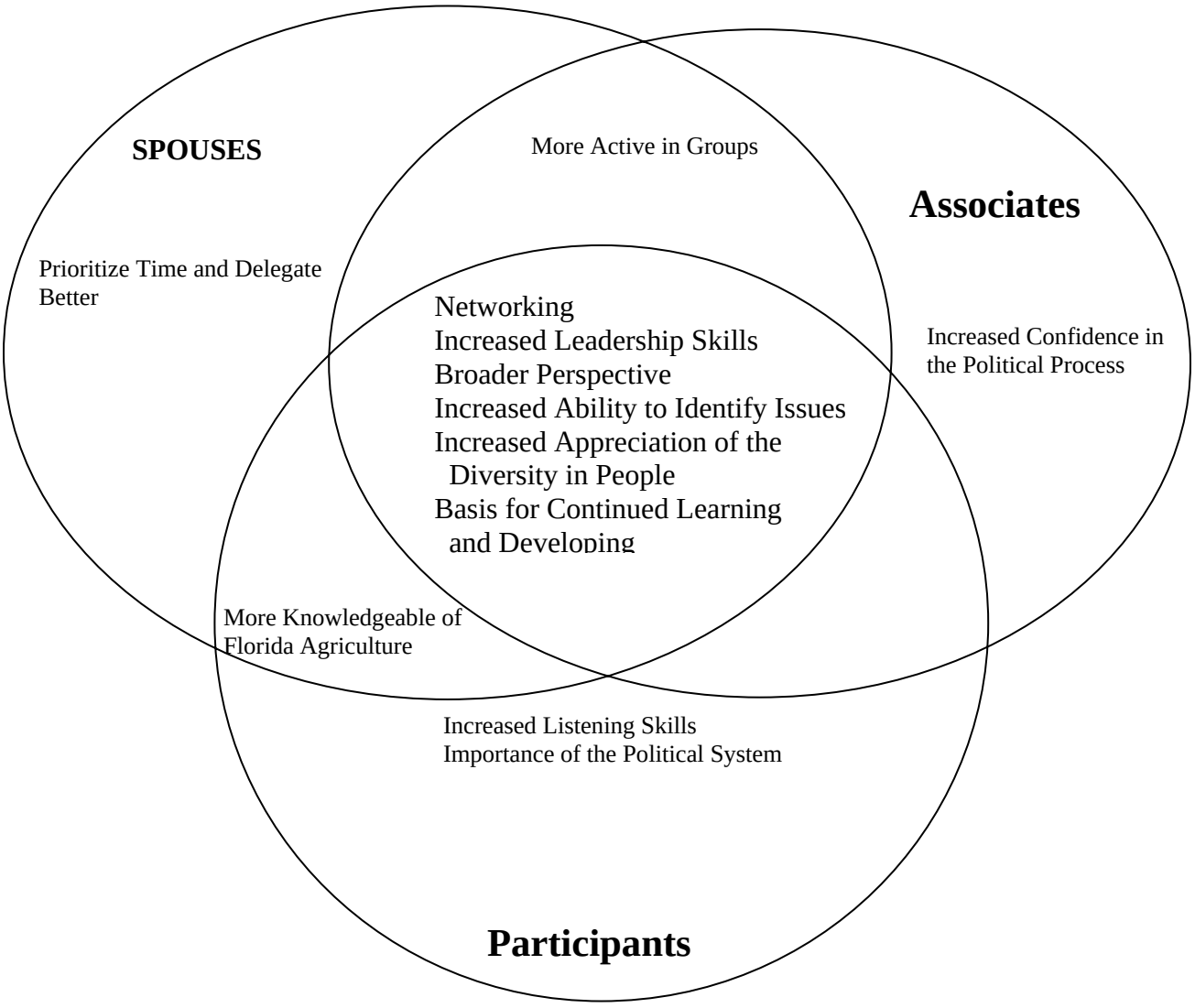
From the findings it is obvious by the results from this study, that the program is not only meeting its objectives, it's exceeding them. The participants, their spouses, and their associates who were interviewed had only positive things to say about the overall learning experience provided by this program. The participants themselves, felt that their lives had been enriched by their participation in the program, and that the lessons they learned, and the contacts they made would stay with them for the rest of their lives. These results are substantiated by the responses of the spouses and associates, who only reiterated the responses given by the participants, which served to add credibility to the findings.

From the discussion of the findings, a few major observations were made:

1. This program should be continued well into the future.
2. Not only should the program be continued, but also a second phase of the program should be implemented for graduates of the program to continue their leadership development.
3. The Alumni Association should continue to remain strong and active. With the implementation of ClassIV this year and a successive class every two years, this alumni organization has the potential to be a powerful voice for agriculture and natural resources in the State of Florida.
4. Be aware of subtle changes being made by the participants. A few responses in this section of questioning believed that the participants became more "cynical" since their participation in the program, which may not be a positive attribute of the program, and one that may have to be further studied.
5. Conduct further studies on how graduates of this program are impacting their particular industries, and the benefits that these industries are receiving from having their members participate in this program.

6. Use standardized critical thinking instruments and leadership assessments to determine what level participants used their critical thinking skills and leadership abilities before and after the program. In the analytical section of questions, many of the participants, their spouses, and their associates believed that the participant already was a "critical thinker", they already had the skills necessary to identify and analyze complex issues.
7. Conduct a more detailed and systematic evaluation of this program. Evaluate a future class from beginning to end. A pre-test to determine the participants leadership roles, abilities, and overall knowledge could be given to the participants when they begin their first class in June. This test could be quantitative in nature and structured after many of the pre-tests used by other programs. A post-test could be given to the participants to see how much they really gained from the program. Using the pre- and post-test design, evaluators could better judge what leadership affects came from the program itself, or actually came from various other confounding factors.

