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Priority Research Areas

Extension Education
Agricultural Communication
Teaching and Learning in Undergraduate and Graduate Academic Programs
Understanding the Food and Fiber System
(Agricultural Literacy)
Agricultural Leadership
Teacher Education and School-Based Agricultural Education

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Editor's Comments
The Continued Development of the JSAER

In this, my second year as Editor of the Journal of Southern Agricultural Education Research (JSAER), I believe this publication is continuing to progress toward the goal of becoming a regional journal recognized for high quality. As I reported in these pages last year, we continue to evolve from a conference proceeding. The first Volume of the JSAER (51) was essentially the conference proceedings of the 2001 Southern Region Research Conference of the American Association of Agricultural Education. In the second (Volume 52), only those articles ranking in the top 50% of papers accepted by the research conference reviewers were published. In the Volume published last year (Volume 53), authors indicated *a priori* whether or not they wanted their article to be considered for publication in the JSAER as well as in the Proceedings of the Southern Region Ag Ed Research Conference. My co-editors of the JSAER and Conference Chairs of the 2003 Southern Region Research Conference of the AAAE, Drs. Jacquelyn P. Deeds and Kirk Swortzel delivered to me all articles accepted for presentation at the conference, whose authors had elected to publish in the JSAER.

This year, the co-editors of the JSAER and Conference Chairs of the 2004 Southern Region Ag Ed Research Conference were, Dr. Tony Brannon from Murray State University, and Dr. David Coffey from Western Kentucky University. For this Volume (54), authors submitted to a new, second, JSAER peer-review process. Articles submitted to me had already been accepted for presentation at the 2004 Southern Region AAAE Research Conference (SRAERC). The Conference Chairs forwarded to me those articles that had been accepted for publication in the conference proceedings whose authors had indicated that they be considered for publication in the JSAER. Since the JSAER review process extended beyond the SRAERC, these second reviews were not blind to the reviewers.

These articles were then distributed to the five members of the JSAER Editorial Board for an additional peer review. The Editorial Board for 2004 was composed entirely of the members of the Southern Region AAAE Research committee. The members for 2004 were; Barry Boyd, Todd Brashears, James Dyer, Craig Edwards, and James Lindner.

Policies adopted at the last meeting of the JSAER Editorial Board required that the Board Members conduct a second review and report the results to the Editor.

In all, 25 articles were submitted for consideration to the 2004 JSAER and distributed for review to the Editorial Board. Of these, 23 were accepted by the reviewers (a 92% acceptance rate in the JSAER review). The Editorial Board passed a motion that the JSAER publish the Total number of articles accepted in the JSAER divided by the Total number of unique submission to the Southern Region AAAE Research Conference. There were 45 articles submitted to the Southern Region AAAE Research Conference, 36 were published in the conference proceedings (80%), and 23 were published in the JSAER (51%).

In the past year I have managed to make a few improvements to the "home" of the JSAER. To make this publication more like the online Journal of Agricultural Education, I have separated all the articles in Volumes 53 and 54 into individual Adobe Acrobat files and created a system through which full-text searching, either within or between Volumes, is possible. In the next year, in addition to adding Volume 55, I hope to work backwards and bring Volumes 51 and 52 into this system creating a single location for the JSAER on the web and providing easy access to full-text searching within and between all the Volumes.

For the next issue (Volume 55) two changes in policy and procedure have been implemented to improve the JSAER. The second review will be managed as a blind review. Articles will be accepted or rejected by the Editorial Board before the release of the papers accepted for the 2005 SRAERC. Secondly, a new review procedure will allow JSAER reviewers to "Accept with Major Revision," and "Accept with Minor Revision" in addition to the "Accept" or Reject" options available in the last two Volumes. I expect that these changes will substantially improve the quality of the JASER.

As Editor, I am committed to the continuous improvement of the Journal of Southern Agricultural Education Research. I believe the JSAER Editorial Board has established a strong foundation for quality in the Journal and I look forward to implementing the policies and procedures that will help us attain our goals.

Critical Thinking Skills of FFA Leaders

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Abstract

The primary purpose of this descriptive study was to describe the discipline-specific critical thinking skills in agriculture and leadership of selected youth leaders in the National FFA Organization. The researcher-developed critical thinking skills test, which was distributed online and by conventional mailing procedures, indicated that selected leaders in the FFA were competent critical thinkers. The youth leaders scored the highest on the Analysis sub-skill and the lowest on the Evaluation sub-skill. There were no significant differences between means, controlling for age and gender. However, GPA was significantly associated with the specific sub-skill of Analysis. Recommendations for practice include promoting FFA and agricultural education programs as a place where critical thinking can be developed; specific teacher training to improve the Evaluation skills of students; and concentration on critical thinking maintenance as well as critical thinking development. Further research should focus on comparing the average agricultural education student and/or FFA member to the sample in this study and attaining clarification concerning the relationship between certain demographics and critical thinking skill level.

Introduction

Just what is critical thinking? One of the most relevant definitions of critical thinking to this study, as defined by Glaser (1941), is the "attitude of being disposed to consider in a thoughtful way the problems and subjects that come within the range of one's experiences; knowledge of the methods of logical inquiry and reasoning; and some skill in applying those methods" (pp. 5-6).

Richard Paul's (1995) definition added some detail to Glaser's description of critical thinking. Paul defined critical thinking as "A unique and purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards upon the thinking, taking charge of the construction of thinking, guiding the construction of the thinking according to [critical thinking] standards, and assessing the effectiveness of the thinking according to the purpose, criteria, and the standards [of thinking] (p. 21). Additionally, Rudd, Baker, and Hoover (2000) conducted a synthesis of research and purported that "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" (p. 5).

Peter Facione (1990), who conducted a national Delphi study of experts to define critical thinking, provided the description of critical thinking used to guide this study because of its detail, descriptiveness, and conciseness in identifying specific skills needed for critical thinking. Facione wrote, "We understand critical thinking to be purposeful, self-regulatory judgment, which results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based" (p.2).

Why is all of this important to youth leaders in the FFA or to anyone else? First, The Committee on Agricultural Education in Secondary Schools (National Research Council, 1988) concluded that redirecting agricultural education programs was in order if graduates of those programs were going to be successful in college or the workforce. One of the key points of the committee's report was their conclusion that ample opportunities should exist for practicing critical thinking skills with increasing variety and frequency. Additionally, critical thinking has a purpose. Paul (1995) stated that critical thinking mastery would help students take command of their lives by continually improving the quality of their life experiences. A report by the United States Department of Labor (1991) identified critical thinking as one of the foundational competencies in the Commission on Achieving Necessary Skills in What Work Requires of Schools: A SCANS Report for America 2000. Could critical thinking also be a foundational competency required of youth leaders?

Harvey Siegel (1988) provided the following rationale for including the concepts of critical thinking in youth education. Siegel believed critical thinking should be a part of the educational system because youth deserve to be able to think critically, because critical thinking is becoming a necessary component of living life, and because today's youth are tomorrow's leaders. Siegel believed that the first reason to include critical thinking as an

educational component is the moral obligation administrators and educators have to treat students (and everyone else) with respect. Additionally, he supported critical thinking as an educational component because of the competence it provides for living a productive life, which involves being able to think and reason about many different areas, for one cannot know all of the content that they should know at the start of a task. Finally, Siegel believed that critical thinking was necessary for democratic living. Ennis (1985) and Facione, Facione, and Giancarlo (1997) agreed that people in power and leadership positions should make decisions that consider all people, situations, and options.

Theoretical Framework

Facione (1990) employed the Delphi Method to attain a consensus definition of critical thinking. His findings serve as the theoretical framework used for this study. Facione assembled a group of 40 experts in Philosophy, Psychology, and Education, recognized by their colleagues as having special experience and expertise in critical thinking instruction. The Delphi study consisted of six rounds of questions and responses. The findings of the Delphi Report are as follows:

- Critical thinking includes the dimensions of skill and disposition.

- There was consensus that critical thinking could be improved in several ways. The experts agreed that a person could critically examine and evaluate one's own reasoning processes, . . . learn how to think more objectively and logically, . . . expand their repertoire of those more specialized procedures and criteria used in different areas of human thought and inquiry, and . . . increase their base of information and life experience (p. 4).

- While critical thinking skills themselves transcend specific subjects or disciplines, exercising them successfully in certain contexts demands domain-specific knowledge, some of which may concern specific methods and techniques used to make reasonable judgments in those specific contexts (p. 5).

- There is a critical spirit, a probing inquisitiveness, a keenness of mind, a zealous dedication to reason, and a hunger or eagerness for reliable information which good critical thinkers possess but weak critical thinkers do not seem to have . . . the affective dispositions are necessary for the critical thinking skills identified to take root . . . in students (p. 11).

- A good critical thinker . . . is habitually disposed to engage in, and to encourage others to engage in a wide range of contexts and for a wide variety of purposes. Although perhaps not always uppermost in mind, the rational justification for cultivating those affective dispositions which characterize the paradigm critical thinker are soundly grounded in critical thinking's personal and civic value. Critical thinking is known to contribute to the fair-minded analysis and resolution of questions. Critical thinking is a powerful tool in the search for knowledge. Critical

> thinking can help people overcome the blind, sophistic, or irrational defense of intellectually defective or biased opinions. Critical thinking promotes rational autonomy, intellectual freedom and the objective, reasoned and evidence-based investigation of a very wide range of personal and social issues and concerns (p. 13).

The critical thinking skills identified by the panel of experts were Interpretation, Analysis, Evaluation, Inference, Explanation, and Self-regulation. A student adept at Interpretation is good at comprehending and expressing meaning about a wide variety of experiences, beliefs, procedures, rules, etc. A competent critical thinker using Analysis would be good at identifying the relationship between statements, questions, concepts or descriptions to express beliefs, judgments or reasons. Students excelling in Evaluation are competent at assessing credibility of statements and representations of others and assessing the logical strength of statements, descriptions or questions. Proficient students in the Inference skill have the ability to draw reasonable conclusions and/or hypotheses based on facts, judgments, beliefs, principles, concepts or other forms of representation. Explanation experts are good at stating and justifying the results of one's reasoning using each of the aforementioned abilities. Self-regulation, the last skill alludes to the ability of an individual to monitor their own personal cognitive activities to make sure that they are engaged in critical thinking.

Following the lead of Peter Facione (2000) and the *Test for Everyday Reasoning (TER)*, three critical thinking skills, Analysis, Evaluation, and Inference were the skills measured in this study. The TER did not specifically try to measure interpretation, explanation, and self-regulation. The skills used in this study (Analysis, Evaluation, and Inference) were selected to represent critical thinking skill because of their orientation to objective measurement; their indicativeness of all the critical thinking skills in the construct; and because subsequent studies have been conducted to validate their usage (Facione 1990; Jones et al., 1994; Giancarlo 1996).

Some philosophers (Paul, 1997) feel that critical thinking is an interdisciplinary skill, but others see critical thinking exhibited best in specific domains. According to Ennis (1989), empirical inquiry is needed to determine how certain aspects of critical thinking apply to a particular content area. He supported the need for contextual, domain, or subject specific critical thinking based on three observations: background knowledge is essential for making justified critical thinking judgments; critical thinking varies from field to field; and a full understanding of a field requires the ability to think critically in the field (Ennis,1990, p.14).

Kintsch (1994), Tindal and Nolet (1995), Cheak (1999), and Halliday (2000) have tested Ennis's claims. They discovered that, indeed critical thinking is subject matter specific. They also agreed with Ennis that critical thinking should be evaluated with a discipline specific measure of critical thinking. This means that agricultural education students should be developing critical thinking skills in agriculture and leadership areas.

One would hope that great leaders are great thinkers, but are they? Many believe the National FFA Organization fosters great leaders (Ricketts, 1982; Townsend & Carter, 1983; Wingenbach & Kahler, 1997), and others believe that sound critical thinking is a component of good leadership (DesMaria, Yang, & Farzenhkia, 2000; Ricketts & Rudd, 2002; vanLinden & Fertman, 1998). This study examines the critical thinking skills of selected youth leaders in the National FFA Organization.

Conceptual Framework

A conceptual model of critical thinking skill development was devised from the theoretical framework. The model is based on and adapted from the Triandis (1979) Model of Human Behavior. This study, which was part of a larger research project, focuses on critical thinking skill, and the facilitating factors; gender, grade point average, and age, within the context of leadership and agriculture. Critical thinking dispositions and leadership experience and training will be addressed in subsequent studies.

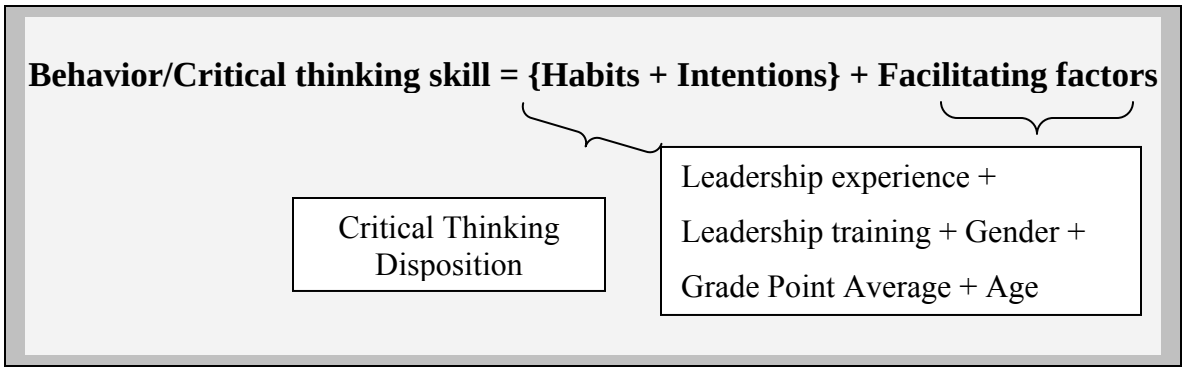

Figure 1.
Conceptual model of critical thinking skills (behavior)

Purpose and Objectives

The primary purpose of this study was to identify the critical thinking skill level of selected youth leaders in the National FFA Organization. Since the researchers believe that critical thinking is discipline specific, this study specifically evaluates the ability of selected youth leaders to think critically about the domains of leadership development and agriculture. To accomplish these purposes the following research objectives were used to guide this study:

1. Describe the age, gender, and GPA of selected leaders in the National FFA Organization.
2. Identify the critical thinking skill level of youth leaders in the National FFA Organization.
3. Identify differences in critical thinking skill based on the demographic variables: age, gender, and GPA.

Methods and Procedures

The population for the study was all leaders in the National FFA Organization. The purposive sample, which was accessed from administrators of The National FFA Organization, was a list of 2002 National FFA Convention delegates specifically selected because of their leadership record in the FFA organization.

The researcher-developed instrument measured the discipline-specific critical thinking skills of Analysis, Inference, and Evaluation. Prior to pilot testing, a panel of experts in critical thinking and agricultural and leadership education checked the 90-item multiple-choice instrument for content and face validity. They trimmed the instrument down to 36 items for pilot testing. The pilot test was administered to 33 subjects at the Florida State FFA Convention. The pilot samples were purposively selected because of their similarities to the sample for this study. After pilot testing and item analysis, the instrument was reduced to 20 items. The Analysis construct contained eight multiple-choice items; the Evaluation construct contained seven items; and the Inference construct had five items. Cronbach's alpha for each sub-skill rested at 0.83 for Analysis, 0.66 for Inference, and 0.63 for Evaluation. These reliability ratings were deemed appropriate since Norris and Ennis (1989) recommended reliability ratings of 0.65 and 0.75 for any instrument testing a variety of critical thinking aspects.

Survey implementation followed Dillman's (2000) system of five compatible contacts. The instrument was initially available online, but non-respondents were eventually sent a paper copy. There were 229 responses from a population frame of 462 possible participants for a response rate of 50%. Seventeen of those respondents were removed from the database because of missing or erroneous data, which left (N = 212) usable responses. To account for non-response, early respondents (online responses received after first mailing) were compared to late (paper responses received after reminder notices) respondents (Miller & Smith, 1983), and no significant differences were found.

Data were analyzed using the Statistical Package for the Social Sciences 10.0. Frequencies, means, and standard deviations were used to summarize and analyze the data. Independent samples t-tests, and analysis of variance procedures were used to determine the associations between critical thinking skills and the demographic variables. Omega^2 and Cohen's *d* (Cohen, 1977) were used to report effect sizes.

Results

Objective 1 - Describe the age, gender, and GPA leaders in the National FFA Organization

There were 212 subjects participating in the national study from the 50 states and Puerto Rico. The sample was 37.3% male (n = 79), 60.4% female (n = 128). Their ages ranged from 16 to 21. The average age of the participants was M = 17.81, SD = .99. The participants' GPAs ranged from 2.0 to 5.0 with an average of M = 3.67, SD = .39.

Objective 2 - Identify the critical thinking skills of youth leaders in the National FFA.

The mean critical thinking skill score was M = 227.86, SD = 37.91. Critical thinking skill scores ranged from a low score of 67.86 to a maximum score of 300. The raw scores for Analysis ranged from a low of 25 to the highest possible score of 100. Inference scores ranged from 0 to 100, and Evaluation scores ranged from 14.29 to 100. All of the mean scores were above 70 for the possible range of scores (0 to 100); indicating the scores of the youth leaders may be high. The highest scores were recorded for the Analysis (M =82.17, SD =15.12) construct, meaning this sample of youth leaders were best at examining ideas, identifying arguments, and analyzing those arguments. Students also scored in the upper range for the Inference (M =73.40, SD =20.74) and Evaluation (M =71.50, SD =17.70) constructs.

Objective 3 - Identify differences in critical thinking skill based on the demographic variables: age, gender, and GPA.

Critical thinking skill scores ranged from 67.86 to 287.50 for male participants and from 120.36 to 300 for female participants. Consistent with the descriptive data in Table 1, females scored higher on total critical thinking skill than males. However, there was no statistical difference between males and females for Analysis, $t(205) = -1.80$, $p>0.05$, $d = 0.28$, Inference, $t(205) = -0.730$, $p>.05$, $d = 0.11$, Evaluation, $t(205) = .003$, $p>0.05$, $d = 0.00$, or total critical thinking skill score, $t(205) = -1.12$, $p>0.05$, $d = 0.17$.

Table 1.
Mean subscale and critical thinking skill score by gender (N = 207)

Skill	Gender	n	M	SD
Analysis	Male	79	80.54	16.95
	Female	128	84.45	14.00
Inference	Male	79	71.90	21.37
	Female	128	74.06	20.29
Evaluation	Male	79	71.64	17.52
	Female	128	71.63	17.59
Total critical thinking	Male	79	224.08	40.84
	Female	128	230.14	35.81

Note: Five respondents failed to indicate whether they were male or female.

Sixteen year-old participants' critical thinking skill scores ranged from 170.36 to 300 out of 300. Seventeen, 18, 19, and 20-year-old participants had scores ranging from 67.86 to 287.50, 152.14 to 285.71, 175.71 to 285.71, and 159.64 to 287.50, respectively. The average Analysis, Inference, and Evaluation scores are detailed in Table 2.

Table 2
Mean subscale and critical thinking skill score by age (N = 208)

Age	n	Analysis		Inference		Evaluation		Total CT Skill	
		M	SD	M	SD	M	SD	M	SD
16	17	80.78	14.01	80.00	23.45	76.46	12.98	237.25	37.04
17	63	79.73	18.15	69.52	23.24	67.01	16.05	216.26	43.43
18	84	86.01	13.36	74.29	20.02	72.45	17.15	232.75	33.42
19	32	84.38	12.70	73.75	16.41	75.22	20.53	233.35	33.26
20	11	80.68	16.17	78.18	16.62	70.13	22.55	228.99	42.44
21	1	62.50	.	80.00	.	71.43	.	213.93	.

One-way analysis of variance procedures revealed that critical thinking score is not dependent on age. Analysis, $F(6, 205) = 1.56$, $p>0.05$, $\omega^2 = 0.02$, Inference, $F(6, 205) = .809$, $p>0.05$, $\omega^2 = 0.01$, Evaluation, $F(6,205) = 1.22$, $p>0.05$, $\omega^2 = 0.01$, and total critical thinking skill scores, $F(6,205) = 1.56$, $p>0.05$, $\omega^2 = 0.02$, did not statistically differ as a function of age.

Generally, total critical thinking skill scores consistently increased as GPA increased (Table 3). Statistically, the specific critical thinking skills of Inference, $F(5, 206) = 1.89$, $p>0.05$, $\omega^2 = 0.02$, and Evaluation, $F(5, 206) = 1.47$, $p> 0.05$, $\omega^2 = 0.01$ were not associated with GPA, but a there was a small effect size. The increase in Analysis scores as GPA levels became higher, which was reported in Table 3 was statistically significant, $F(5, 206) = 3.36$, $p<0.05$, $\omega^2 = 0.05$, and approaching a medium effect size (Keppel, 1991). The increase in overall critical thinking skill score as GPA increased was also significant and approaching a medium effect size, $F(5,206) = 3.11$, $p<0.05$, $\omega^2 = 0.05$.

Table 3
Mean critical thinking skill score by grade point average (N = 212)

GPA	n	Analysis		Inference		Evaluation		Total CT Skills	
		M	SD	M	SD	M	SD	M	SD
2.0-3.0	21	77.98	17.64	69.52	26.55	65.76	16.54	213.26	48.94
3.01-3.49	25	76.50	18.51	68.00	19.15	74.86	17.14	219.36	39.26
3.5-3.74	58	80.66	14.43	70.34	23.17	69.22	18.94	220.63	40.34
3.75-3.99	59	86.20	13.27	74.58	18.13	70.62	17.89	231.40	32.88
4.0	37	88.51	12.63	78.92	18.23	76.83	15.83	244.27	27.17
4.01-5.0	12	83.33	14.43	83.33	14.36	71.43	17.23	238.10	36.95

Conclusions

Since this study purposively selected a sample of selected youth leaders in the National FFA Organization, one should not generalize findings beyond the 2002 National FFA Convention delegate participants. There were other limitations in the study. These include self-reported GPA's, which could or could not be correct and the fact that the grade point averages were both secondary and post-secondary scores. With these limitations in mind, and based on the findings of this study, the following conclusions were drawn concerning critical thinking skills and the independent demographic variables of the conceptual framework in Figure 1.

Relatively speaking, critical thinking skill scores of the National FFA delegates were high. Scores were in the upper end of the range for each of the sub-skills. National FFA delegates were most competent in the specific skill of Analysis, meaning they were best at examining ideas, identifying arguments, and analyzing those arguments. They were least competent in Evaluation, meaning they had some difficulty assessing claims related to agriculture and leadership.

According to the descriptive data, female scores were higher than male scores in terms of the critical thinking skill of Analysis, meaning females in the sample may be more adept at "identifying the intended and actual inferential relationships among statements, questions, concepts, descriptions of other forms of representation intended to express beliefs, judgments, experiences, reasons, information, or opinions" (Facione, 1998, p. 7). They also scored higher than males in their ability to make inferences, meaning females in the sample were more able to "identify and secure elements needed to draw reasonable conclusions; to form conjectures and hypotheses; to consider relevant information and to educe the consequences flowing from data, statements, principles, evidence, judgments, beliefs, opinions, concepts, descriptions, questions, or other forms of representation" (p. 9).

Additionally, just as Rudd, et al., (2000) had reported, an increase in age did not translate into more total critical thinking. The youngest age group scored the highest in critical thinking ability, and the group one year their senior scored the lowest. Student academic performance, measured by the participants' self-reported grade point average was associated with total critical thinking skills and the specific skill of Analysis.

Recommendations

Based on the findings of this study, the following recommendations were made. Since the critical thinking abilities of the select group of individuals were high, and since other researchers (Rollins, 1988; Cano & Martinez, 1991; Cano, 1993) would agree that agricultural education students have the potential to be more competent at critical thinking than non agricultural education students, educators should promote their FFA and agricultural education programs as a place where critical thinking skill may be developed. The findings of this study suggest that the agricultural education curriculum is doing something right in terms of influencing the critical thinking abilities (Analysis) of students.

However, there seem to be some deficiencies in the critical thinking skills (Evaluation) of agricultural education students that could be accounted for if agricultural education made an effort to focus on them. Therefore, agricultural educators should incorporate teaching strategies that are intended to improve the critical thinking skills of students. Educators and leadership trainers should develop and use curricula, workshops, and activities that focus students' abilities to assess the credibility of statements and representations of others and assessing the logical strength of statements, descriptions, or questions. In other words, the specific critical thinking skill of Evaluation should be the most immediate focus of educators and leadership trainers. Additionally, in order to focus on Evaluation, critical thinking should be taught and evaluated in a contextually specific manner, for one cannot make value judgments if one does not understand the subject matter there are about to judge.

It is unclear whether females are actually more competent in critical thinking, but it has been demonstrated that the females in this study were at least as competent as males in their critical thinking skills. Agricultural educators, employers and business leaders should not discriminate based on gender, for this research and others have proven that females are just as capable as or possibly more capable of using critical thinking to solve problems and make decisions than males. Perhaps this is one of the reasons for the recent surge in female FFA leadership, as reported by Ricketts, Osborne, and Rudd (2003). They found that in the state of [a southeastern state], females represented the majority of FFA officer positions and outnumbered males in participation of Career Development Events in all but two events.

In this study critical thinking skill was lower for 17-year-old participants compared to 16-year old participants. Educators should not only concentrate on the development of critical thinking skills, but they should also concern themselves with the maintenance and retention of those abilities, as students progress through adolescence. Maybe critical thinking is tied to motivation, just as achievement, affiliation, and power (Rohs & Anderson, 2001). If so, then agricultural educators have, yet another reason to improve their ability to motivate students, as they get older. More research should follow to substantiate this assumption.

According to this study, competence in critical thinking was related to higher student academic performance. Though more research is needed to test for a causal relationship, another benefit of teaching critical thinking skills could be improved student academic achievement. Teachers concerned with having high achieving students that can more easily get into college and/or high skill/high wage jobs may need to consider teaching for critical thinking in their leadership development and agricultural education courses.

Suggestions for Additional Research

Similar research should be conducted that assesses the critical thinking skills of agricultural education students not in the FFA and students not in agricultural education. The findings of this study of National FFA leaders should be compared with research that

assesses the critical thinking skills of agricultural education students not enrolled in the FFA and those not enrolled in agricultural education.

Gender seems to be a demographic variable that is evaluated secondarily. Because it is still unclear whether there are differences between males and females in regards to critical thinking skill, a focused study should be conducted that empirically defines the impact of gender on critical thinking. Specifically, future research should determine if critical thinking is tied to the recent prominence of female leaders in the National FFA Organization.

Research should be conducted to understand the extreme differences in critical thinking skill between 16-year-old and 17-year-old students. Are the differences related to grade level? Are they related to more or less exposure in a particular grade level? Are there more stresses on 17-year-old students than 16-year olds? The answers to these questions could help critical thinking curriculum development efforts.

Overall GPA was reported by the participants. Further research should evaluate GPA as it relates to content specific critical thinking skills tests. In this regard, research should also be conducted to determine if students who score better on leadership and agriculturally specific critical thinking skills tests perform better in leadership and agriculturally related courses.

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The Relationship between Critical Thinking Dispositions and Critical Thinking Skills of Selected Youth Leaders in the National FFA Organization

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Abstract

The primary purpose of this correlational study was to explain the relationship between discipline specific critical thinking skills in agriculture and leadership and critical thinking dispositions of selected youth leaders in the National FFA Organization. Voluntary participants in the study included 212 youth leaders from 50 states. The researcher-developed critical thinking skills tests and critical thinking disposition inventory (*EMI*), which were distributed online and by conventional mailing procedures indicated positive, but low relationships between critical thinking skills and the innovativeness and engagement dispositions. Additionally, low, but negative relationships were found between critical thinking skills and the maturity critical thinking disposition. In the recommendations section, educators are asked to consider influencing critical thinking dispositions by exposing students to a wide range of cultures and experiences through field trips, service-learning activities, videotapes, and the Internet. It is also recommended that agricultural educators influence critical thinking by infusing teaching for critical thinking into agricultural education courses and in leadership training activities. Lastly, the researchers recommended further research on the instruments used to collect data on critical thinking skills and dispositions. Specifically, the cognitive maturity disposition of the EMI should be further developed, and the skills instrument should be altered to achieve more variability.

Introduction

Determining the composition of critical thinking skills could be the missing link in preparing students of agriculture to be competent problem solvers and decision makers. If agricultural education students can critically examine and evaluate their own reasoning processes, then they could learn how to think more objectively and logically about the field of agriculture; expand their repertoire of more specialized procedures in agriculture; and increase their base of information and life experience for success in a future career.

Agricultural education professionals have determined that critical thinking skill is an important part of what we do. The Committee on Agricultural Education in Secondary Schools (National Research Council, 1988) concluded that redirecting agricultural education programs was in order if graduates of those programs were going to be successful in college or the workforce. One of the key points of the committee's report was their conclusion that ample opportunities should exist for practicing critical thinking skills with increasing variety and frequency.

In a synthesis of research, Edwards (2003) concluded the student behavior of critical thinking "ought to be occurring in secondary-level agricultural education classrooms and laboratories" (p. 189). But is it occurring in these settings? If critical thinking is occurring, to what extent is it occurring, and does it help students in any way? Although critical thinking studies (Cano, 1993; Rollins, 1990; Rudd, Baker, & Hoover, 2000; Torres, 1993; Vygotsky, 1978) have been numerous in previous years, limited research related to critical thinking and youth was identified, especially in the fields of agricultural education and leadership development. Calls for further critical thinking research have been made by agricultural education (Cano & Martinez, 1991; National Research Council, 1988; Ware & Kahler, 1988), but few answers to those calls have been provided.

Theoretical / Conceptual Framework

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

Richard Paul (1995) defined critical thinking as "A unique and purposeful thinking in which the thinker systematically and habitually imposes criteria and intellectual standards upon the thinking, taking charge of the construction of thinking, guiding the construction of the thinking according to [critical thinking] standards, and assessing the effectiveness of the thinking according to the purpose, criteria, and the standards [of thinking] (p. 21). Rudd, Baker, and Hoover (2000) provide the description of critical thinking guiding this study. They determined that "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" (p. 5).

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

Each of the aforementioned critical thinking researchers making major contributions to the development of critical thinking believed that critical thinking consisted of a dispositional and skill dimension. This study seeks to determine the relationship between critical thinking dispositions and discipline-specific critical thinking skills in agriculture and leadership. Findings of some researchers (Facione, Facione, & Giancarlo, 1996; Jones, Ratliff, Tibbetts, & Glick, 1994; Giancarlo & Facione, N., 1994; Facione & Facione, 1997) have found there is a relationship between critical thinking skills and dispositions. Similar findings in an agricultural and leadership context for youth would provide valuable information for educators seeking to improve critical thinking in their students.

The theoretical framework for this study is supported by the Delphi study of Peter Facione (1990). The critical thinking skills identified by the panel of experts in that study were Interpretation, Analysis, Evaluation, Inference, Explanation, and Self-regulation. Following the lead of Facione (2000) and the *Test for Everyday Reasoning (TER)*, three critical thinking skills, Analysis, Evaluation, and Inference were the skills measured in this study. Facione created the TER to test critical thinking skills. The TER did not specifically try to measure interpretation, explanation, and self-regulation. The skills used in this study (Analysis, Evaluation, and Inference) were selected to represent critical thinking skill because of their orientation to objective measurement; their indicativeness of all the critical thinking skills in the construct; and because subsequent studies have been conducted to validate their usage (Facione, 1990; Jones, et al., 1994; Giancarlo, 1996).

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

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

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

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

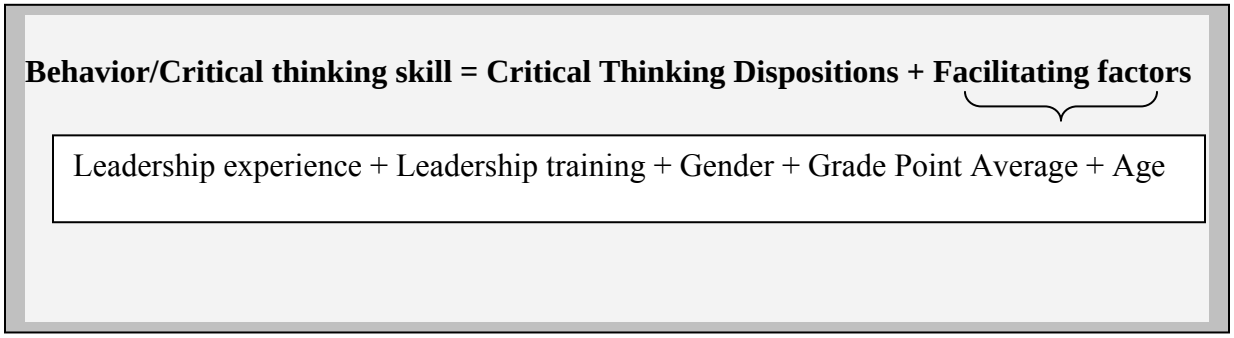
- The Engagement disposition measured students' predisposition to looking for opportunities to use reasoning; anticipating situations that require reasoning; and confidence in reasoning ability.