Figure 1-1. Findings from triangulation. Overlapping circles represent themes common in more then one group.



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NOTES FROM THE AAAE POSTER SESSION CHAIR

Originally titled "exchange of ideas," the poster session is a forum for agricultural education professionals to share proven education methods from their individual programs. To be considered for consideration a poster must be a new idea or the creative modification of an existing idea, it must be of potential regional or national significance, and it must have been used before the time the idea was submitted for consideration.

In October of 1999, a call for poster proposals emailed to all subscribers to the Southern Region AAAE List-serve. A call was also mailed to the head of each Agricultural Education Program in the Southern Region.

Ten proposals were submitted for consideration. Each proposal was reviewed and rated by three peer educators in a blind review process. Proposals were judged on significance of the idea, creativity, technical content, practically, educational value, and adoption potential. All ten proposals were selected for presentation for an overall acceptance rate of 100%. Posters will be judged on site with the top four posters qualifying for presentation at the 2000 National Agricultural Education Research Meeting in San Diego.

William G. Weeks
Associate Professor
Oklahoma State University
Poster Session Chair

BIOTECHNOLOGY AND AGRISCIENCE RESEARCH COURSE AND CURRICULUM DEVELOPMENT

Elizabeth B. Wilson
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Introduction

Today’s biotechnology is being used to develop agricultural products and to improve existing plant and animal species. Agricultural scientists, technicians and consumers need to understand agricultural biotechnology in order to conduct research and to make informed decisions. High school agricultural education programs can provide young people the information and training they need to pursue related careers or to become informed decision-makers.

Program Phases

In 1994, North Carolina agriculture education teachers indicated in a North Carolina Department of Public Instruction (NCDPI) survey that agricultural biotechnology should be taught in North Carolina high school agricultural education programs. In 1996, a committee of industry, business and education personnel was formed, under the leadership of North Carolina State University, to determine the competencies and curriculum that should be taught in a course titled Biotechnology and Agriscience Research. This committee referred to the “National Voluntary Occupational Skill Standards for Agricultural Biotechnology Technicians” to determine the skills needed for an entry-level employee in agricultural biotechnology.

During the 1998-1999 and the 1999-2000 school year, the Biotechnology and Agriscience Research course was piloted in eleven schools across North Carolina. A grant was received from the North Carolina Biotechnology Center to buy supplies for the pilot labs and teachers were also invited to participate in their equipment loan program. The pilots and project director accomplished the following objectives:

1. Taught basic biotechnology and current agricultural applications of biotechnology in North Carolina high schools.
2. Introduced approximately 50 teachers to the labs/curriculum in the summer of 1999.
3. Piloted the curriculum materials and lessons.
4. Collected data to access student performance.
5. Steps taken to achieve the objectives:
6. Trained pilot teachers in workshops at NCSU.
7. Trained pilot teachers in workshops at Carolina Biological Supply Co., Inc.
8. Provided teachers with access to equipment and lab supplies to implement biotechnology lessons.
9. Worked with the DPI and pilot sites to complete the course blueprint.

10. Worked with consultants to develop matching curriculum materials.

As the North Carolina course was being developed, the pilot teachers and the curriculum committee realized the need for a comprehensive and up to date agricultural biotechnology curriculum. The National Agricultural Council was interested in supporting the development of such a curriculum. Smith and Strozier consulting firm was identified as having developed biotechnology curriculum and having assisted with various high school agricultural projects in North Carolina. Current agricultural applications of biotechnology were integrated with employee skills identified in the "National Voluntary Occupational Skill Standards for Agricultural Biotechnology Technicians" and the course competencies of the North Carolina Biotechnology and Agriscience Research course to create the framework for the "Biotechnology for Plants, Animals, and the Environment" curriculum.

The "Biotechnology for Plants, Animals, and the Environment" curriculum was piloted in North Carolina and nation wide by the National Agricultural Education Council during the spring of 1999. This curriculum is complete and will be available for purchase by the National Agricultural Education Council in the spring of 2000

Results To Date

The goal of this project was to expand biotechnology education among Agricultural Education students in North Carolina. During the 1998-1999 school year, 98 students were enrolled in the Biotechnology and Agriscience Research course at pilot schools. An additional 295 students took part in one or more of the biotechnology labs integrated into an existing agriculture education course. In the summer of 1999, pilot teachers conducted a teacher workshop at the annual N.C. Agricultural Education Summer Conference to introduce over 50 teachers to the course and new curriculum. In the fall of 1999, the pilot teachers presented an introductory NATA workshop to showcase the curriculum to over 100 teachers nationwide.

Implications

In this project, many partners of education have come together to deliver biotechnology education to agriculture education students. The purpose of agriculture education is to educate and train future leaders and employees of the agriculture industry. The success of these students will depend on their knowledge of current technology including biotechnology. In turn, the biotechnology industry will depend on the agriculture industry to understand and utilize biotechnology products and processes. Biotechnology education should and is an integral part of agriculture education.

Future Plans

In the spring of 2000, national train the trainer workshops will be conducted by the National Agricultural Education Council to distribute the curriculum nationwide. The North Carolina pilots will continue to serve as model/pilot programs. The projector director will research the barriers of adoption of the course and curriculum in North Carolina. North Carolina State University will create an item bank of multiple choice objectives for post assessment/accountability requirements.

TEAM WORK

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Introduction

In any career, you will spend an enormous amount of time working with people. This involves experience in organizing, managing and coordinating groups, projects, and events. Teamwork, leadership and problem solving skills have been identified as important interpersonal skills being sought in potential employees. In research by Bruening, Cordero, and Scanlon, (1996), one employer stated "…the one consistent thing I am looking for…is team work…the ability to work well with others and the ability to feel part of the team….". Jill Stephens, Director of Corporate Outreach with America Online stated "you absolutely have to be able to work in teams, rather than being purely self-oriented." (Techniques, 1997)

People can play various roles within group situations. These roles are team-centered and self-centered. Team-centered roles are concerned with helping the group work toward cooperation and accomplishment and are used to make the team more effective. These roles help build a harmonious group, and are involved in coordinating task accomplishment. Self-centered roles are concerned with personal goals and are often destructive in group situations. (Clifford & Robinson, 1974). Learning to be a team player takes practice.

How It Works

Teamwork is used as a group learning strategy in the Issues in Agriculture course. A main goal of the course is to help students gain the ability to use team approaches to problem solving and decision making in the context of agricultural issues. This goal is accomplished through small group activities such as simulation activities,

presentations and papers, and organized discussion meets. Each student is challenged to address selected issues, to identify problems and causes, to analyze and synthesize all available data, and to bring multiple sources of knowledge and skill to the group in order to make logical recommendations toward resolving the problem. Each group consists of 3-5 students. Students are assigned to a group based on the results of the Myers-Briggs Type Inventory or chosen by classmates. The various methods are used to foster an understanding of the group process and problems associated with working in a group. The following steps are used for group projects:

1. Groups are assigned an issue for resolution.
2. The group decides how to approach the gathering of background information
3. The group develops an organizational structure and outlines the issue.
4. The group writes a paper concerning the issue.
5. The group chooses a method of presentation and presents the issue to the class.
6. Each student writes a group process essay to explain what he or she learned from the group experience.

An example of the group working together is the final project. This project consists of a paper and discussion meet. Groups are assigned based upon a common interest and divided into opponents and proponents of the issue. The discussion meet is designed to teach the value of compromise, to effectively solve problems through discussion, stimulate logical thinking, develop the ability to listen, and assist the individual in learning to give and receive criticism in a meaningful manner.

Results

The group process essay is used to evaluate the effectiveness of using teamwork in the classroom. The essay provides an analysis of the group experience and is written after each group paper and presentation. The following comments are responses from student process essays:

> Worked well in the group because personalities complemented each other.
>
> We had a common interest/goal and divided the tasks equally.
>
> Worked well around everyone's needs and the group's needs.
>
> Communication was verbal and nonverbal.
>
> We listened, supported each other, and compromised.
>
> Time was the biggest problem.
>
> We didn't have consistent involvement.
>
> The group accomplished its' goal.
>
> Group members were prepared for discussion.

Future Plans/Advice

When planning to use group activities to teach teamwork skills, it is important to set specific guidelines for group interaction. The use of group activities involves each student in the learning process and fosters an environment of cooperation and learning. It is important to allow class time for the initial group meeting.

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USING REAL CASES FOR INSTRUCTION

Donna L. Graham
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Introduction

Do you need to help students to build analytical and synthesis skills, learn to solve problems, develop mature judgment and critical thinking skills or enhance communication skills? If so, then you may want to consider using case studies in your instruction. Decision cases are teaching tools, which are well suited for interactive learning about agricultural issues, policy and management strategies. Case studies are similar to the storytelling approach to teaching and learning in that higher order learning is achieved beyond the specifics of the case itself. The student can understand the broader implications and ethical interpretations of certain decisions when using this approach. Decision cases represent reality and place the student in the position of discovering knowledge from a real situation. Cases can be issues of national concern or they can be localized to a particular region or community.

The case can be used for large class discussion as well as small group collaboration and integrated writing assignments. Cases can be used to illustrate parts of larger issues, to illustrate how values and beliefs influence the decision making process and conflict resolution. Case studies foster cooperative learning which is effective in allowing students to create knowledge rather than passively listen to yours. Research has demonstrated that cooperation among students produces greater achievement and higher-level reasoning, more positive relationships, greater acceptance of differences, and higher self-esteem.

Methodology

The first step is Assignment and Engagement. Students are usually given an assignment before the discussion. The assignment could range from something as simply as reading the case to a more complex task such as evaluating case information or doing background reading. The teacher might also use audio-visual aids or local news articles to enrich the students' understanding of the case. This helps get the student involved and develops a sense of ownership in the case. A series of opening questions seems to work well. The second step is Analysis and Discussion. The students systematically analyze the case and discuss it under the direction of the teaching objectives. Good questioning skills are important for the teacher. The third step is for the students to Respond to the case discussion and analysis. A decision does not always need to be made, but it usually is. The response can take many forms, such as recommending what decision should be made, expressing feelings during case discussion, conducting further case analysis, or identifying additional information needed to make an informed decision. Most of the cases are discussed with the total group input, then smaller groups work to investigate the facts and myths of the issue before a response is made.

Every case used should be used for a purpose. You should use the case to 1) define the dilemmas faced by the parties involved. This includes a presentation on the problems, undesirable outcomes, the parties involved in the issue, and the goals or objectives of each of the parties. 2) Determine the cause of the problem. This may involve providing examining the historical context, a shift in value paradigms, or similar causes. 3) Create some alternatives. 4) Select the Abets alternatives after the consequences are determined for each of the alternatives. It is important that the discussion leader help the student to discover the Affects and the values of the case. This is difficult as many groups use scientific data to support their arguments in a particular issue.