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

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

A conceptual model of critical thinking skill development was devised from the theoretical framework. The model is based on and adapted from the Triandis (1979) Model of Human Behavior. This study, which was part of a larger research project, focuses on critical thinking skill, and the facilitating factor of critical thinking disposition, within the context of leadership and agriculture. Age, gender, GPA, and leadership experience and training are addressed in supplementary studies.

Figure 1.
Conceptual model of critical thinking skills (behavior)



Purpose and Objectives

The primary purpose of this correlational study was to explain the relationship between discipline specific critical thinking skills and critical thinking dispositions of selected youth leaders in the National FFA Organization. To accomplish these purposes the following research objectives were used to guide this study:

1. Determine the relationship between critical thinking skills and the disposition of Innovativeness in selected youth leaders in the National FFA Organization.

2. Determine the relationship between critical thinking skills and the disposition of Engagement in selected youth leaders in the National FFA Organization.

3. Determine the relationship between critical thinking skills and the disposition of Cognitive Maturity (Maturity) in selected youth leaders in the National FFA Organization.

4. Determine the relationship between critical thinking skills and the total critical thinking disposition score in selected youth leaders in the National FFA Organization.

Methods and Procedures

Since the purpose of this study was to explain the relationship between critical thinking skills and dispositions, the research design was correlational. The target population for the study consisted of the 2002 National FFA Convention delegates specifically selected because of their leadership record in the FFA organization. A pilot test of the researcher-developed critical thinking skills test was administered to 33 subjects at the [a southeastern state] state FFA Convention. A pilot test of the critical thinking disposition test, which will be referred to as the *EMI*, from this point forward was administered electronically to 60 subjects from a successful FFA Chapter. The pilot samples were purposively selected because of their similarities to the target population.

The researcher-developed critical thinking skills test measured the discipline-specific skills of Analysis, Inference, and Evaluation (Facione, 1990). The EMI measured the student dispositions of Innovativeness, Engagement, and Maturity. Prior to pilot testing, a panel of experts in critical thinking and agricultural and leadership education checked the multiple-choice skills test and the 5-item-Likert-type EMI for content and face validity. After pilot testing and item analysis, Cronbach's alpha for each critical thinking sub-skill was 0.83 for Analysis, 0.66 for Inference, and 0.63 for Evaluation. Cronbach's alphas for the subscales of the EMI critical thinking disposition assessment were 0.79 for Innovativeness, 0.75 for Maturity, and 0.89 for Engagement. These reliability ratings were deemed appropriate since Norris and Ennis (1989) recommended reliability ratings of 0.65 and 0.75 for any instrument testing a variety of critical thinking aspects.

Survey implementation followed Dillman's (2000) system of five compatible contacts. The instrument was initially available online. A paper copy of the instrumentation was sent to non-respondents. There were 229 responses from a population frame of 462 possible participants for a response rate of 50%. Twenty-seven of those respondents were removed from the database because of missing or erroneous data, which left (N = 202) usable responses. To account for non-response, early respondents were compared to late respondents (Miller & Smith, 1983), and no significant differences were found.

Data were analyzed using the SPSS® for Windows™ statistical package. Pearson's product moment (*r*) statistics were conducted to identify the magnitude of relationship of critical thinking skills to the other variables in the study. The Coefficient of Determination (R^2)was used as an index of the proportion of variance in critical thinking skills explained by the independent variables.

Findings

Critical thinking skill scores ranged from a low score of 67.86 to a maximum score of 300. The mean total critical thinking skill score was M = 227.86, SD = 37.91. The scores for Analysis ranged from a low of 25 to the highest possible score of 100. Inference scores ranged from 0 to 100, and Evaluation scores ranged from 14.29 to 100. The highest scores were recorded for the Analysis (M =82.17, SD =15.12) construct. All of the skill scores were above 70 for the possible range of 0 to 100. Students also scored in the upper range of scores for the Inference (M =73.40, SD =20.74) and Evaluation (M =71.50, SD =17.70) skills.

Objective 1 - Determine the relationship between critical thinking skills and the disposition of Innovativeness in selected youth leaders in the National FFA Organization

Innovativeness disposition scores ranged from 16 to 35, with an average score of M = 29.52, SD = 3.24. There was a low (Miller, 1998) relationship between the Innovativeness disposition score and total critical thinking score. There was also a low relationship between the specific skills of Analysis and Inference and Innovativeness (Table 1). However, the

relationship was always positive. According to Table 1, the relationships between Innovativeness disposition and total critical thinking skill scores $r(201) = 0.26$, $p < 0.05$, $R^2 = 0.07$, which explained seven percent of the variance; Analysis $r(201) = 0.24$, $p < 0.05$, $R^2 = 0.06$, which explained six percent of the variance; and Inference, $r(201) = 0.29$, $p < 0.05$, $R^2 = 0.08$, which explained eight percent of the variance, were statistically significant compared to Evaluation, $r(201) = 0.03$, $p > 0.05$.

Table 1.
Correlation between critical thinking skills and Innovativeness disposition (N = 202)

Skill	*r*	df	Sig.(2-tailed)
Analysis	0.24	201	0.00
Inference	0.29	201	0.00
Evaluation	0.03	201	0.68
Total critical thinking	0.26	201	0.00

Objective 2 - Determine the relationship between critical thinking skills and the disposition of Engagement in selected youth leaders in the National FFA Organization

Engagement scores ranged from 29.00 to 55.00 with a mean of $M = 45.44$, $SD = 5.08$. The Engagement disposition score also had a low relationship with total critical thinking score and the specific skill of Inference. However, the relationships between Engagement and Analysis, Inference, Evaluation, and total critical thinking skill scores were positive. According to Table 2, this relationship between critical thinking skill scores and Engagement was significant for Analysis, $r(201) = 0.17$, $p < 0.05$, $R^2 = 0.03$, which explained three percent of the variance; Inference $r(201) = 0.23$, $p < 0.05$, $R^2 = 0.05$, which explained five percent of the variance; and total critical thinking, $r(201) = 0.24$, $p < 0.05$, $R^2 = 0.06$, which explained six percent of the variance. Evaluation, $r(201) = 0.11$, $p > 0.05$ displayed the same trend, but was not significant at the 0.05 alpha level.

Table 2.
Correlation between critical thinking skills and Engagement disposition (N = 202)

Skill	*r*	df	Sig.(2-tailed)
Analysis	0.17	201	0.02
Inference	0.23	201	0.00
Evaluation	0.11	201	0.11
Total critical thinking	0.24	201	0.00

Objective 3 - Determine the relationship between critical thinking skills and the disposition of Cognitive Maturity (Maturity) in selected youth leaders in the National FFA Organization

Maturity scores ranged from 13.00 to 36.00 with a mean of $M = 21.73$, $SD = 4.12$. The magnitude of the relationship between the Maturity disposition and critical thinking skill was low, but the direction of the relationship was negative. According to Table 3, this low, but negative relationship was significant for Analysis $r(201) = -0.19$, $p < 0.05$, $R^2 = 0.04$,

Inference $r(201) = -0.14$, $p < 0.05$, $R^2 = 0.02$ and total critical thinking skill score $r(201) = -0.18$, $p < 0.05$, $R^2 = 0.03$, explaining four, two, and three percent of the variance, respectively. Though Evaluation, $r(201) = -0.07$, $p > 0.05$ depicted the same inverse relationship, it was not statistically significant at the 0.05 alpha level.

Objective 4 - Determine the relationship between critical thinking skills and the total critical thinking disposition score in selected youth leaders in the National FFA Organization

EMI critical thinking disposition scores ranged from 76 to 117, with an average score of $M = 96.68$, $SD = 7.60$. There was a low relationship between critical thinking skills and total EMI scores. However, the relationship was always positive. According to Table 4, EMI score was significantly related to total critical thinking skill scores, $r(201) = 0.18$, $p < 0.05$, $R^2 = 0.03$, accounting for three percent of the variance; and the specific sub-skill, Inference, $r(201) = 0.20$, $p < 0.05$, $R^2 = 0.04$, accounting for four percent of the variance. The relationship was not significant for Analysis, $r(201) = 0.11$, $p > 0.05$ and Evaluation, $r(201) = 0.05$, $p > 0.05$.

Table 3.
Correlation between critical thinking skills and Maturity disposition (N = 202)

Skill	*r*	df	Sig.(2-tailed)
Analysis	-0.19	201	0.01
Inference	-0.14	201	0.05
Evaluation	-0.07	201	0.33
Total critical thinking	-0.18	201	0.01

Table 4.
Correlation between critical thinking skills and total EMI scores (N = 202)

Skill	*r*	df	Sig.(2-tailed)
Analysis	0.11	201	0.12
Inference	0.20	201	0.00
Evaluation	0.05	201	0.47
Total critical thinking	0.18	201	0.01

Conclusions / Implications

Since this study purposively selected a population of selected youth leaders in the National FFA Organization, one should not generalize findings beyond the 2002 National FFA Convention delegate participants. With this limitation in mind, and based on the findings of this study, the following conclusions were drawn.

Innovativeness

There were low, but positive relationships between the Innovativeness disposition and critical thinking skills. This relationship was significant for total critical thinking skill

scores, Analysis, and Inference. Why would there be a significant relationship between these variables?

Innovativeness was a critical thinking disposition derived from the Facione theoretical framework, which embodied "inquisitiveness with regard to a wide range of issues," "concern to become and remain generally well-informed," and "diligence in seeking relevant information" (Facione, 1990, p. 25). Although the relationship is small, the positive nature of the relationship may indicate that it is easier to teach students to examine ideas, detect arguments, analyze arguments, examine evidence, ponder alternatives, and draw conclusions if they are inquisitive, informed, and continually seeking information. This should also show educators that there is more to concentrate on and to try to instill than skills alone, if students are to get better at critical thinking.

This finding could be implying that students have a better chance at becoming a critical thinker if they were equipped with the proper experiences and attitudes to engage in critical thinking. Agricultural educators and leadership trainers may be able to develop these attitudes and pre-dispositions with and without formal education.

To accomplish these purposes, teachers should expose students to a wide range of cultures through travel, videotapes, service learning, and the Internet. Agricultural educators should also reward students who bring helpful information to a discussion that challenge the disseminated curriculum or at least causes a different perspective. Research should be conducted to determine if these types of cognitive dissonance strategies influence the Innovativeness disposition, and/or critical thinking skills.

Engagement

The Engagement disposition had a low, but positive relationship to critical thinking skills. This relationship was significant for Analysis, Inference, and total critical thinking skill, but the relationship was not significant for Evaluation. The relationship is likely significant because the components of Engagement involve alertness to opportunities to use critical thinking; trust in the process of reasoned inquiry; and persistence, though difficulties are encountered. If participants were pre-disposed to look for opportunities to critically think, and even believe in the value of critical thinking it is no wonder they are also likely to be successful at analyzing and making inferential judgments.

Even though, there is literature to suggest that infusing critical thinking is better than pre-teaching it (Angeli, 1999; Hagelskamp, 2000), teachers and leadership trainers who understand this relationship would probably do well to not only try to teach students how to critically think, but they should also sell them on the value of critical thinking. Teachers should also model the attitudes of being alert to opportunities for critical thinking and believing in the process of reasoning.

Cognitive Maturity

There was a relationship between the Maturity disposition and critical thinking skill, but it was a negative relationship. This low and negative relationship was significant for Analysis, Inference, and total critical thinking skill score. Assuming that the critical thinking skills instrument and the EMI disposition instrument were measuring the constructs they were intended to measure, this finding was somewhat disturbing. It indicates that students who are competent at Analysis (examining ideas, detecting arguments, analyzing arguments) and Inference (querying evidence, conjecturing alternatives, making decisions) are not open-minded regarding different worldviews, not flexible in considering alternatives and opinions, not accepting of the opinions of others, and not willing to change a decision when reflection indicates a change is warranted.

This is particularly disturbing in terms of leadership development. As students develop their leadership abilities, which include skills in critical thinking, they are better able to move and influence others towards a goal because of their skills. If a leader becomes competent in Analysis of arguments and Inference to make decisions, but is not considering the rights, opinions, or desires of other, then they are not a leader; they are a dictator. Formal training in leadership development, which takes the time to discuss the leadership attitude, will, and desires of others (Ricketts & Rudd, 2002) could be beneficial in stopping such a trend.

Total Critical Thinking Dispositions

Overall, there was a low, but positive relationship between total EMI and critical thinking skills. This relationship is important because EMI is the representation of "habits" and "intentions." Recall from the conceptual model: Behavior/Critical thinking skill = {Habits + Intentions} + Facilitating factors. According to model adapted from Triandis (1979), if someone has the habit and intends to do something, that is half the equation for human behavior, so it is very important that critical thinking disposition was found to be positively related to critical thinking skill, even though the relationship was minimal.

Recommendations

With the understanding that the relationships discovered were small, the EMI critical thinking disposition assessment and the critical thinking skills test should be further developed, and stronger versions of the instrument should be used to check for relationships between disposition and critical thinking skills. Specifically, the Maturity construct should be the focus of the disposition assessment to determine if the negative relationships were because of the instrument or the actual disposition of the participants. If the Maturity construct remains solid, then educators should turn their attention to improving students' predisposition to being aware of the complexity of real problems; being open to other points of view; and being aware of their own and others biases and predispositions.

The critical thinking skills test needs to be further refined. One of the reasons for the low relationships may have been the low level of variability attained using dichotomous scoring. Instrument changes that seek to improve the variability should be made, followed by a second iteration of this study. However, relationships did exist and the following recommendations were made for agricultural education professionals.

Educators and leadership trainers should still attempt to influence critical thinking dispositions by exposing students to a wide range of cultures and experiences through travel, video-tapes, service-learning, and the Internet. Educators should also reward students who bring helpful information to a discussion that challenges the curriculum or at least causes students to view information from a different perspective. Stronger instrumentation and similar studies with more heterogeneous groups should test these assumptions.

Since there is a relationship that exists between Engagement and Analysis and Inference, educators can promote competent Analysis and Inference by infusing critical thinking into the content of courses and leadership training, but also by providing information regarding the "nuts and bolts" of critical thinking. Testing secondary agricultural education students who have been exposed to pedagogy designed to improve their critical thinking skill level should also be evaluated.

Assuming the Cognitive Maturity scale is psychometrically sound, teacher educators and administrators need to develop sound curriculum that develops Cognitive Maturity. Pre-service and in-service training for teachers on how to develop the components (open-mindedness regarding different worldviews, flexibility concerning alternatives and opinions, understanding of the opinions of others, willingness to change a decision if needed) of Cognitive Maturity may prove to be very useful in the quest to develop students' critical thinking skills.

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An Analysis of the Barriers and Benefits to Diversity Inclusion in North Carolina Secondary Agricultural Education Curricula

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Abstract

The purpose of this study was to analyze the attitudes of North Carolina secondary agricultural education teachers toward increasing diversity inclusion in North Carolina secondary agricultural education programs. Overall North Carolina agricultural educators found diversity to be of great value, additionally it was perceived that it aided agricultural education students in character and leadership skill development. Respondents perceived that diversity in agricultural education could improve the critical thinking skills of agricultural students. Guidance counselors and the perception of agriculture itself were seen as major influences upon diversity inclusion in agricultural education. Recommendations included preservice multicultural training, reflective diversity teaching practices, establishing collaborative relationships with guidance counselors, and the creation of diversity evaluation plans.

Introduction

The United States is one of the most ethnically and culturally diverse nations in the world (Spears, Oliver, & Maes, 1990). Even so, the differences among people can delight, puzzle, disturb, and sometimes even overwhelm one (Macionis, 1997). According to Spears, Oliver, and Maes (1990), these circumstances hold implications for education, even in places where the local population is not very diverse. The Census Bureau Report (1992) predicted that the white population of the United States, at 75% as of 1990, would shrink to 52.7% by 2050. Hispanics are expected to increase from 9% (24.1 million) to 21% (80.7 million). Asian/Pacific Islanders, who currently account for 2.8% (7.5 million), are expected to constitute 10.1% (38.8 million). African Americans, who make up 11.8% (32 million) of the population at present, will increase to 15% (57.3 million). The Native American population will nearly double, from 2.2 million to 4.08 million (Census Bureau Report, 1992). In some cities, these projections are already a reality. Because the United States is a multicultural society, citizens need to understand and respect one another, both as individuals and as members of ethnic minority distinct groups (Grant & Sleeter, 1989). The aforementioned demographic characteristics will have major implications among America's public school system (Klauke, 1989). As the nation's ethnic minority diversity increases, schools will have to develop ways to create productive, multicultural environments to accommodate diverse student backgrounds and native languages (Klauke, 1989).