Results/Implications

Many positive comments have been received from student evaluations. Students have said the class has been really good. We have discussed issues that I was not informed on. I have realized it is important to be aware of the facts and to not just repeat what I have heard from TV. . . .The experience of speaking in front of a group has certainly helped me . . . .The relaxed environment of the class is great because it generates responses from students who otherwise would not say anything . . . . Hearing various opinions has also been good . . . . I will certainly recommend this class to fellow students. From my observation, students also learn to grapple with complexity and ambiguity, work in groups, organize and synthesize issues, and realize that many decisions are based on political agendas.

Advice to Others

This is not an approach if you like to have a structured lecture. You must be flexible and willing to allow for discussion to move in many directions. You must be alert to emerging issues and keep up to date with current events in many fields. You must be a generalist, not a specialist. The greatest skill needed is the ability to ask probing questions or introduce additional information or hypothetical characters to broaden the case's perspective. Many times you must question the reasoning ability of the student. Some tips to effective use of this technique are to control the dominating student, try not to give the discussion too much structure, learn to ask probing questions, and try to include everyone in the discussion.

Costs/Resources

Case studies require a usage fee or purchase. Copyright laws protect some. Most sources allow for the duplication of the material for educational purposes.

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PERCEPTIONS OF AGRIBUSINESS MANAGEMENT AND MARKETING OF TEXAS AGRICULTURE TEACHERS

Doug Ullrich
Roger Hanagriff
Sam Houston State University

Introduction

The agricultural economy has changed, is changing and will continue to change. With the past turbulence of the agricultural economy farmers and ranchers must become knowledgeable and proficient in business strategies to maintain existence. The job market in agriculture is also shifting from production skills to management and agribusiness skills. To prepare students for this change in the job market students should learn basic agribusiness concepts at the high school level. This knowledge will be helpful for both college and workforce bound students.

Agricultural Education classes in Texas have over 89,000 students currently enrolled during the Fall 1999 semester in approximately 970 programs. With the large number of students, programs, and the increasing need for a workforce with agribusiness skills, one could expect large numbers of programs to offer specific classes in agribusiness, marketing, management, or entrepreneur.

Methodology

During the Professional Improvement Conference for Agricultural Education Teachers in Texas, 700 surveys were distributed to teachers participating in educational workshops. A $100 incentive was randomly given to a participant who completed the survey. Approximately 286 surveys were returned and were completed properly. The survey included a lickert scale of the participant's assessment regarding their knowledge of agribusiness topics. These topics are the chapter titles for the Texas Agricultural Business Vocational Courses (i.e. AgSc. 311, 311H, Entrepreneurship). The survey also included some brief demographically oriented information including courses teachers took in college and courses they currently teach in agribusiness.

Results

The results are summarized in the following table. The average amount experience of teachers completing the survey was 12.19 years. The majority also had taken Agricultural Economics in college as part of their teacher preparation program, while a select few had taken Farm Business Management, Agricultural Marketing, Law, Finance, Policy or Sales. The percentages relate the percent that had experience with the corresponding courses. The percentage of the respondents that have taught AgSc 311 or Entrepreneurship is 72% and 66% respectively. These are very high percentages versus the lower percentages of college training in agribusiness courses.

The assessment of knowledge by the participants varies among topic areas.

Summary of Results

The teachers indicated that they have a below average (3.16) level of knowledge in "Legal Structure of Business," "Accounting Procedure", "Farm & Ranch Financial Analysis", "Enterprise Budgeting", "Partial Budgeting", "Cash Flow Budgeting", "Production and Financial Leases," "Insurance Management," "Business Plans," "Marketing Plans," and "Presenting Business Proposals." See Table 1

These areas are the topic areas in which workshops or short-courses may be useful. These are also the "perceived" topic areas. A planned follow up survey will test participant's knowledge in each area, which will possibly provide more detail into the topic areas where training may be needed.

Future Changes or Recommendations

It is recommended that teacher preparation programs develop new courses or reevaluate existing courses to meeting the demands of teaching Agribusiness Management, Marketing, and Entrepreneurship to high school students. Emphasis needs to be placed on skills and knowledge pertaining to the various units of instruction expected for

mastery by high school students. Workshops need to be offered during the Professional Improvement Conference to help teachers develop skills to teach these subjects. Furthermore, easy to understand and useable curriculum materials need to be revised and developed for dissemination to teachers.

Table 1.
Ratings of Knowledge Areas

Areas of knowledge*	Mean (1-5)	Std. Dev.	Years experience*	Mean (yrs.)	Std. Dev.
Employability characteristics	3.86	0.81	Years teaching	12.19	10.09
Legal structure of business	2.80	0.88			
Role of government in agriculture	3.27	0.75			
Supply and demand principles	3.71	0.75	College courses	Percent	Std. Dev.
Accounting procedures	3.12	0.90	Ag. econ.	37	0.48
Income statements and balance sheets	3.31	0.84	Farm bus. mgmt.	14	0.35
Farm and ranch financial analysis	3.13	0.91	Ag. marketing	9	0.28
Enterprise budgeting	3.11	0.91	Ag. law	2	0.14
Partial budgeting	3.03	0.89	Ag. finance	3	0.17
Cash flow budgeting	3.08	0.87	Ag. policy	1	0.11
Production and financial leases	2.88	0.91	Ag. sales	3	0.17
Borrowing funds	3.35	0.93	Average	10	
Insurance management	2.84	0.90			
Marketing	3.24	0.88			
Marketing strategies for production ag.	3.20	0.90			
I.D. business opportunities and customers	3.21	0.85	Courses taught	Percent	Std. Dev.
Business plans	2.92	0.87	Ag. science 311	72	0.45
Marketing plans	2.91	0.89	Ag. science 311-H	9	0.28
Presenting business proposals	2.99	0.97	Entrepreneurship	66	0.48
Average mean	3.16	0.87	Average	49	

*Note: N=286

TEXAS PARTNERS FOR A SAFER COMMUNITY

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Introduction

The *Partners for a Safer Community* program was initiated in response to the unacceptably high agriculture and home-improvement related deaths and injuries among children in the United States. About 22,000 children are seriously injured each year in agriculture, home-improvement and work-related accidents. Recent studies show that a majority of these deaths and injuries may be preventable. *Partners* has developed a highly promising "seven principle" model to encourage communities to work together to adopt positive approaches to youth safety and health through education.

The following is a brief description of the "seven principle" model:

Youth-Teaching Youth: The core of the Partners model entails youth teaching youth about safety and health. This is accomplished through training of a core team of high school students to serve as teachers and mentors of others.

Youth Leadership Development: Building on the strengths of youth organizations the Partners program encourages development of community leadership and self-esteem among youth.

Multidisciplinary Approach: The multidisciplinary approach reflected in all stages of this program draws upon the complementary, specialized knowledge and skills of diverse individuals within communities.

Community Needs Assessment: The model is designed to help communities identify local youth safety and health concerns and tailor programs to meet those needs.

Community Development: Using this program as a model, participants are in unique positions to develop community strength and involvement, as well as promote safety.

Evaluation: This model emphasizes program evaluation at every level and teaches easy-to-learn evaluation skills for measuring program success in local communities.

Sustainability: The *Partners* philosophy stresses the importance of sustainability. By incorporating the first six *Partners* principles, communities are strengthened in their capacities to create and maintain successful youth safety and health programs over time.

The training model and associated educational materials packet developed by *Partners* is currently being disseminated throughout Texas to agricultural education teachers. This program includes principles and educational materials that make it an effective and sustainable model with the potential to strengthen communities beyond the life of the project

Program Phases

In the spring of 1998, *Partners for a Safer Community* held a "train the trainers" workshop in Atlanta, Georgia. Representatives from Texas were among those who participated and began development of information dissemination methodologies to reach youth organizations in Texas. Plans were made to conduct training sessions for agriculture teachers and students teachers during the Professional Improvement Conference for Agricultural Education Teachers and the State FFA Convention.

Training session announcements for the summer 1998 workshops were sent to approximately 1400 Agricultural Education teachers. Approximately twenty-five teachers and thirty high school students were in attendance during the training sessions.

Following a proposal review by the Houston Livestock Show and Rodeo Grants and Awards Committee, a $10,000 grant to purchase educational materials and support the training effort was awarded to Sam Houston State University Agricultural Sciences Department. With these funds and support from University of Texas Health Center Southwest Center for Agricultural Health, Injury Prevention and Education, a federally-funded regional agricultural health center, 250 *Partner*s educational packets were purchased for dissemination during the 1999 Professional Improvement Conference.

A multi-year program with awards and recognition for the teachers, students, and programs was been created to increase interest. Awards applications are now available on the Texas FFA Homepage. The awards system is designed to recognize ten out-standing programs, students and teachers in regards to implementation of a community safety program. Funds are currently available to support these awards for three years.

Results to Date

To date approximately 300 teachers and 40 pre-service teachers have received training and reviewed the Partners educational materials. An informal review of those teachers receiving the materials has shown that they are using selected topics that meet needs within their program and community.

The attention safety issues have received from the *Partners* project has helped begin the development of communication linkages between the Texas Education Agency Agricultural Education Division, the Southwest Center for Agricultural Health, Injury Prevention and Education, the Houston Livestock Show and Rodeo, Sam Houston State University, Texas FFA Association and the Texas Council on Agricultural Safety and Health.

Interdisciplinary projects using the expertise of these groups are currently under discussion.

The Future

An additional, 250 *Partners* educational packets will be purchased and disseminated during the 2000 Professional Improvement Conference. Furthermore, a CD-ROM is under development and will contain lesson plans, PowerPoint®/multimedia presentations, transparency masters, and other safety resources for dissemination at this conference.

Safety education material needs to be assessed for suitability for use in the agricultural education classroom. Much of the material currently available is outdated, industry oriented, and printed in black and white. These materials need to be updated and improved to include the use of multimedia.

TEXAS JUNIOR FFA LEADERSHIP CONFERENCE

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Introduction

Texas currently has 5,596 Junior FFA members in 462 chapters. To be a Junior FFA member, the student must be involved in the local FFA Chapter and pay dues of $2.50 to the Texas FFA Association. These members are expected to participate in the local program of activities and manage an SAE. The Junior FFA program is more than a way for pre-high school-aged students to show livestock. Each Junior FFA chapter must receive approval through the Texas FFA Association, elect Junior officers and hold meetings for the Junior chapter. Additionally, to be in good standing, the Junior members must actively participate in the creation, adoption and implementation of the local program of activities. However, beyond the chapter level, little had been done to promote involvement in the Junior FFA organization.

To accentuate the leadership capital for the future of the organization, the Texas FFA Association State Officers, with support from the state Agricultural Education Staff, instituted the First Annual Junior FFA Leadership Conference. This conference was implemented as a day camp, complete with leadership development, educational programs and physical activities.

How It Works

The expenses of the program were covered by State Junior FFA dues and a $10 per member registration fee. These expenses included the rental of a dining hall and campsite, one mid-day meal, snacks, T-shirts for each participant, decorations, and State Officer expenses.

The State Officers and State Agricultural Education Staff met during the FFA Convention in July to develop guidelines and a program for the conference. Dr. Steve Forsythe, State FFA Executive Secretary, developed a rough draft for the program and created a method for publicizing the event. The officers then finalized the program and activities for the day.