According to Foster and Henson (1992) the agricultural industry is the foundation for any society; however, in the United States ethnic minorities and women involvement in the field of agriculture is limited. Various demographic estimates indicate that ethnic minority populations are steadily increasing, and more of these students will need to be recruited into agricultural related careers in order to sustain the agricultural industry for the future and to help ensure that the United States remains competitive in the global economy (USDA Fact Book 1998; Mitchell, 1993). In order for the United States to sustain its current agricultural rank, recruitment of a more diverse workforce must be enhanced, particularly in the area of teaching professionals in secondary agricultural education. Opportunities in agriculture related fields are continuing to expand; but the number of individuals, particularly people of color, is declining continuously on a yearly basis. In order to reverse this trend and alleviate the myths about the agricultural field, the field of education and agribusiness as a whole must acquire an understanding of the motivational factors and rewards that would attract ethnic minorities and women to pursue an agricultural career (Zoldoske, 1996).

Ethnic minorities today face an uncertain future regarding their participation in vocational education (Gordon, 1999). If planned and administered in ways that reflect quality, vocational education is not only an important tool for preparation of ethnic minorities workers, but also a way for America to overcome a growing social and economic crisis, the deterioration of living conditions for many of its citizens (Gordon, 1999). Because of the economic and demographic development in America, there is now a window of opportunity for all ethnic minorities in vocational education (Gordon, 1999). This opportunity will not be realized, however, if basic challenges are not met and resolved by the vocational education community (Gordon, 1999). According to Gordon (1999) it is important to emphasize that

the American vocational education community does have the potential and leadership capabilities to respond to these challenges that could strengthen America's social productivity.

Studies by Marshall (1989), Metzger (1985), Valverde (1988), and Jones and Bowen (1998), which explored the under representation of ethnic minorities in vocational education, suggest that stereotyping, discrimination, constraints imposed by self and family, low career aspirations, lack of confidence and initiative, lack of sponsors and role models are causes for low participation by ethnic minorities.

Problem Statement

During the 2000-01 academic year in North Carolina, there were over 35,000 students enrolled in secondary agricultural education, with Caucasians encompassing 78% of total enrollment, in comparison to African Americans who comprised only 17% of total enrollment. Native Americans and Hispanic Americans made up 4% of the secondary agricultural education student enrollment. According to the North Carolina Department of Public Instruction (2001), of the 35,000 students enrolled in secondary agricultural education, females constituted only 32% of the total enrollment (NCDPI, 2001).

Currently in the State of North Carolina, there are approximately 366 secondary agricultural education teachers. Of this population, 82% consists of white males; ethnic minorities represent only 6% of secondary agricultural education teachers, and women make up 12% (NC DPI, 2001; NC Agricultural Education Directory, 2001). When comparing the percentage of ethnic minority secondary agricultural education students with the number of ethnic minority secondary agricultural education teachers, a disparity exists. Currently, there is one white agricultural teacher for every nine Caucasian students compared to one ethnic minority teacher for every 40 ethnic minority students. With the aforementioned factors in mind, how can diversity inclusion be increased in North Carolina's secondary agricultural education programs? What are the benefits and barriers of diversity inclusion for North Carolina's secondary agricultural education programs? Could perhaps North Carolina secondary agricultural educators provide valuable insight into answering the aforementioned questions?

Conceptual Framework

The conceptual framework for this study is built upon the concept of Inclusion. Inclusion is a philosophy that brings students, families, educators, and community members together to create schools and other social institutions based on acceptance, belonging, and community (Bloom, Permultter, & Burrell, 1999). The concept of inclusion seeks to "establish collaborative, supportive, and nurturing communities of learners that are based on giving all students the services and accommodations they need to learn, as well as respecting and learning from each other's individual differences" (Salend, 2001, p. 5). Inclusion is built upon four major principles: Diversity, Individual Needs, Reflective Practice, and Collaboration.

Diversity improves the educational systems for all students by placing them in general education environments regardless of race, ability, gender, economic status, gender, learning styles, ethnicity, cultural background, religion, family structure, linguistic ability, and sexual orientation. Banks (1994) stated diversity could have a positive impact upon a person's cognitive and personal development because it challenges stereotypes, broadens perspectives, and sharpens critical thinking skills, all needed components in the field of education.

Individual Needs involves sensitivity to and acceptance of individual needs and differences. In the field of education one will constantly encounter individuals of cultural, ethnic, and socioeconomic backgrounds different from their own. When this occurs having an understanding and respect of a person's individual needs greatly benefits the educational environment (Banks, 1994).

Reflective Practice insists that educators reflect upon their attitudes, teaching and classroom management practices, and curricula to accommodate individual needs. Educators must constantly evaluate their daily professional practice in order to optimize the educational learning environment for all of student clientele, irregardless of their respective differences (Banks, 1994).

Collaboration involves groups of professional educators, parents, students, families, and community agencies working together to build effective learning environments (Salend, 2001). Optimal educational environments involve collaborative efforts among all educational stakeholders in order to ensure that the greatest amount of learning can take place for all students (Banks, 1994).

Purpose and Objectives

The purpose of this study was to analyze the attitudes of North Carolina secondary agricultural education teachers toward increasing diversity inclusion in North Carolina secondary agricultural education programs. In order to accomplish the aforementioned objectives, the following objectives were developed:

1. Assess North Carolina secondary agricultural education teachers' perceptions of the benefits of diversity inclusion in North Carolina secondary agricultural education programs.
2. Assess North Carolina secondary agricultural education teachers' perceptions of he barriers of diversity inclusion in North Carolina secondary agricultural education programs.
3. Determine the demographic characteristics of North Carolina secondary agricultural education teachers.

Methodology

Traditional mail survey methodology, using a three round, one week interval format, in alignment with Dillman's Total Design Method (2000) was utilized to carry out this study. No previously established survey instruments were available for the purposes of this study, therefore an instrument was developed by the researcher after an exhaustive review of literature. The survey instrument consisted of three sections. Part one consisted of 10 statements to measure the benefits of diversity inclusion, part two consisted of 18 statements to measure the barriers of diversity inclusion, and the last section measured various demographic characteristics of North Carolina secondary agricultural education teachers. Content validity was established by a panel of experts of 8 university faculty with research experience in the area of diversity. Face validity and reliability were established during a pilot test of twenty North Carolina agricultural education teachers not included in the final survey population. In order to test the internal consistency reliability of the instrument, the returned pilot tested instruments (7) were analyzed with the aid of Cronbach's alpha according to conventions established by Nunnally (1967) and Davis (1971). The overall correlation coefficient for the instrument was .93. According to Davis (1971) this would indicate a very strong association between variables.

The population for this study consisted of secondary agriculture teachers in North Carolina who were listed in the 2001-2002 North Carolina Agricultural Education Directory (N = 366). Based on Krejcie and Morgan's (1970) formula for a 5% margin of error, a random sample of 180 would be required for a population of this size. As is the nature of survey research a certain loss rate can be expected, in an attempt to achieve the target sample size of 180 a random sample of 210 secondary agricultural education teachers was utilized. A three round mail questionnaire approach was utilized for this study. The first round consisted of North Carolina secondary agricultural education teachers receiving a cover letter from the researcher outlining the purpose of the research, a survey, and a return stamped envelope; these were mailed on February 8, 2002. Teachers were given one week to return the initial survey; this resulted in 63 surveys being returned. The next round consisted of all non-respondents receiving a follow-up letter stressing to them the importance of returning the survey for data analysis purposes and to strengthen the study. This mailing was sent out on February 15, 2002. This resulted in 38 surveys being returned. Non-respondents were again given one week to return the survey. The third round consisted of all nonrespondents receiving all of the items received in the first round, with another week to respond. This mailing was sent February 22, 2002 and yielded 9 surveys being returned. In order to control for nonresponse error Miller and Smith (1983) recommended comparing early to late respondents. Research has shown that late respondents are often similar to nonrespondents. In relation to this study, no significant differences were found. The final return rate was 52%.

Findings

Respondents were asked their perceptions in relation to 10 statements regarding the potential benefits toward diversity inclusion in North Carolina secondary agricultural education Programs. Table one shows the means, standard deviations, and rankings for the perceived benefits of diversity inclusion as they relate to secondary agricultural education programs in North Carolina. The following Likert scale was utilized for tables one and two: Strongly Disagree, 2= Disagree, 3= Uncertain, 4= Agree, 5= Strongly Agree. For purpose of data analysis, readers should utilize the following specifications when interpreting the aforementioned scale for tables two, three, and four: 1 – 1.49 = Strongly Disagree, 1.50 – 2.49 = Disagree, 2.50 – 3.49 = Uncertain, 3.50 – 4.49 = Agree, 4.5 – 5.0 = Strongly Agree.

Table 1. Benefits of Diversity Inclusion Table (n = 110)

Benefits	Mean	SD	Rank
1. There are many benefits for secondary agricultural education with the inclusion of ethnic minorities.	4.50	.67	7
2. There are many benefits for secondary agricultural education with the inclusion of women.	4.54	.67	4
3. Secondary agricultural education provides ethnic minorities with the opportunity for character development.	4.53	.62	5
4. Secondary agricultural education provides women with the opportunity for character development.	4.51	.62	6
5. Secondary agricultural education provides ethnic minorities with the opportunity for leadership development.	4.55	.55	3
6. Secondary agricultural education provides women with the opportunity for leadership development.	4.57	.55	2
7. The inclusion of diverse populations in agricultural education is a benefit for all agricultural education stakeholders.	4.62	.61	1
8. Diversity inclusion can sharpen students' critical thinking skills.	4.34	.80	8
9. Diversity inclusion broadens the perspectives of agricultural students.	4.54	.62	4
10. Diversity inclusion broadens the perspectives of agricultural teachers.	4.55	.58	3

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

Agricultural educators in North Carolina approached strong agreement with means of 4.5 or higher on the following 9 statements related to the potential benefits of diversity inclusion: "There are many benefits for secondary agricultural education with the inclusion of women."; "There are many benefits for secondary agricultural education with the inclusion of ethnic minorities.";" Secondary agricultural education provides ethnic minorities with the

opportunity for leadership development**.**"; " Secondary agricultural education provides ethnic minorities with the opportunity for character development."; "Secondary agricultural education provides women with the opportunity for leadership development**.**"; "Secondary agricultural education provides women with the opportunity for character development**.**"; "The inclusion of diverse populations in agricultural education is a benefit for all agricultural education stakeholders."; "Diversity inclusion broadens the perspectives of agricultural students."; "Diversity inclusion broadens the perspectives of agricultural teachers."

The following statement, which reached a level of agreement, concerned the benefit of diversity inclusion in agricultural education as it relates to agricultural education stakeholders: "Diversity inclusion can sharpen students' critical thinking skills."

Respondents were asked their perceptions in relation to 18 statements regarding the potential barriers to diversity inclusion in North Carolina secondary agricultural education programs. Table two shows the means, standard deviations, and rankings for the perceived barriers to diversity inclusion. North Carolina agricultural teachers approached agreement concerning the following 5 statements in relation to the perceived barriers of diversity inclusion: "Stereotypes are a primary reason why ethnic minorities do not enroll in agricultural classes.", "Guidance counselors influence the participation of ethnic minority in agricultural education.", "Guidance counselors influence the participation of women in agricultural education." "The perception of agriculture itself influences the participation of ethnic minorities in agricultural education."; "The perception of agriculture itself influences the participation of women in agricultural education."

The following four statements approached a level of agreement by North Carolina secondary agricultural education teachers: "Prejudicial issues in relation to ethnic minorities by school systems should be addressed."; "Prejudicial issues in relation to women by school systems should be addressed." "Only when students observe staff commitment to providing a fair and representative environment will they feel a sense of school ownership."; "Acceptance by peers is a barrier to diversity inclusion in vocational education."

North Carolina secondary agricultural education teachers were uncertain concerning the following 8 statements in relation to the perceived barriers of diversity inclusion: "A lack of role models hinders the participation of ethnic minorities' inclusion in agricultural education."; "A lack of role models hinders the participation of women's inclusion in agricultural education.", "Stereotypes are a primary reason why women do not enroll in agricultural classes.", "The glass ceiling theory may influence the participation of ethnic minorities in agricultural education.", "The glass ceiling theory may influence the participation of women in agricultural education."," Acceptance by the community is a barrier to diversity inclusion in vocational education.", "Acceptance by the school administrators is a barrier to diversity inclusion in vocational education.", "Balancing family and a career is a barrier women endure in vocational education."

North Carolina secondary agricultural education teachers disagreed with the following statement, “Sexual harassment may be a factor why women do not enroll in agricultural education classes”.

Table 2.
Barriers of Diversity Inclusion Table (n = 110)

Barriers	Mean	SD	Rank
1. A lack of role models hinders the participation of ethnic minorities' inclusion in agricultural education.	3.47	1.08	10
2. A lack of role models hinders the participation of women's inclusion in agricultural education.	2.99	1.21	15
3. Stereotypes are a primary reason why ethnic minorities do not enroll in agricultural classes.	3.50	1.18	9
4. Stereotypes are a primary reason why women do not enroll in agricultural classes.	3.41	1.13	11
5. Guidance counselors influence the participation of ethnic minorities in agricultural education.	3.80	.98	3
6. Guidance counselors influence the participation of women in agricultural education.	3.75	1.04	5
7. The perception of agriculture itself influences the participation of ethnic minorities in agricultural education.	3.89	.90	2
8. The perception of agriculture itself influences the participation of women in agricultural education.	3.72	1.00	6
9. Sexual harassment may be a factor why women do not enroll in agricultural education classes.	2.16	1.11	18
10. The glass ceiling theory may influence the participation of ethnic minorities in agricultural education.	2.85	.83	16
11. The glass ceiling theory may influence the participation of women in agricultural education.	2.82	.86	17
12. Prejudicial issues in relation to ethnic minorities by school systems should be addressed.	3.67	1.14	7
13. Prejudicial issues in relation to women by school systems should be addressed.	3.63	1.15	8
14. Only when students observe staff commitment to providing a fair and representative environment will they feel a sense of school ownership.	3.93	.78	1
15. Acceptance by peers is a barrier to diversity inclusion in vocational education.	3.77	1.01	4
16. Acceptance by the community is a barrier to diversity inclusion in vocational education.	3.24	1.03	12
17. Acceptance by school administrators is a barrier to diversity inclusion in vocational education.	3.04	1.13	14
18. Balancing family and a career is a barrier women endure in vocational education.	3.17	1.24	13

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

Table three presents the means, standard deviations, frequencies, and percentages for the demographic and program variables contained in the survey instrument. In relation to age, North Carolina secondary agricultural education teachers reported a mean age of 40. Regarding gender in this study, 87 secondary agricultural education teachers were male and 23 were female. In relation to race or ethnicity, there were 8 Black agricultural education teachers and 102 White agricultural education teachers. However, there were no Hispanic, Native American, and Asian agricultural education teachers reported.

Table 3.
Demographics For North Carolina Secondary Agricultural Education Teachers

Demographics		
1. Age:	Mean = 40	
	N	**Percent**
2. Gender:		
Male	87	79.1%
Female	23	20.9%
3. Race/Ethnicity:		
Black	8	7.3 %
White	102	92.7 %
Hispanic	0	0 %
Native American	0	0 %
Asian	0	0 %
4. Highest Degree:		
Bachelor's	74	67.2%
Master's	32	29.1%
Specialist	4	3.7 %
	Mean	**SD**
5. Number of years teaching:	11.59	9.75
6. Number of Hours in Diversity Training:	3.67	5.67

Agricultural teachers in this study were asked to provide their highest level of education attained. Seventy-four North Carolina agricultural education teachers held bachelor degrees. Thirty-two North Carolina agricultural education teachers held master's degrees. Four agricultural teachers in North Carolina had earned the specialist degree, and no teachers held a doctoral degree.

Agricultural education teachers in North Carolina had taught secondary agriculture an average of 12 years. Lastly, agricultural teachers in this study were asked how many hours of training they had taken in the area of diversity inclusion in the past five years. North

Carolina agricultural teachers had taken a mean of four hours of training in the area of diversity inclusion.

Conclusion

1. Overall agricultural educators saw the value of diversity inclusion in North Carolina secondary agricultural programs. With the increasingly multicultural society it is imperative that agricultural educators recognize the value of diversity of all kinds, as student clientele change.

2. Agricultural educators indicated that agricultural education can aid in the development of character and leadership skills in minorities and women, skills that are needed in order to compete in an increasingly global society. This is direct alignment with the goals of the National FFA Organization which holds character development and leadership development as two of its main cornerstones (National FFA Organization, 2000). Agricultural education could perhaps increasingly address the "individual needs" of minority students in these areas.

3. Participants perceived that diversity in agricultural education could improve the critical thinking skills of agricultural students. Perhaps diversity in agricultural education is a valuable tool that can aid in the development of this "individual need" of all students.

4. Role models were not seen as a barrier to diversity inclusion in secondary agricultural education. This is direct contrast to studies by Marshall (1989), Metzger (1985), Valverde (1988), and Jones and Bowen (1998) which indicated the lack of role models being a significant barrier to diversity in vocational education.

5. Stereotyping was seen as a barrier to minority participation in agricultural sciences courses, but not for women. This finding was particularly interesting considering that agricultural education has traditionally been a male dominated discipline. Perhaps the role of women in agricultural education has changed from the traditional role of limited participation, to increased involvement.

6. Guidance counselors were seen as major influences upon increasing the participation of women and minorities in agricultural education. The "collaboration" principle of the concept of Inclusion calls for educational stakeholders such as school officials to work together to build effective learning environments for all students (Salend, 2001). Guidance counselors can have a great influence upon the career aspirations of students, particularly ones considering agricultural education as a career.

7. The perception of agriculture itself was perceived to be a barrier to the participation of women and minorities in agriculture. Agriculture traditionally has been perceived as a labor intensive industry, particularly with historically negative connotations in minority communities. Perhaps if women and minorities are introduced to the wide

array of career opportunities in agriculture, perceptions of the industry could possibly change, leading to increased participation.

8. Agricultural educators stated that overall prejudicial issues should be addressed regarding diversity, which directly reflects studies conducted by Marshall (1989), Metzger (1985), Valverde (1988), and Jones and Bowen (1998). Research has shown that diversity could have a positive impact upon a person's cognitive and personal development, factors that are of great importance in the development of agricultural education students.

9. It was perceived that acceptance by the community and school administrators were not major barriers to diversity inclusion, in contrast to studies conducted by Marshall (1989) and Metzger (1985) which found these groups to be major influences upon vocational education diversity. Agricultural education like other educational branches has traditionally been influenced by external groups, perhaps the agricultural education teachers in this study have good working relationships with these groups and should continue to foster them.

Recommendations

1. Preservice agricultural education programs in North Carolina should have a strong emphasis in the area of multicultural education and diversity training. By implementing diversity training into preservice training programs, new agricultural education teachers would be competent and have the skills needed to prepare students for the highly diverse world of work.

2. North Carolina secondary agricultural education teachers should encourage increased diversity in their programs, a component that could encourage better problem solving skills and overall character development for their students.

3. North Carolina secondary agricultural education teachers should develop an evaluation plan in order to identify the impact that diversity inclusion has had on their respective programs.

4. North Carolina secondary agricultural education teachers should analyze and reflect on old teaching practices, and incorporate new ideas that would increase ethnic minority and women representation in their secondary agricultural education programs.

5. North Carolina secondary agricultural education teachers should strive to mentor and provide all their students with positive role models involved in the professional arena of agriculture.

6. Agricultural educators could establish collaborative relationships with guidance counselors in order to encourage greater diversity inclusion in their respective programs.

7. More minority and female teachers should be recruited to reflect the population of students in the public schools.

Recommendation For Further Research

1. A longitudinal study should be conducted upon beginning agricultural education teachers to gauge whether the multicultural education and diversity training that they receive in their preservice programs has an impact upon their daily pedagogical practice.

Implications

Diversity is a trend in the United States cultural landscape that is here to stay. In order for American public school systems to face the challenges that a more diverse population of students brings, multicultural education must become a priority in teacher training and daily practices. The discipline of agricultural education is no exception, for a field that has traditionally been white male dominated, pedagogical changes to address cultural differences will become a way of life. If the purpose of education according to Grant (1978) is to prepare individuals to function in an ethnically and culturally diverse world, then how will agricultural education as a profession respond? Agricultural educators not only in North Carolina, but on a national scale must address this question.

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Perceptions of Agriculture Students Regarding the Image of Agriculture and Barriers to Enrolling in an Agriculture Education Class

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Abstract

The purpose of this study was to determine the perceptions of high school freshmen regarding the image of agriculture and the barriers to enrolling in an agricultural class. Results indicated that non-minority students had significantly higher overall mean scores than minority students for reasons for enrolling in an agricultural education class. The findings also indicated that non-minority students had a more positive perception of enrolling in an agricultural education course. Both groups of students indicated that no individual would have any influence on their reasons for enrolling or not enrolling in an agricultural education class; however, findings revealed that both groups of students indicated that they were enrolled in an agricultural education class or probably would enroll in a class because of reasons other than the intended purposes of the class.

Introduction/Theoretical Framework

The decline in the number of students entering the field of agriculture has been on the rise over the years. As reported by the United States Department of Agriculture (1998), five major challenges face the U.S. agricultural industry in the next decade: (1) maintaining an agricultural system that's highly competitive in the global economy, (2) balancing agricultural production and the environment, (3) providing a safe and secure food supply for all citizens, (4) maintaining a healthy, well-rounded population, and (5) increasing the number of people entering the field, economic opportunities and improving the quality of life for all Americans. Although the numbers of American farms have declined over the years, American farmers still provide enough food for the American people and much of the world. On average, American consumers spend just 10 percent of their disposable income for food, which is lower than any other national in the world (American Farm Bureau, 2002). Also, in the world of agricultural production and technology, the United States continues to hold the advantage over its counterparts. USDA statistics show that 43 percent of U.S. farms have Internet access and 55 percent have general access to computers (American Farm Bureau, 2002). Additionally, a survey that was conducted on young farmers and ranchers shows that nearly 87 percent use a computer and 77.4 percent have Internet access (American Farm Bureau, 2002). If the United States wants to continue to be a front-runner in the world of agriculture, strong efforts must be made to recruit a cross-section of all Americans into agriculture.

Agriculture is one of the largest employers in the United States, with more than 22 million people employed in some phase from growing food and fiber to selling agricultural products at the retail level (American Farm Bureau, 2002); however, the demand for college graduates, particularly minority individuals, in this field continues to exceed the supply (Jones, 1999). The civilian labor force is projected to increase by 17 million over the 2000-2010 period, reaching 158 million in 2010 (United States Bureau of Labor & Statistics, 2002). The labor force group, Asian and other, and the Hispanic labor force are projected to increase faster than other groups, 44 percent and 36 percent, respectively, because of high net immigration and higher than average fertility (U.S. Bureau of Labor & Statistics, 2002). The Black labor force is expected to grow by 21 percent, more than twice as fast as the nine percent growth rate for the White labor force (U.S. Bureau of Labor & Statistics, 2002). Due to the dwindling participation of people of color in agricultural-related careers and the substantial demographic percentage increase that this population is expected to make in the next decade, those charged with perpetuating the leadership role of the United States in the area of agriculture and related fields should continue to find ways to enhance participation of this group (Jones, 1999).

To sustain agriculture at its current status, recruitment of outstanding individuals must be enhanced. To enhance recruitment, more effective recruitment strategies must be implemented. To develop effective recruitment strategies, it is necessary to research students' decision making processes and their images of agriculture (Lucas, 1993).

Purpose and Objectives

The purpose of this study was to determine perceptions of high school freshmen regarding their image of agriculture and the barriers to enrolling in an agricultural class. Specific objectives of the study were to:

1. Describe selected demographic and situational characteristics of minority and non-minority students enrolled in a ninth grade English or homeroom class.

2. Compare the attitudes of minority students and non-minority students toward agricultural and their perceived barriers to enrolling or not enrolling in an agricultural education class.

Significance of Study

Timely and accurate information regarding the perceptions that high school students have about agriculture and the analysis of factors that would prevent them from enrolling in an agriculture class are needed to enhance the recruitment of talented individuals in agriculture. Those who are dedicated to making agriculture a more diverse society would benefit from this study because it could possibly identify factors that would encourage minorities to enroll in agriculture classes and/or possibly choose agriculture as a career. Job opportunities in agriculture and related sciences are continuing to increase, and are expected to continue through at least 2005 (U.S. Department of Labor, 1996); however, the number of students pursuing agricultural careers through college since the 1970s has declined steadily. To reverse this trend, educational leaders must understand the motivational factors and rewards that lure people to a particular career (Zoldoske, 1996).

Previous studies (Talbert, 1992; Talbert, 1996; Talbert & Larke, 1995 & Terry, 1999), surveyed students who were currently enrolled in an agricultural class. This study differs in that the targeted sample population consisted of students enrolled in an English or homeroom class. By targeting these classes, the researcher was able to collect information from two types of students: those who were enrolled in an agricultural education class and those who were not enrolled in an agricultural education class.

Procedures

The data for this study were collected by means of a slightly modified replicated instrument used in previous studies identifying factors influencing students to enroll in an agricultural course (Talbert, 1992; Talbert, 1996; Talbert & Larke, 1995 & Terry, 1999). Permission was granted by the researcher to use and modify the instrument. The data were analyzed using Social Sciences Release 11.5 (SPSS 11.5 for Windows). Descriptive statistics generated by SPSS procedures CROSSTABS were used to analyze demographic data and situational characteristics for objective one. Independent samples t-test (ANOVA) was used to determine differences in students' perceptions. The 11 scales for reasons for

enrolling, barriers to enrolling, and personal opinions toward agriculture were used as dependent variables and the student minority/non-minority status was used as the independent variable. An alpha level of .05 was used to determine statistical significance between the mean scores. All independent sample t-test scores were reported regardless of their significance. These were computed to satisfy objective two. To determine statistical significance, an alpha level of <.05 was used for all analyses. A pilot test of the instrument was conducted by administering the survey to 12 ninth grade students enrolled in a school in Fayetteville, Arkansas and not included in the study. The population of the study consisted of 132 ninth grade students who were enrolled in selected counties that had high enrollment of minority students in public high schools in the state of Arkansas during the spring of 2003. U.S. Census data were used to determine those counties in Arkansas that showed the highest numbers of African-American and Hispanic populations. These counties were targeted for the study. According to the latest U.S. Census (2000), the five counties with the largest percentages of Hispanic populations were Sevier, Yell, Carroll, Benton, and Bradley. The five counties with the largest percentages of African-American populations were Phillips, Chicot, St. Francis, Crittenden, and Deshea. Because of the design of the study, the researcher targeted only those high schools within each county that offered agricultural education programs.

Cover letters were mailed out to the ten individual school principals of each of the selected counties asking for their participation in the study. Before a school could participate, a written statement was to be sent to the researcher by the schools stating that they agreed to participate in the study. Verbal agreements to participate were secured from each of the individual principals of the targeted schools in the study, but due to inconvenient and untimely circumstances within their schools, only six responded with a written document agreeing to participate. The response rate was six out of ten. Those schools that agreed to participate were asked to select a ninth grade English or homeroom class within their school to participate in the study.

One of the researchers traveled to each of the targeted schools and administered the survey. The researcher explained the purpose and significance of the study to the students before administering the survey. The instrument consisted of the following parts:

Part I – Demographic

Part I consisted of demographic characteristics of the students. These characteristics included ethnicity (African-American/Black, Caucasian/White, Hispanic, Native-American and Asian-American), gender, agricultural education (had or had not enrolled in an agricultural class), residence (farm or ranch, rural area, small town, and city/suburb) and agriculture as a career choice.

Part II – Reasons for Enrolling or Not Enrolling

The Agriculture-Scale (items 11-22) measured the influence of the agricultural education class and agriculture in general on the student's decision to enroll. The Influential Person-Scale (items 23-29) measured the influence of family members, friends and school personnel in the decision to enroll. The Disavowance Scale (items 30 & 34) involved items that would influence students to enroll in an agricultural education class for reasons other than the intended purposes of the class such as taking an agricultural education class because it was an elective, or being in an agricultural education class would give them a sense of acceptance and belonging. The Agricultural Career-Scale (items 31-33) measured the effect of vocational aspects of agricultural education on the enrollment decision.

Part III – Barriers to Enrolling

The Personal Negative Scale (items 35-39) involved negative interaction with students or influential persons. The Teacher Negative Scale (items 40-43) involved negative interactions with the agricultural education teacher. The Course Negative Scale (items 44 & 45) measured the degree of incompatibility between the student and his/her perceived qualities of the course. The Agriculture Negative Scale (items 46-50) measured the negative perceptions of the student toward agriculture.

Part IV – Agricultural Opinions

The Personal Career Scale (items 51-54,68) measured the student's attitude toward entering an agricultural career. The Agricultural Occupations Scale (items 55-61) surveyed the student's perception regarding the variety and scope of the agricultural industry. The Occupational Requirements Scale (items 62-67) consisted of the student's perception regarding the requirements needed to obtain a career in agriculture.

As with previous studies, a five-point Likert-type scale was used for each of the statements in the scales. Scales ranged from strongly disagree (1) to strongly agree (5). The higher the scale score the greater the individual perceived that particular scale as a reason for enrolling, a barrier to enrolling, or more strongly agreed with the personal opinion scale.

Findings

The main focus of this study was to compare minority and non-minority students' perceptions of agriculture and the barriers to enrolling in an agricultural class. The results of this study, with the exception of Table 1, are presented in minority/non-minority status. For this analysis, students who identified their ethnicity as African-American/Black, Native-American, Hispanic, Asian American, or Bi-racial were coded into the data as being a Minority. Students who identified their ethnicity as being Caucasian/White were coded into the data as being a Non-Minority.

Objective one described selected demographic and situational characteristics of minority and non-minority students enrolled in a ninth grade English class or homeroom.

The sample consisted of 132 ninth grade students made up of 34.1% African-American/Black, 3.0% Native American, 6.8% Hispanic, 3.0% Asian American, and 53.0% Caucasian/White. Students reported their ages as 14 or younger (46.2%), 15 (45.5%), 16 (6.8%), 17 (0.8%), and 18 (0.8%).

Places of residence identified by students were 47.7% live in a small town, 28.0% in a rural area, 16.7% on a farm or ranch, and 7.6% in a small city or suburb. Both ethnic groups were more likely to live in a small town than any other place of residence. There were only 44.7% of the sample of students who had been enrolled or were currently in an agricultural education class. There were more minority students who had been enrolled in an agricultural education class (28.8%) than non-minority students (15.9%). Of the students who took part in the survey, 22.7% had participated in 4-H. Minority students (12.9%) were more likely to be members of 4-H than non-minority students (9.8%).

The majority of the students in both ethnic groups identified a high school diploma/GED as being their fathers' highest level of education (65.9%). The next level of education that was predominately selected by both groups was less than a high school diploma (14.4%). Minority students had more fathers who held an Associate or Technical degree (5.3%) than non-minority students while non-minority students had more fathers who had attained a Bachelor's Degree (6.1%) than minority students. The majority of the students in both groups identified a high school diploma as being their mothers' highest level of education (47.7%). The next levels of education that were predominate between both groups were those mothers with less than a high school diploma (15.9%) and mothers with Associate/Technical degrees (15.9%). Minority students had more mothers with a Bachelor's degree (7.6%) than non-minority students (4.5%) while non-minority students had more mothers with advanced degrees (6.1%) than minority students (2.2%).

Students (41.7%) in the sample identified their chance of being employed in an agricultural career after graduation as being "unsure." Only 12.9% of the population said, "probably yes," while 31.8% said "probably not." Students were asked to evaluate their chances of being involved in an agricultural career within their working lifetime. A majority (39.4%) of the students in the sample identified their chances of being employed in an agricultural career sometime in their lifetime as being "unsure." Non-minority students (14.4%) were more likely than minority students (5.3%) to answer, "probably yes." On the other end of the scale, minority students (7.6%) were more likely and non-minority (4.5%) were less likely to answer "definitely not."

Objective two was to compare minority and non-minority students' reasons for enrolling in an agricultural class, their perceived barriers to enrolling in an agricultural class, and attitudes toward agriculture. Items 11 through 68 were used to construct the scales used in these analyses.