A summer camp near Kerrville, Texas was selected and reserved as the site for the Conference. Officers organized into teams to develop T-shirts, finalize the activities, manage the publicity and registration and develop the final format of each session.

The officers met the afternoon prior to the conference to review the program and practice each of the sessions. Several advisors and parents were recruited to help monitor registration and each session during the day. Over 70 Junior members, advisors and parents attended the first-ever Junior FFA Leadership Conference.

Results

The State FFA Officers and State Agricultural Education Staff believe the program was successful. The goal of bringing everyone together for a full day of education about Agricultural Education and FFA in Texas was accomplished. The Junior FFA members attending the conference developed an understanding of FFA history, tradition, and opportunities. These students were able to see positive role models in the State FFA Officers. An excitement for becoming an FFA member in high school and participating in the full range of FFA activities was created. The conference attendees set long and short-term goals and created an action plan for accomplishing those goals.

The theme for the one-day camp was “Step by Step – Past, Present and Future.” The campers had a great time talking with state officers, meeting Lt. Governor Rick Perry, making new friends from across the state, and learning about Agricultural Education and the FFA experience.

Future Plans

Planning has begun for the Second Annual Texas Junior FFA Leadership Conference. Several changes will be made for next years’ conference, centered on better meeting the maturity and conceptual needs of elementary and middle school students.

The lack of a rigid, well timed schedule created some conflict with the younger students who lacked the maturity and time management skills to return at scheduled times. Next year, the conference will incorporate a tighter

schedule, with each group session beginning and ending at uniform times.

Another concern was that State Officers managing the program were not adequately trained to deal with the younger students. To better prepare them, the officers will receive additional training to deal with the cognitive, affective and psychomotor development of Junior FFA members. Additionally, several people with elementary teaching experience or training will be involved to assist the group leaders with students during the activities.

Changes to the program are also being made. It was suggested the program focus less on recreation activities. Too much effort was made to make the program fun and physically entertaining and not enough effort was spent dealing with educational or goal setting activities. Next year the program will incorporate entertainment and recreation, but will focus on helping Junior FFA members achieve a balanced approach to life through experiential hands-on activities.

MORE POWER!!! [*GRUNT, GRUNT*] ANOTHER TOOL FOR THE PRE-SERVICE TOOLBOX

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Introduction

Pre-service teacher education students are introduced to and encouraged to develop a wide array of teaching tools to add to their instructional arsenal. Due to the diversity of our curriculum, variability of delivery methods is essential to the success of student learning.

Educational reform initiatives (A Nation at Risk, 1983; The Unfinished Agenda, 1984) have called for educators to develop methods for students to learn more effectively and efficiently. Responding to the need of increasing "science literacy", agricultural education accepted the challenge of integrating science concepts into the agriculture classroom. However, adopting to change has been a slow process. Whent (1992) reported that agriculture teachers were reluctant to adopting the concept of science integration into existing agriculture programs for fear of threatening the program. Although Thompson (1998) recommended that undergraduate students should receive instruction on how to integrate science into the agriculture classroom. The National FFA Organization has recognized the importance of agriscience and has adopted programs to promote scientific agriculture in secondary agricultural education (Duval, 1988).

The agriscience fair as a career development event has gained acceptance in various states and at the national level. This activity recognizes students studying the application of scientific principles and new technologies. To reach the national level, students must participate at the state level.

Methodology

Idea of conducting a state level Agri-Science Fair at the Oklahoma State FFA Convention was discussed with approved by the state FFA advisor. A service-learning grant was obtained to provide funding for the project to cover the costs of duplicating fliers, and entry information, mailing expenses, travel, and awards. Lab time was dedicated to teaching the concept of integrating agriscience activities into the traditional agriculture classroom. The agriscience fair activity was introduced to the students and their role and participation was presented. Pre-service students enrolled in AGED 3203 would serve to mentor high school students interested in developing an agriscience project. A web page was developed to provide information and ideas to agriculture teachers and FFA members. Two high school agriculture programs accepted an invitation to have AGED 3203 students visit their classes and conduct presentations on developing agriscience fair activities. The national FFA guidelines were adopted for the state level competition. Entry forms and guidelines were mailed out to all agriculture programs in the state. Service learning funds paid for transportation costs, printing & postage and awards. AGED 3203 students practiced developing their own topics into agriscience fair activities utilizing the steps of scientific investigation. Presentations were made during lab times and peer evaluations were conducted. A web page was created with various links to existing science fair sites to provide ideas and answer questions.

Results

Eight student entries were received. As a part of their final exam activity, AGED 3203 students interviewed each agriscience fair participant and evaluated the seven displays. As a follow up, all AGED 3203 students prepared reflection papers describing the individual entries and their strengths and weaknesses. Suggestions for improving each research project were solicited as well as methods for individual future teachers to integrate such an activity into their own agriculture programs. FFA participants were presented with plaques during a special session of the state convention. 38 agriculture teachers attended a workshop for developing agri-science fair projects during the 1999 summer conference for agricultural education instructors. The activity will be continued as regular career development event for the Oklahoma State FFA Association. Six Oklahoma entrees competed at the national agriscience fair at the National FFA Convention in Louisville, Kentucky. Four entries from Oklahoma placed in the top three of their respective categories and divisions.

Implications

Agricultural education teacher training institutions should look to adopt the agriscience fair activity or offer to conduct it for their state associations and utilize it as an experiential activity for pre-service training of future agriculture educators. What better way to train a future teacher to prepare students for such an activity than to immerse them into the process of organizing, conducting and evaluating a university-sponsored event.