Analysis of the data indicated (Table 1) that non-minority students had significantly higher overall mean scores than minority students on the Agriculture scale and the

Agricultural Career scale for reasons for enrolling in an agricultural education class. This finding indicated that non-minority students had a more positive perception of enrolling in an agricultural education course than minority students. On the Influential Persons scale, both minority and non-minority students had overall mean scores lower than 3.0 which may indicate that none of the statements in the influential persons part of the survey had or would have any influence on their reasons for enrolling in an agricultural education class. On the Disavowance scale, both groups of students had overall mean scores higher than 3.0 which may indicate that they were enrolled in an agricultural education class or would probably take an agricultural education class because of reasons other than the intended purposes of the class.

Table 1.
Independent Samples t-test of Students' Reasons for Enrolling in an Agricultural Education Class

Scale	Ethnicity	Mean*	Standard Deviation	t-value	Significance (<.05) 2-tailed
Agriculture	Minority	3.2836	.6198	2.125	.036
	Non-Minority	3.5452	.7745		
Agricultural Career	Minority	3.4395	.8751	2.531	.013
	Non-Minority	3.8250	.8716		
Influential Persons	Minority	2.5853	.8690	1.475	.143
	Non-Minority	2.8020	.8191		
Disavowance	Minority	3.2419	.8951	.787	.433
	Non-Minority	3.3643	.8884		

Note: *1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

The perceived barriers to enrolling in agricultural class scales (Table 2) show similarities and some differences from the reasons for enrolling scales. All of the perceived barriers to enrolling scales have means lower than 3.0, which may lead to the conclusion that none of the statements in the survey are actually barriers to enrolling in an agricultural class. Analysis of the data indicates that non-minority students had significantly lower overall mean scores than minority students in three of the four scales used to measure the perceived barriers to enrolling.

For analysis purposes, a higher mean score is described as a perception of a greater barrier to enrolling in an agricultural class. This means that non-minority students believe that these factors were slightly less important barriers to their enrollment in an agricultural

education course than minority students. Non-minority students perceived the teacher as being the least barrier to enrolling while minority students perceived agriculture as being the greatest barrier to enrolling. The teacher negative scale yielded the lowest mean score among minority students, indicating that the agricultural education instructor was the least significant barrier to their enrolling in agricultural class.

Table 2.
Independent Samples t-test of Students' Barriers to Enrolling in an Agricultural Education Class

Scale	Ethnicity	Mean*	Standard Deviation	t-value	Significance (<.05) 2-tailed
Personal	Minority	2.5419	.6759	2.155	.033
Negative	Non-Minority	2.2543	.8368		
Teacher	Minority	2.2702	.8338	3.097	.002
Negative	Non-Minority	1.8143	.8530		
Course	Minority	2.3629	.9842	.338	.736
Negative	Non-Minority	2.3000	1.1370		
Agriculture	Minority	2.6387	.8031	3.078	.003
Negative	Non-Minority	2.1943	.8492		

Note: *1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

Analysis of the data for the personal opinions about agriculture scales (Table 3) indicates that non-minority students had only one significantly (<.05) higher mean score than minority students.

Table 3.
Independent Samples t-test of Students' Opinions About Agriculture Scale Scores by Ethnicity

Scale	Ethnicity	Mean*	Standard Deviation	t-value	Significance (<.05) 2-tailed
Personal	Minority	3.2548	.6996	1.463	.146
Career	Non-Minority	3.4429	.7681		
Agricultural	Minority	3.4470	.6275	2.689	.008
Occupational	Non-Minority	3.7592	.6975		
Occupational	Minority	3.2473	.5850	.343	.732
Requirements	Non-Minority	3.2857	.6881		

Note: *1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

For all three scales in Part IV of the survey, non-minority students had higher overall mean scores than minority students. In general, both groups had positive opinions about agriculture. The occupational requirements scale had the only significant mean scores

between the groups. This indicated that non-minority students had more positive opinions on occupations in agriculture and the scope of the agriculture industry than minority students. The occupations in agriculture scale yielded the highest means for both groups, while the occupational requirements scale yielded the lowest mean between both groups. This could indicate that although both groups of students may know the opportunities that exist in agriculture, they may not be on the same track in regards to what is required of them to pursue those jobs in agriculture.

Conclusions

The following conclusions were formulated based on the results of the study:

1. The population of the study was diverse in ethnicity and gender while the majority of all students had not been members or previous members of 4-H.
2. There were few significant differences between minority and non-minority students enrolled in a ninth grade English or homeroom class for enrollment decisions in an agricultural education class.
3. Both minority and non-minority students' parents had similar education levels, and both groups resided in similar situations.
4. The majority of the students still had positive perceptions of agriculture regardless of whether or not they had enrolled in an agricultural education class.
5. Both groups of students were likely to enroll in an agricultural education class for reasons of disavowance.
6. Both groups of students were more likely to enroll in an agricultural class because they believed it would benefit them in life, and prepare them for an agricultural career.
7. Both groups disagreed with the statements used to measure barriers to enrolling in an agricultural class.
8. Influential persons were the least motivating factor for students to enroll in an agricultural education class. This finding counters Super's (1957, 1963) conclusions. Super's studies stated that role models, especially same gender parents, exert a great influence on the career decision process.
9. Both groups of students had positive opinions about agriculture and its related fields, but the majority of the students were less confident in their knowledge about how to prepare for those careers.

Recommendations

Based on the findings of this study, the following recommendations were developed:

1. By the ninth grade, adolescents seem to already have a solid view of their image about agriculture. Because of this, early inclusion of an agricultural course, possibly at the junior high level, should be implemented to broaden students' perceptions of agriculture and its related fields.

2. Because minority and non-minority students were aware of the many occupations in agriculture but less confident about how to prepare for an agricultural career, agricultural instructors, along with other teachers in the school, should collaborate and implement some form of instruction that could be used as a tool to inform students on what requirements they would need in order to pursue a particular field in agriculture or a related field.
3. Because of the low overall mean scores in Part III, Barriers to Enrolling, qualitative studies should be conducted to determine why there are low percentages of students in agricultural education classes.
4. Because both minority and non-minority students were more likely to enroll in an agricultural education class for "disavowance" reasons, counselors should discourage students from enrolling in agricultural education classes for reasons other than the intended purposes of the class.
5. Studies similar to this one should be conducted with more minority and non-minority students in different demographical and educational settings. For instance, this study should be replicated at schools that are located in large urban areas, possibly at the sixth grade level.

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Impact of an Introductory Agriscience Technology Course in Developing Applied Skills Using Information Technologies

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Abstract

The purpose of this study was to determine if students in an Agricultural and Environmental Science and Technology (AEST) program developed more skill using information technology after being enrolled in an introductory agriscience technology course. Furthermore, this study sought to determine if students who were enrolled in either a biology or business course developed more skill using information technology after being enrolled in their respective course. The population for the study consisted of 1,312 secondary students enrolled 14 AEST programs and 14 Biology/Business programs from all geographical areas of the state. By the end of the school year, students had more skill using e-mail, preparing a spreadsheet, preparing a multimedia presentation, preparing a graphic design, using a digital camera, using a Global Positioning System, making a purchase using the Internet, using a scanner, operating a CD burner, and troubleshooting/accessing technical help. More specifically, AEST students also had more skill at the end of the year using educational software and installing new programs on a computer. It is unclear as to whether being enrolled in a course using information technologies on a daily basis actually helps students become more skilled with information technologies. Because many of the skills used in this study were commonplace, additional research needs to be conducted to identify appropriate information technology skills as it relates to agriculture.

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Introduction and Conceptual Framework

Information Technology (IT) is a concept describing all aspects of managing and processing information. Specifically, information technology can be defined as the "study, design, development, implementation, support or management of computer-based information systems, particularly software applications and computer hardware" (Office of Technology Policy, n.d., p. 5). IT careers are based on computer technologies, the Internet, and networks concerned with creating, analyzing and accessing data for decision-making and problem solving. Information tools, such as personal computers and the Internet, are increasingly critical to economic success and personal advancement. Many IT workers design, develop, support and/or manage IT systems found in careers related to agriculture. These applications range from record keeping to making management decisions about fertilizer and pesticide applications, developing livestock breeding programs and using Global Positioning Systems (GPS).

Information Technology Application Skills

The U. S. Department of Education developed the National Educational Technology Plan *eLearning: Putting a World-Class Education at the Fingertips of All Children* (Rivero, 2000). The plan's goals included providing all students and teachers with access to information technology in the classroom, schools, communities and homes. This report also indicated that all students will have technology and information literacy skills. However, many communities face a number of challenges to becoming savvy with information technologies.

The Office of Technology Policy (OTP) identified factors affecting the supply and quality of IT workers, which included a poor image of the IT profession, lack of career information and encouragement for students, a need for increased competency in math and science, challenges in the IT teaching infrastructure, and a failure to attract underrepresented groups to the IT profession (Meares & Sargent, 1999). The OTP report encouraged educators to provide K-12 students with information about science and technology careers, their rewards, and what education and training are necessary to pursue them (Meares & Sargent, 1999). Agricultural and Environmental Science and Technology (AEST) programs—IT based curricula—are attempting to foster students' IT career path decisions as they relate to using information and computer technologies for today's food and fiber production. At the core of this issue is determining the IT perspectives of secondary students concerning their perceived level of applied information technology skills.

Information technology research has shown that a complex pattern of factors affect a student's performance, learning, and motivation in the classroom (Naughton, 1986). These factors include the subject matter being learned, instructional design concepts to include methods and techniques, information technology equipment and tools available, and contextual locations for learning. Furthermore, Atkinson (1999) indicated that the relationships between these complex factors and those attributes that students bring with

them, such as curriculum experience, knowledge base and personal goals, cannot be underestimated.

The application of information technology skills has progressed beyond drill and practice software (Kosakowski, 1998). Students must be actively involved in learning and work cooperatively on projects that integrate technology. When asked what skills do you think are necessary for an information technology career, keyboarding and computer skills and programming are the overwhelming choice of both boys and girls (Gupta & Houtz, 2000). Possessing good math skills rated near the bottom of the list.

Information Technology Skills Needed by IT Workers

The Assessment and Qualifications Alliance (2002) identified four different levels of information technology skills needed by IT workers. Level 1 skills included such things as finding and selecting relevant information, using different formats to help find and select relevant information, and presenting information in an accurate and clear manner. Level 2 skills included such things as identifying information from suitable sources, conducting effective searches for information, and selecting information relevant to your purpose (educational or occupational). Examples of Level 3 skills needed by IT workers included making judgments regarding the relevance and quality of information selected, using effective methods to exchange information to support your purpose, and presenting information in a format and style that suits your purpose and audience. The last level, Level 4, wants individuals developing strategies for using IT skills over a long period of time, monitoring their progress and adapting their strategy to achieve quality outcomes, and evaluating your overall strategy as it related to the outcomes of your work. The Assessment and Qualifications Alliance recommended that individuals create and submit a portfolio to document evidence of having successfully met the requirements to possess information technology skills.

Agricultural and Environmental Science and Technology Programs

AEST is an educational program that introduces students to new technologies and instructional areas leading to careers in related industries. The AEST curriculum is designed to provide students with a knowledge base in areas such as agricultural production, food processing, plant genetics, environmental stewardship, and international trade. Each subject matter area is supported by a variety of information technologies required for accessing, analyzing, and problem solving. For example, the *Concepts of Agriscience Technology* course introduces students to the sciences, technologies, and applied practices of the progressive agriculture/ agriscience industry. Emphasis is on an active learning environment enriched with technology and science based applications. The course serves as the entry-level course for the other courses in the AEST curriculum. The course consists of 13 units taught using computer modules and activities. Students use the computers for obtaining instructional content, journaling, accessing World Wide Web sources, and submitting unit

evaluations. Computers are used daily as an integral component of the instructional program. Each unit explores current and emerging trends, technologies, and career opportunities associated with that unit. These programs are located in all areas of the state, both urban and rural areas, and have a significant percentage of females and minority students enrolled in the courses.

School programs and relevant courses in these programs have to assume the responsibility of making sure students have the requisite information technology skills needed to enter and succeed in the workforce. As much as information technologies are being used in agriculture today, such programs must prepare students with not only the knowledge, but skill in using information technologies in relevant agricultural applications. What impact does enrolling in a specific agriculture course have on students' development of information technology skills needed to be successful in information technology careers? It is hoped that daily use of such technologies will help students improve their information technology skills, helping make them savvy to enter the IT workforce and apply their skills in an agricultural setting.

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Purpose and Objectives

The purpose of this study was to determine if students in an Agricultural and Environmental Science and Technology (AEST) program developed more information technology skills after being enrolled in an introductory agriscience technology course. Furthermore, this study sought to determine if students who were enrolled in either a biology or business course developed more information technology skills after being enrolled in their respective course. Specifically, the objectives of this study were:

1. To identify students' self-perceived skill levels using information technologies at the beginning of the school year.
2. To identify students' self-perceived skill levels using information technologies at the end of the school year.
3. To determine if students developed more skills using information technology from the beginning of the school year to the end of the school year.
4. To determine if AEST students developed more skills using information technology from the beginning of the school year to the end of the school year
5. To determine if biology/business students developed more skill using information technology from the beginning of the school year to the end of the school year

Methods and Procedures

The population for the study consisted of 1,312 secondary students enrolled in either an Agricultural and Environmental Science and Technology (AEST) program (N = 14) or a Biology/Business program (N = 14) from all geographical areas of Mississippi. Biology/business programs were used as a comparison group because such programs taught similar science and technological content or technological skills as did the AEST programs.

Biology/business programs selected for the study were from schools that did not have an AEST program.

Data were collected through a questionnaire developed by the researchers. The questionnaire consisted of six parts. The part of the questionnaire used to collect data on students' self perceived skills level using information technologies consisted of 32 skills. Students rated the 32 skills on a Likert-type scale as having (1) No Skill, (2) Few Skills, (3) Some Skills or (4) Many Skills to assess students' self-perceived skill level.

AEST and biology/business teachers agreeing to allow their classes to participate in the project checked the questionnaire for content validity. Teachers reviewed and edited the proposed instrument. Teachers also added and/or deleted items, recommended more appropriate wording, and suggested an appropriate instrument format. Final decisions were made by group consensus. Teachers also recommended procedures for data collection and suggested placing survey instruments on-line to expedite the data collection process. Face validity and reliability of this part of the questionnaire were determined though a pilot test on state officer candidates attending the state FFA convention and re-administered at the state leadership conference. A test-retest reliability coefficient measuring .66 for this section of the instrument was calculated. Even though the reliability coefficient was low, such reliability coefficients are acceptable according to the recommendations by Nunnally and Bernstein (1994) for instruments that are developed and used for the first time.

Teachers were instructed to collect data at the beginning of the school year between September 10 and September 21, 2001. Schools on block scheduling also collected data again in January 2002 for new students enrolling the respective AEST/biology/business courses. Teachers were instructed to collect data at the end of the school year between April 1 and April 19, 2002. Schools on block scheduling also collected data again in December 2001 for students completing the course at the end of the semester. Seventeen of the 28 teachers utilized the online instruments and had their students complete the instruments on-line. The remaining 11 teachers were supplied with scanable instruments for data collection. AEST teachers surveyed all students enrolled in the Concepts of Agriscience Technology course while biology/business teachers surveyed introductory classes made up of 9^{th} and 10^{th} grade students.

Data were summarized using descriptive statistics. Frequencies and percentages were used to describe demographic characteristics and the self-perceived skill level of students using information technologies. McNemar's Chi Square was used to determine if students' self-perceived skill levels using information technologies changed from the beginning of the school year to the end of the school year. McNemar's Chi Square is similar to a correlated-samples t-test that compares two sets of data from a single group in a pre/post test sense (Huck, 2000). This test is used to test the homogeneity of proportions within a group. Alpha levels were set a $p = .05$ a priority.

Findings

A census of 1,312 secondary students from 14 AEST programs and 14 biology/business programs in Mississippi were surveyed. From the population, 1,196 students completed the survey instrument at the beginning of the school year or semester, yielding a 91 percent response rate. At the beginning of the school year, 52 percent of those who responded to the instrument were male while 48 percent of the respondents were female. The majority of those who responded were 9th graders (53 percent) and 32 percent were 10th graders. Another 10 percent were in the 11th grade with only 5 percent in the 12th grade. Caucasians comprised 55 percent of the participants while African Americans comprised 42 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 3 percent.

At the end of the school year or semester, 808 students completed the survey instrument for a response rate of 62 percent. At the end of the school year, 50 percent of those who responded to the instrument were female while 50 percent of the respondents were male. The majority of those who participated were 9th graders (52 percent) and 32 percent were 10th graders. Another 12 percent were in the 11th grade with only 4 percent in the 12th grade. Caucasians comprised 52 percent of the participants while African Americans comprised 45 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining three percent.

Self Perceived Skill Level Using Applied Information Technologies: Fall 2001

Respondents indicated at the beginning of the school year their self-perceived skill level on 32 information technology skills. Their responses are presented in Table 1. Nineteen statements had a modal response category of "Many Skills." Two statements had a modal response category of "Some Skills" while two statements had a modal response category of "Few Skills." Seven statements had a modal response category of "No Skill." One statement was bimodal, having equal responses on "Few Skills" and "Some Skills."

In this discussion, only statements with modes that included 50% or more of the responses will be discussed. Students perceived they had many skills "Using the telephone" (91%), "Operating a CD player" (89%), "Operating a cassette tape recorder" (80%), "Using a cell phone" (80%), "Programming the channels on a television" (69%), "Operating the controls found in video games" (67%), "Using an electronic calculator" (64%), "Using a video camera" (53%), "Using e-mail" (51%), and "Programming a telephone answering machine" (51%). Students perceived they had no skill in "Using a Global Positioning System (GPS)" (54%).

Self Perceived Skill Level Using Applied Information Technologies: Spring *2002*

Respondents indicated at the end of the school year their self-perceived skill level on 32 information technology skills. Their responses are presented in Table 2. Twenty-one statements had a modal response category of "Many Skills." Five statements had a modal

response category of "Some Skills" while five statements had a modal response category of "No Skill." One statement was bimodal, having equal responses on "Few Skills" and "Some Skills."

In this discussion, only statements with modes that included 50% or more of the responses will be discussed. Students perceived they had many skills "Using the telephone" (86%), "Operating a CD player" (85%), "Using a cell phone" (80%), "Operating a cassette tape recorder" (78%), "Programming the channels on a television" (67%), "Operating the controls found in video games" (66%), "Using an electronic calculator" (62%), "Using a video camera" (57%), "Using e-mail" (53%), "Operating a DVD player" (52%), and "Programming a cell phone" (52%).

Differences in Students' Self-Perceived Skill Levels Using Information Technology

McNemar's Chi-Square was used to determine if students' self-perceived skill levels using information technologies changed from the beginning of the school year to the end of the school year. Students self-perceived skill levels changed significantly from the beginning of the school year to the end of the school year for the following skills: "Using e-mail" (X^2 = 11.392, p = .011), "Preparing spreadsheet using a computer" (X^2 = 11.537, p = .003), "Preparing a multimedia presentation using a computer" (X^2 = 24.775, p = .002), "Preparing a graphic design using a computer" (X^2 = 10.456, p = .020), "Writing your own software programs" (X^2 = 12.526, p < .001),"Using a digital camera" (X^2 = 11.712, p = .006), "Using a Global Positioning System" (X^2 = 6.653, p < .001), "Making a purchase using the Internet" (X^2 = 2.052, p = .024), "Sending a fax" (X^2 = 16.601, p = .006), "Using a scanner" (X^2 = 19.758, p < .001), "Programming a cell phone" (X^2 = 4.372, p = .023), "Operating a CD burner" (X^2 = 13.071, p < .001), "Programming an electronic calculator" (X^2 = 5.390, p < .001), and "Troubleshooting/accessing technical help" (X^2 = 4.372, p < .001). With all of these information technology skills, a higher proportion of students indicated that they had more skill doing at the end of the school year than they did at the beginning of the school year with each specific information technology skill.

Table 1.

Students' Self Perceived Skill Level Using Information Technology: Fall 2001 (N = 1196)

Information Technology Skill	Percentage			
	No Skill	Few Skills	Some Skills	Many Skills
Preparing documents using a computer	8	24	40	28
Using e-mail	13	13	23	51
Preparing a spreadsheet using a computer	14	30	37	19
Using educational/tutorial software	20	36	28	16
Preparing a multimedia presentation using a computer	32	30	24	14
Programming a VCR	13	15	27	45
Preparing a database using a computer	20	30	30	20
Using the telephone	2	2	5	91
Preparing a graphic design using a computer	20	32	31	17
Operating a cassette tape-recorder	4	4	12	80
Operating the controls found in video games	5	9	19	67
Programming the channels on a television	5	8	18	69
Using a video camera	5	12	30	53
Writing your own software programs	48	30	13	9
Using a digital camera	11	20	31	38
Using a Global Positioning System (GPS)	54	25	14	7
Programming a telephone answering machine	8	16	25	51
Using voice mail	21	20	23	36
Using a cell phone	2	6	12	80
Making a purchase using the Internet	19	17	28	36
Operating a DVD player	21	15	26	38
Operating a CD player	2	4	5	89
Using an electronic calculator	6	10	20	64
Sending a fax	35	25	21	19
Using a scanner	19	22	27	32
Programming a cell phone	16	17	25	42
Installing a caller ID system	19	18	23	40
Using instant messenger	20	17	19	44
Operating a CD burner	32	20	20	28

Programming an electronic calculator	36	28	18	18
Troubleshooting/accessing technical help	41	29	18	12
Installing new programs/components on a computer	28	22	20	30

Table 2.
Students' Self Perceived Skill Level Using Information Technology Skills: Spring 2002 (N = 808)

	Percentage			
Information Technology Skill	No Skills	Few Skills	Some Skills	Many Skills
Preparing documents using a computer	8	24	35	33
Using e-mail	8	14	26	53
Preparing a spreadsheet using a computer	12	25	37	26
Using educational/tutorial software	19	25	35	21
Preparing a multimedia presentation using a computer	23	28	32	18
Programming a VCR	9	18	26	47
Preparing a database using a computer	17	30	32	21
Using the telephone	2	4	8	86
Preparing a graphic design using a computer	16	31	31	22
Operating a cassette tape-recorder	3	6	14	78
Operating the controls found in video games	4	10	20	67
Programming the channels on a television	4	9	20	66
Using a video camera	4	10	29	57
Writing your own software programs	39	28	22	12
Using a digital camera	7	19	31	44
Using a Global Positioning System (GPS)	40	26	20	15
Programming a telephone answering machine	8	16	28	48
Using voice mail	16	18	27	40
Using a cell phone	2	6	13	80
Making a purchase using the Internet	14	19	24	43
Operating a DVD player	11	12	24	52
Operating a CD player	2	4	9	85
Using an electronic calculator	5	9	24	62
Sending a fax	29	22	27	21

Using a scanner	11	22	28	39
Programming a cell phone	10	14	24	52
Installing a caller ID system	15	17	24	45
Using instant messenger	13	19	20	49
Operating a CD burner	21	16	23	41
Programming an electronic calculator	29	23	22	25
Troubleshooting/accessing technical help	32	30	22	17
Installing new programs/components on a computer	24	20	26	30

Differences in Self-Perceived Skill Levels of AEST Students

McNemar's Chi Square was used to determine if AEST students' self-perceived skill levels using information technologies changed from the beginning of the school year to the end of the school year as a result of being enrolled in the Concepts of Agriscience Technology Course. Descriptive data for significant skills are reported in Table 3. AEST students self-perceived skill levels changed significantly from the beginning of the school year to the end of the school year for the following skills: "Preparing spreadsheet using a computer" (X^2 = 22.923, p = .001), "Using educational software" (X^2 = 11.673, p = .003), "Preparing a multimedia presentation using a computer" (X^2 = 28.127, p = .042), "Preparing a database" (X^2 = 4.060, p < .001), "Preparing a graphic design using a computer" (X^2 = 8.175, p = .007), "Writing your own software programs" (X^2 = 14.525, p < .001), "Using a digital camera" (X^2 = 10.769, p = .003), "Using a Global Positioning System" (X^2 = 9.064, p < .001), "Making a purchase using the Internet" (X^2 = 7.529, p = .003), "Operating a DVD player" (X^2 = 8.867, p < .001), "Sending a fax" (X^2 = 9.094, p = .007), "Using a scanner" (X^2 = 14.273, p < .001), "Using instant messenger" (X^2 = 5.797, p = .001), "Operating a CD burner" (X^2 = 13.071, p < .001), "Programming an electronic calculator" (X^2 = 5.390, p < .001), "Troubleshooting/accessing technical help" (X^2 = 4.372, p < .001), and "Installing new programs" (X^2 = 22.923, p = .001). With all of these skills, a higher proportion of AEST students indicated they had more skills doing the specific information technology skill at the end of the school year than they did at the beginning of the school year.

Differences in Self-Perceived Skill Levels of Biology/Business Students

McNemar's Chi Square was used to determine if biology/business students' self-perceived skill levels using information technologies changed from the beginning of the school year to the end of the school year as a result of skills developed in their respective courses. Descriptive data for significant skills are reported in Table 4. Biology/business students self-perceived skill levels changed significantly from the beginning of the school year to the end of the school year for the following skills: "Preparing a multimedia presentation using a computer" (X^2 = 28.127, p = .042), "Operating a DVD player" (X^2 =

4.060, $p < .001$), "Using a scanner" ($X^2 = 14.273$, $p < .001$), and "Operating a CD burner" ($X^2 = 13.071$, $p < .001$). With all of these skills, a higher proportion of biology/business students indicated they had more skills doing the specific information technology skill at the end of the year than they did at the beginning of the year.

Table 3.
Differences Between AEST Students Self Perceived Skill Levels

		Percentage					
Information Technology Skill	n	NS	FS	SS	MS	X^2	p
Preparing a spreadsheet using a computer	611 346	17 14	29 25	37 33	18 28	22.923	.001
Using educational/tutorial software	611 346	22 20	38 22	27 35	14 23	11.673	.003
Preparing a multimedia presentation using a computer	611 346	32 24	32 26	21 31	15 18	28.127	.042
Preparing a database using a computer	611 346	25 17	29 30	30 31	16 22	4.060	<.001
Preparing a graphic design using a computer	611 346	21 14	33 28	30 35	16 23	8.715	.007
Writing your own software programs	611 346	48 34	31 26	12 24	9 15	14.525	<.001
Using a digital camera	611 346	12 6	20 18	31 29	37 47	10.769	.003
Using a Global Positioning System (GPS)	611 346	55 33	24 24	13 25	8 18	9.064	<.001
Making an purchase using the Internet	611 346	21 14	18 18	31 22	31 46	7.529	.003
Operating a DVD player	611 346	22 14	15 18	28 22	35 46	8.867	<.001
Sending a fax	611 346	37 30	21 21	21 27	22 22	9.094	.017
Using a scanner	611 346	20 11	19 21	27 27	35 47	14.273	<.001

Using instant messenger	611	22	15	22	41	5.797	.019
	346	13	17	21	49		
Operating a CD burner	611	31	22	20	28	17.309	.001
	346	19	14	22	44		
Programming an electronic calculator	611	37	28	18	17	5.990	<.001
	346	27	20	23	29		
Troubleshooting/accessing technical help	611	41	32	18	10	6.409	<.001
	346	27	30	25	19		
Installing new programs components on a computer	611	30	20	18	32	15.892	.017
	346	23	20	24	33		

Note: [a] NS = No Skill, FS = Few Skills, SS = Some Skills, MS = Many Skills
N = 611 represents number of respondents at the beginning of the school year, N = 346 represents number of respondents at the end of the school year.

Table 4.
Differences in Self-Perceived Skill Levels of Biology/Business Students

		Percentage					
Information Technology Skill	n	NS	FS	SS	MS	X^2	p
Preparing a multimedia presentation using a computer	585	33	27	26	14	7.353	.025
	462	22	29	32	17		
Operating a DVD player	585	20	16	24	41	6.782	<.001
	462	9	11	26	53		
Using a scanner	585	18	25	27	31	18.571	.01
	462	11	24	28	38		
Operating a CD burner	585	33	19	19	29	7.493	.002
	462	22	18	23	38		

Note: [a] NS = No Skill, FS = Few Skills, SS = Some Skills, MS = Many Skills
N = 585 represents number of respondents at the beginning of the school year, N = 462 represents number of respondents at the end of the school year.

Conclusions and Recommendations

Overall, students perceived that they had many information technology skills. Students were skilled at using e-mail, using the telephone, operating a cassette recorder, using a video camera, using a cell phone, and operating a CD player. Students had no skill in using a Global Positioning System (GPS). Towards the end of the school year, students had

a more skill in using a GPS system while remaining stable in the skill level on the other information technology skills.

Being enrolled in an introductory agriscience technology course did help AEST students improve their skill level on many information technology skills. These students were more skilled at the end of the school year preparing spreadsheets, using educational software, preparing multimedia presentations, preparing databases, preparing graphic designs, using digital cameras, making Internet purchases, operating DVD players, using scanners, operating CD burners, troubleshooting/accessing technical help, and installing new programs. Biology/business students only increased their skill level in preparing multimedia presentations, operating DVD players, using scanners, and operating CD burners.

While it does appear that being enrolled in an introductory agriscience technology course does improve agriscience students' skill levels in information technology, one must also be aware of the skills that are being developed. Many of the skills students responded to are commonplace today in society. If educational programs are to truly prepare students with the information technology skills needed for the workforce in the future, educators must plan and design programs incorporating the information technology skills identified by the Assessment and Qualifications Alliance (2002). Curricula and learning activities focusing on the application of information technology skills in agriculture must reflect these skills. The researchers recommend a review of the AEST curriculum in order to incorporate more of these applied information technology skills as defined by the Assessment and Qualifications Alliance (2002) into the instructional materials.

Even though it may appear that students enrolled in the AEST program may be developing more skills as a result of the curriculum they are completing, are AEST students developing their skills through that introductory agriscience technology course, or are their other factors influencing their skill development? Many of the skills identified on this research are commonplace and do not reflect with business and industry is looking for in their workers. Future research studies looking at information technology skills should reflect the actual information technology skills needed in today's industries, especially in agriculture. Such skills needed by the agricultural industry, as identified through appropriate research studies, can help educators plan appropriate program addressing the information technology skills needed by its workers. Additional research also needs to be conducted to control for possible extraneous factors that might influence students' information technology skill development.

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Assessing Agriculture Teachers' Capacity for Teaching Science Integrated Process Skills

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Abstract

Since the release of the National Research Council's (1988) report, research in agricultural education has examined a variety of aspects of the professions' propensity for, and attitudes toward integrating scientific concepts in agriculture. Yet, after 15 years of research on the topic, little has been shown empirically regarding agriculture teachers' knowledge or ability to teach using a science as inquiry approach. This study was conducted to establish a base level of information of agriculture teachers' knowledge and ability in scientific integrated process skills. A secondary purpose was to determine the influence of selected teacher variables on science integrated process skills. Bandura's (1997) self-efficacy theory formed the theoretical framework for the study. Okey and Dillashaw's (1980) Test of Integrated Process Skills was used to measure the knowledge of basic science concepts among 40 purposively sampled teachers of agriculture. The results indicated that irrespective of learning style, years of teaching experience, area of teacher certification, or gender, agriculture teachers possess a solid background knowledge in the integrated process skills espoused by science educators to be essential to effective science instruction. Implications for future research and recommendations for professional practice are included.

Introduction

In its report, *Understanding agriculture: New directions for education* (National Research Council, 1988), the Committee on Agricultural Education in Secondary Schools called for the expansion of agricultural education curriculum to include scientific subject matter. This expansion was not a call to completely abandon agricultural education's vocational past, but rather the report called for the "teaching of science through agriculture" (p. 5). Fifteen years later, in an era of high stakes testing and public accountability mandates for educational funding, Agricultural Education is finding itself in a critical position to prove its value. The future of agricultural education in the schools may rest on the need for empirical evidence to verify how agricultural education assists in student development in science and other academic subject areas.

An increased emphasis on integrated science in agricultural education is not solely a response to political pressure. The scientific literacy needs of individuals entering careers in agriculture are increasing in importance. Employees in today's job market need to know how to learn, reason, think creatively, make decisions, and solve problems. Science education and agriscience education can contribute in an essential way to the development of these skills in agricultural education students (National Academy of Science, 1996).

One response of the agricultural education profession has been to offer school graduation credit in science for agricultural education coursework. In a national study of agriculture teachers, Dormody (1993) found that 34% taught agriculture courses for science credit during the 1990-91 academic year. In 1995, Conners and Elliot recommended that "Local school boards should study the possibility of offering science credit for agriscience and natural resource classes that contain a significant amount of science objectives" (p. 62). While the trend to offer science credit for agriculture courses has grown steadily, Enderlin and Osborne's (1992, p. 43) caution is noteworthy; "In order for students to receive quality science instruction from an agriculture course taught by an agriculture instructor, a systematic statewide effort must be made to develop scientifically literate secondary agriculture instructors who are competent in inquiry learning techniques in science."