Future Plans

The state association and the university agricultural education department plan to continue to conduct the agriscience fair as part of the state FFA convention activities. Efforts to secure external funding for award sponsorship to provide assistance for student travel to the National FFA Convention and the national Agriscience Fair are underway.

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INTEGRATING ANIMAL SCIENCE COURSES IN HIGH SCHOOL AGRICULTURAL EDUCATION PROGRAMS IN NORTH CAROLINA

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The National Research Council (1988) revealed that much of the curriculum in agricultural education was outdated. In 1995 a survey was conducted by agricultural teachers in North Carolina to ascertain what new courses they would like to see offered in high school agricultural education programs. A series of animal science courses was selected and ranked on top as to the perceived courses to be added to the program of study.

A cross section of educational professionals was assembled in 1996 to begin developing competencies and objectives for animal science (1), animal science (2), and equine science. The committee consisted of agriculture teachers, extension agents, university faculty members from animal science, agricultural education, and agribusiness.

The Agricultural Education Team from the Department of Agricultural and Extension Education at North Carolina State University released curriculum course outlines, blueprints and competency-based evaluation test item banks in the Fall of 1998. Currently there are more than 200 high schools offering animal science in North Carolina with many more making plans to pursue this specialty area.

Purpose and Objectives

Animal science is vital to the food chain for all people and affects agribusiness as well as technology. In North Carolina the farm income as reported by the North Carolina Department of Agriculture is a billion-dollar industry. Swine production is ranked 2nd in the nation, turkey production is ranked 1st, dairy is in the top 10 and the equine industry is enjoying tremendous growth.

The purpose of this project is to prepare educators who are interested in developing new courses or programs of study for high school agricultural programs. It is designed to provide opportunities for sharing existing course outlines, blueprints and competencies with fellow educators; develop specific educational objectives for agri-science programs; develop a delivery method utilizing multimedia instruction; improve collaboration between extension agents and high school agriculture teachers; and finally, to develop competency-based measures for students, teachers, state department specialists, and university faculty.

Procedures

Animal science is a year-long course for the traditional seven period day schedules or the new four-by-four semester block schedule. This course is designed for students 9-12 in North Carolina Public Schools. Essential elements for this course and units and topics of instruction are listed. The curriculum committee recommended a primary textbook to be used for this course. There are also secondary references. All essential elements will be met by using designated references from both primary and secondary sources.

A course blueprint provides information regarding the recommended hours of instruction for each unit title/competency and objective statement as well as information indicating the percentage of weight each objective statement has in relation to both the course and the unit of instruction. Type of outcome behavior is identified as either "cognitive 1,2,3," "psychomotor," or "affective" for each competency and objective statement. Additionally, related skills were identified for arts, communications health/safety, math, science, and social studies, as well as vocational or JPTA skills. The blueprint is designed to provide 108 hours of teaching content. Twenty-seven additional hours of teaching time remain for local adaptation by the teacher if the course is offered on a block four 135 hour unit, and 72 additional hours of teaching time remains for local adaptation by the teacher if the course is offered on a traditional 180 hour unit.

Outcomes

The project has proven to be very successful. Many agricultural education programs have either added animal science or substituted the traditional agricultural production for animal science. In less than two years, North Carolina went from 0 to > 200 animal science programs. Student numbers are up with a more diverse class make up. Equine science continues to attract a large number of females and bright students. Parents are very supportive and have elected to make numerous donations of animals, equipment and personal time to these programs. Many programs are beginning to get science credit and are co-teaching with science teachers. New teachers and student teachers are utilizing technology by teaching with Power Point and Web-based materials such as Oklahoma State Animal Science Department's Breeds of Livestock. Finally, the agribusiness industry has been a tremendous support providing classroom resources, lab equipment and job opportunities for the students in North Carolina. The additional of animal science to the North Carolina Agricultural Education Program of Study has improved our positioning to meet the needs of students preparing for careers in the twenty-first century.

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WHOSE REALITY COUNTS? PROFESSIONAL DEVELOPMENT NEEDS OF STATE EXTENSION SPECIALISTS

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Introduction

Professional development is a planned experience designed to change behavior and result in professional and/or personal growth that enhances organizational effectiveness (Bryan & Schwartz, 1998). University of Florida Extension (UFE) state specialists have numer-ous responsibilities including the charge to remain current with research in their particu-lar field and contribute to statewide extension programming. Specialists are educated in a technical discipline and are employed after the obtainment of a Ph.D. Most UFE specialists hold joint appointments between extension and either academic programs or research. However, conflicts exist between promotion and tenure pressures (which often overemphasizes research publications) and the need to support extension programming. Once employed, specialists have professional development opportunities through UFE, as well as their involvement in technical professional associations. Since few studies have been conducted in relation to the professional development needs of state specialists, this study will supply foundational information to staff development professionals, extension administrators, and graduate student advisors who counsel future state specialists.

Methodology

The purpose of this descriptive, multiphase study was to identify professional development needs of state specialists based upon the perceptions of specialists, county directors, and county faculty. Phase I involved a census survey of

67 county directors regarding their perceptions of professional development needs of specialists. Phase II assessed professional development needs of specialists as perceived by county faculty (N=222, n=110). In Phase III, specialists were asked to identify their professional development needs (N=220, n=118).

The instrument was modified slightly as it went through each study phase. Generally acceptable instrumentation procedures in agricultural and extension education were used in establishing content and face validity, and instrument reliability. The instrument measured three constructs areas: (1) research generation and synthesis, (2) extension programming, and (3) communication and presentation. Critical needs were determined based upon the use of a matrix analysis as recommended by Witkin (1984). Means of attribute importance and the degree to which state specialists possessed the attribute were calculated for each construct. The attribute means were then used to construct a XY graph, plotting the degree of possession of each attribute on the "X" axis and the overall importance of each attribute on the "Y" axis. After plotting both grand means, four quadrants emerged. This allowed the researchers to plot individual attribute scores based upon a mean score of importance and a mean score of possession. As a result, each attribute in the construct fell into a critical need quadrant, a low-level need quadrant, a high-level successful ability quadrant, or a low level successful ability quadrant.

Results/Implications

For the sake of conserving space in this text, only the critical needs will be reported for each phase (Phase I – perceptions of county directors, Phase II – perceptions of county faculty, and Phase III – perceptions of state specialists). In the research generation and synthesis construct, respondents in Phase I indicated that specialists should collaborate with county faculty in conducting result demonstrations. Respondents in Phase II agreed with the critical need identified by Phase I respondents, and felt that specialists needed to do a better job in communicating client problems to researchers. Respondents in Phase III indicated a critical need regarding difficulties in remaining current with research findings in their discipline. In terms of extension programming, respondents in Phases I and II agreed upon the following critical needs: (1) produce educational programming material; (2) deliver appropriate inservice training to county faculty; and (3) evaluate state major programs. In addition, respondents in Phase I indicated a need for specialists to better understand their clients. However, respondents in Phase III felt that specialists had a critical need to identify funding sources for program development. In terms of communication and presentation, respondents in Phase I revealed a critical need related to more frequent travel of specialists to county offices. Respondents in Phase II indicated that specialists had a critical need regarding their ability to listen and to respond to technical questions in a timely manner. However, respondents in Phase III had a critical need for learning to incorporate instructional techniques into their presentations.

Future Plans

The results reveal that the critical needs identified by specialists differed in all three construct areas, when compared to those identified by county faculty and county directors. It is also interesting to note that county faculty and county directors were relatively consistent regarding their expectations of specialists. The next UFE step is to take this information, enrich it with focus group interviews with all three audiences and extension administrators, and develop a Position Analysis Tool (PAT) for specialists that can be used for individual assessment and improvement.

Costs/Resources Needed

It is anticipated that a with a modest operating budget and a one-third time doctoral-level graduate assistantship, the faculty member responsible can complete the development of the PAT for specialists and beta test it's performance within a one-year period of time.

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MAXIMIZING THE DOMESTIC BENEFIT AND IMPACT OF INTERNATIONAL EXTENSION INVOLVEMENT

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Introduction

Several strategies have been utilized to support the progress of agriculture in developing countries. In 1990 the Polish-American Extension Project (PAEP) was initiated for American Extension specialists and agents to work jointly with Polish Extension counterparts to develop educational programs. Seventy Americans served assignments of six months or more at provincial-level agricultural advisory centers in Poland. The results of this study provide information to organizations and individuals seeking to improve international extension programs and projects through strong domestic involvement and interaction.

Purpose

The purpose of this study was to document the domestic implications, both positive and negative, as a result of the Polish-American Extension Project (PAEP). Specifically, the study was designed to assess and document the extended involvement of PAEP participants, colleagues, community members, groups and constituents along with continuing interactions with Poland. This was measured as KASA and practice change in terms of international extension, as well as any social-cultural linkages and endeavors that have affected PAEP participants and, in turn, a larger cross-section of Americans.

Methods and Procedures

The primary design was a descriptive case study to systematically describe the domestic implications of the Polish-American Extension Project on participants and near-associates. A mixed-method design was utilized in which a quantitative mail survey was used in conjunction with qualitative methodologies (semi-structured interviews). The preliminary analysis of the survey data provided a foundational basis for the subsequent development of interview questions and analysis of the resulting qualitative data. Typology development was utilized to integrate the quantitative results with the qualitative results.

Findings and Results

The PAEP was an extremely satisfying experience for the participants. Over 89 percent rated the experience highly satisfying to very satisfying depicting strong interest, commitment, and support for their work. Of a possible ten-point satisfaction scale, respondents rated the assignment 9.29 (very positive). Most participants (48%) rated the experience 10 while another 42 percent rated it 9.

Participants derived extensive impact from the experience (8.53 of a ten-point scale). They were able to gain an increased global awareness, appreciation and understanding; improved self-esteem, motivation and reinvigoration; and they gained professionally in the areas of grassroots input, needs analysis, program development and symbiotic relationships with others. Through this international experience, participants perceived that others had also received impact. Of a ten-point scale, participants felt that immediate and extended families had received highly moderate impact (6.79), and colleagues and clientele had received moderate impact (5.20).

A significant amount of communication and interaction occurred during and subsequent to the PAEP, and many people realized benefits from it. People became involved with the participant's international assignment which resulted in increased international interest, awareness and understanding. This helped people maintain a sense of contact with the individual that minimized disregard for the person and their domestic position. The PAEP also precipitated interactions and linkages such as international exchanges, tours, hosting visitors, business endeavors, and the establishment of an international 4-H foundation.

Conclusions and Recommendations

The prominence of global issues causes greater need for people to fully comprehend the complexities of an intertwined worldwide society. Extension can play a key visionary leadership capacity to instill international awareness, knowledge and understanding among its clientele. This research has documented the importance of Extension efforts to enhance global knowledge and understanding. The public attained a better global appre-ciation for Extension's international involvement through those involved in the PAEP. People were able to learn more about another country, its people, and its agriculture.

This study also showed that there is support among the general public to endorse programs that result in linkages among educational providers and businesses. There are numerous contextual benefits that can be derived through cooperation and collaboration among international education providers, businesses and individuals. Cooperative international efforts help foster trade, new technologies and new information between the U.S. and other countries through a spirit of camaraderie and partnership.

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