Although the need for an expanded science emphasis in the agricultural education curriculum is generally agreed upon, the ability of current agricultural educators to meet this challenge has not yet been fully examined. Chiasson and Burnett (2001) found that Louisiana agriscience students scored significantly higher on the science portions of the 11th grade state standardized test than did non-agriscience students. These findings would suggest that agriscience teachers in Louisiana have the capacity to help students make meaningful connections between agricultural and scientific concepts. Additional studies have examined the training agriscience teachers have received to prepare them to integrate scientific concepts (Thompson & Schumacher, 1998; Thompson & Balschweid, 2000; Johnson, 1996). The majority of studies in the area of agriscience however, have examined only teacher attitudes and perceptions toward science integration (Balschweid & Thompson, 1999; Connors & Elliot, 1994; Dyer & Osborne, 1999; Layfield, Minor, & Waldvogel, 2001; Newman & Johnson, 1993; Peasley & Henderson, 1992; Thompson, 1998; Thompson &

Balschweid, 1999; Welton, Harbstreit, & Borchers, 1994). Although attitudes and perceptions are important, one and a half decades after the National Council's call, the time is ripe for further investigation into agriculture teacher's capacity to deliver quality science based instruction.

Conceptual/Theoretical Framework

As the agricultural education profession works to expand its research base regarding teacher capacity to deliver scientific concepts effectively, the work completed in this area by our colleagues in science education should be examined. The science education literature states that shifting to an emphasis of active science learning requires a shift away from traditional teaching methods (National Academy of Science, 1996). The report by the American Association for the Advancement of Science (AAAS) titled *Science for All Americans* (1990) emphasized that the teaching of scientific concepts should be consistent with the nature of scientific inquiry. Furthermore, the *National Science Education Standards* (National Academy of Science, 1996) state that inquiry is central to learning science.

The process skill approach (Chiappetta & Koballa, 2002), a commonplace method in the science education literature, could be employed by agriculture teachers in the effort to teach science as inquiry. This approach focuses on teaching broadly transferable abilities that are appropriate to many science disciplines and are reflective of the behavior of scientists (Padilla, 1990). Chiappetta (1997) states, "the acquisition and frequent use of these skills can better equip students to solve problems, learn on their own, and appreciate science" (p. 24). The science process skills can be classified as either basic or integrated (see Table 1). The basic science process skills are designed to provide a foundation for learning the more complex integrated science process skills (Padilla, 1990). Examples of integrated science process skills include skills such as formulating hypotheses, operationally defining, controlling, and manipulating variables, planning investigations, and interpreting data (Livermore, 1964).

The study was framed theoretically on Bandura's Theory of Self-Efficacy (1997). Self-efficacy is a person's beliefs concerning their capabilities to organize and implement actions necessary to learn or perform behaviors at designated levels. Although a person's beliefs about their capabilities are not the same as their actual ability, they are closely related. If a person has a low self-efficacy regarding a certain task or concept, their performance in that area is expected to be low (Bandura, 1997). Conversely speaking, higher ability levels would tend to increase self-efficacy levels and as a result increase the level of performance.

A review of literature failed to identify research that has investigated the competency level of agriculture teachers in the area of integrated science process skill. This information is needed in order to better assess the capability of secondary school teachers of agriculture to integrate science content into the agricultural education curriculum. The findings from this study could be utilized by both university agriculture teacher educators and by state staff in agricultural education in the development of professional development activities regarding agriscience skill development.

Table 1.
Basic and Integrated Science Process Skills

Process Skill	Definition
Basic Skills	
Observing	Noting the properties of objects and situations using the five senses
Classifying	Relating objects and events according to their properties or attributes
Space/time relations	Visualizing and manipulating objects and events, dealing with shapes, time, distance, and speed
Using numbers	Using quantitative relationships
Measuring	Expressing the amount of an object or substance in quantitative terms
Inferring	Giving an explanation for a particular object or event
Predicting	Forecasting a future occurrence based on past observation or the extension of data
Integrated Skills	
Defining operationally	Developing statements that present concrete descriptions of an object or event by telling one what to do or observe
Formulating models	Constructing images, objects, or mathematical formulas to explain ideas
Controlling variables	Manipulating and controlling properties that relate to situations or events for the purpose of determining causation
Interpreting data	Arriving at explanations, inferences, or hypotheses from data that have been graphed or placed in a table
Hypothesizing	Stating a tentative generalization of observations or inferences that may be used to explain a relatively larger number of events but that is subject to immediate or eventual testing by one or more experiments
Experimenting	Testing a hypothesis through the manipulation and control of independent variables and noting the effects on a dependent variable; interpreting and presenting results in the form of a report that others can follow to replicate the experiment

Note: From Chiappetta, E. L., & Koballa, T. R., Jr. (2002). *Science instruction in the middle and secondary schools* (5th ed.). Upper Saddle River, N.J: Merrill Prentice Hall.

Purpose and Objectives

The primary purpose of the study was to establish a base level of information of agriculture teachers' knowledge and ability in scientific integrated process skills. The specific objectives guiding the study were to:

1. Assess and describe in-service agriculture teachers' knowledge level of integrated process skills.
2. Determine the influence of learning style on integrated process skill.

3. Determine the influence of number of years of teaching experience on integrated process skill.
4. Compare integrated process skill to area of teacher certification (agriculture or science).
5. Determine the influence of gender on integrated process skill.

Procedures

The population for this study was composed of middle school and high school agriculture teachers in a state offering an agriscience course to freshmen students. An accessible sample consisting of all agriculture teachers (n=40) who participated in one of three, two-day regional workshops titled "Integrating Science Skills in Agriculture" was used.

Three instruments were utilized for data collection. Okey and Dillashaw's Test of Integrated Process Skills (TIPS) (1980) was administered at the beginning of the workshop. The TIPS instrument is a 36 question, multiple-choice exam developed to measure integrated process skills of secondary students along five objectives. Objectives addressed by the TIPS instrument included: identifying variables, identifying and stating hypotheses, operationally defining, designing investigations, and graphing and interpreting data. Reliability of the TIPS instrument was established by the authors (Dillashaw and Okey) and reported to be 0.89 (Cronbach's α).

A second instrument, the Gregorc Style Delineator (Gregorc, 1982a) was administered to assess the preferred learning styles of each teacher. The Gregorc instrument separates learning styles into combinations of four categories: Concrete Sequential, Concrete Random, Abstract Sequential, and Abstract Random. Scores of 26 or higher indicate a general preferred learning style in a particular category. Individuals may exhibit preferences in one or more categories, or may not exhibit a preference for any of the categories.

The Gregorc Style Delineator is a standardized instrument that has been used in educational research for approximately 20 years (Gregorc, 1982a). The developer of the instrument established validity and reliability of the Delineator. Gregorc (1982b) reported internal consistency using standardized alphas ranging from .89 to .93. Stability was reported using test-retest correlation coefficients ranging from .85 to .88.

Additional data relevant to the study were collected from teachers' responses on a researcher-developed instrument designed to collect demographic data, including years of teaching experience, gender, and primary teaching certification area. According to Campbell and Stanley (1963), reliability is not a threat on items ascertaining demographic information. Validity on the demographic instrument was determined using an expert panel of university agricultural education faculty, state agricultural education staff, and middle school and high school teachers. Usable responses were gathered from 38 teachers, for a response rate of 95%.

Findings

The first objective was to assess and describe in-service agriculture teachers' knowledge level of integrated process skills. This objective was addressed by assessing agriculture teachers' knowledge level on the five objectives addressed by the TIPS instrument (Okey and Dillashaw, 1980). Descriptive statistics were analyzed for the total exam as well as by objective. Results are presented in Table 2.

The mean overall score out of 36 total points possible on the TIPS instrument was 29, or 89% correct, with a range from 24 to 33 correct responses. Analysis of the results by objective reveals that agriculture teachers in the sample performed best on the objectives "designing investigations" and "identifying and stating hypotheses." The objective "graphing and interpreting data" had a mean correct response of four out of six possible questions, a 67% correct response rate.

Table 2.
Mean TIPS Scores by Objective (n = 38)

Objective	Total Possible	Minimum Correct	Maximum Correct	Mean Correct	S.D.	Percent Correct
Identifying variables	12	6	12	9.76	1.87	81.3
Identifying and stating hypotheses	9	6	9	7.89	0.95	87.7
Operationally defining	6	3	6	4.92	0.91	82.0
Designing investigations	3	1	3	2.66	0.53	88.7
Graphing and interpreting data	6	2	6	4.03	0.85	67.2
Total score	36	24	33	29.26	2.66	88.7

The second objective was to determine the influence of learning styles on integrated process skill. Teachers' learning styles were assessed using the Gregorc Style Delineator (Gregorc, 1982a). Differences among TIPS total score and learning style (as delineated by Gregorc's instrument) were determined using one-way analysis of variance using a .05 alpha level determined a priori. No significant differences were found between TIPS score and learning style. Results are presented in Table 3.

Table 3.
Analysis of Variance for TIPS Score by Learning Style

Learning Style	*df*	*F*	ρ
Concrete Sequential	9	1.55	.18
Abstract Sequential	9	0.43	.91
Abstract Random	9	0.56	.82
Concrete Random	9	0.51	.86

The third objective was to determine the influence of number of years of teaching experience on integrated process skill. Years of teaching experience was self-reported by research participants. Teachers were assigned to one of four categories based on years of experience as follows: zero to three years, four to nine years, ten to fourteen years and fifteen

to thirty years. Differences among TIPS total score and years of teaching experience were determined using a one-way analysis of variance using a .05 alpha level. As indicated in Table 4, no significant differences were found between TIPS score and years of teaching experience.

Table 4.
Analysis of Variance for TIPS Score by Years of Teaching Experience

Years of Experience	*df*	*F*	ρ
0 – 3	9	0.84	.58
4 – 9	9	0.94	.51
10-14	9	0.48	.87
15-30	9	1.52	.19

The fourth objective sought to compare integrated process skill to area of teacher certification (agriculture or science). Five of the study participants reported holding their primary teaching certificate in science education, and the remaining 33 were certified in agriculture. At the time of the study, all study participants were employed as full time teachers of agriculture. Results of a *t* test revealed no significant difference at the .05 alpha level, $\rho = .10$, in TIPS scores based on area of teaching certification.

The fifth and final objective was to describe the influence of gender on integrated process skill. Analysis of *t* test results revealed no significant difference in TIPS scores based on gender at the .05 alpha level, $\rho = .13$.

Conclusions

Science integrated process skills have been identified in the science education literature as an effective inquiry method of teaching science. While agricultural education has made the claim for years that science is an integrated component of agricultural education, few studies have examined agriculture teachers' level of scientific knowledge or their capacity for teaching scientific concepts. The primary purpose of the study was to establish a base level of information of agriculture teachers' knowledge and ability in scientific integrated process skills. A secondary purpose was to determine the influence of selected teacher variables on science integrated process skills.

The purposive sample of this study provided data on agriculture teachers with an expressed interest in integrating science into agriculture in their instruction. These teachers responded correctly to 89% of the questions on the Test of Integrated Process Skills and thereby exhibited a positive level of ability in integrated science knowledge. The conclusion can be drawn that either in their preparation, or in their professional development, the teachers in this study have acquired the requisite knowledge to perform and apply integrated process skills. While data are not available for a comparable cohort of science teachers, the findings of this study would suggest that the study participants have the knowledge required to instruct their students in the integrated process skills.

Based on what is known about learning styles (Gregorc, 1982a), one would assume that dominant concrete sequential and concrete random learners, as problem oriented people, would perform more proficiently in scientific concepts than would abstract random or concrete random learners. The findings of this study do not support this assumption. This could be the result of the relatively small degree of variance and the relatively high TIPS scores. Another possible conclusion is that individuals who perform well in science-related areas are drawn to agriculture due to the natural relationship between science and agriculture.

Anecdotal evidence would suggest that more recent college graduates would exhibit a higher level of proficiency in integrated science process skills than individuals further removed from the formal application of such skills in a college setting. Among the group of teachers in this study, no significant differences were found based on number of years of teaching experience. It can therefore be concluded that teachers in this study have either retained knowledge gained during their formal education, or that they have acquired and use knowledge of integrated process skills on a more regular basis.

Five of the teachers involved in the study earned their teaching certification in science before securing positions as teachers of agriculture. The remaining 33 held their primary teaching certificate in agriculture. In this time of nationwide shortages of agriculture teachers, this phenomenon is not unique. Often concern is expressed as to the level of preparedness of secondary area certification teachers to offer courses in agriculture. Conversely, members of the science education community can be skeptical of the preparation of agriculture teachers to offer science credit for agriscience courses. Using integrated process skill as the measure, no differences appear to exist between the two groups. The conclusion can be reached that teachers certified in both science and agriculture have the propensity for teaching science as inquiry, as measured by the Test of Integrated Process Skills.

Although anecdotal evidence suggests that males have a higher level of achievement in science-related areas than do females, this study did not support that assertion. Based upon the TIPS scores of the 15 females and 23 males who participated in the study, it can be concluded that no differences exist in integrated science process skills based upon the gender of the teachers.

Irrespective of learning style, years of teaching experience, area of teacher certification (science or agriculture), or gender, and based upon the results of this study, it can be concluded that agriculture teachers in this study possess a solid foundation in the integrated process skills espoused to be essential to effective science instruction.

Implications

Since the release of the National Research Council's (1988) report, *Understanding Agriculture: New Directions for Education,* research in agricultural education has examined a variety of aspects of the professions' propensity for, and attitudes toward integrating scientific concepts in agriculture. Yet, after 15 years of research on the topic, little has been

shown empirically regarding agriculture teachers' knowledge or ability to teach using a science as inquiry approach. This study was conducted in an attempt to begin an examination of a seldom-researched phenomenon.

The implications of the study are primarily for further research as the sample size and purposive nature of the sample studied prohibit generalization of the findings beyond the sample. Nevertheless, the study verified that agriculture teachers with an expressed interest in science have appropriate levels of knowledge to teach scientific concepts. The research base strongly supports a positive attitude within the profession toward the integration of science in agriculture (Balschweid & Thompson, 1999; Connors & Elliot, 1994; Dyer & Osborne, 1999; Layfield, Minor, & Waldvogel, 2001; Newman & Johnson, 1993; Peasley & Henderson, 1992; Thompson, 1998; Thompson & Balschweid, 1999; Welton, Harbstreit, & Borchers, 1994). Bandura's theory of self-efficacy suggests that interest and knowledge are likely indicators for positive performance. Future research is warranted to determine whether the theory is supported relative to integrated science in agriculture.

Additional research along these lines has the potential to support or refute the continuation of the trend to offer agriculture courses for science credit. Furthermore, questions related to science teachers offering agriculture courses for science credit are increasing in frequency. This study neither supports nor denies the notion that teachers trained in science or agriculture are capable of teaching in areas outside their primary certification area. Additional inquiry into the frequency of teacher application of these concepts in teaching situations would further develop the knowledge base relative to the appropriateness of agriculture teachers offering science credit.

Recommendations

Pre-service agriculture teacher preparation programs are in a unique position to contribute to the science concept knowledge and performance of agriculture teachers. If not already being done, effective science instruction methods should be infused into agriculture teaching methods courses as a way to bolster the scientific rigor of future agriculture teachers and simply to enhance their effectiveness.

In areas where science credit for agriscience courses is common, in-service teacher education programming should emphasize the importance of integrated process skills in the infusion of science into agriculture. Furthermore, agriculture teachers offering science credit should be equipped with the latest information regarding outcomes measured on standardized exams in science and encouraged to infuse those outcomes into their curricula.

Agriscience curriculum development projects should reflect accurate and appropriate scientific concepts to provide the theoretical reinforcement for agricultural concepts. In addition, curricular activities should promote active learning that incorporates integrated process skills into the daily routine of agricultural education students.

Generalization of these findings is limited because of the clinical nature of this study and the small purposive, accessible sample. Further research is needed to understand the phenomena under study and to attempt generalization through replication of findings.

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Informal Learning in Science: Does Agricultural Education Have a Role?

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Abstract

This study examined what science education researchers report about informal learning in science and its relationship to students' science achievement. Aspects of secondary agricultural education that may support students' informal learning in science were also described. Two components of secondary agricultural education, integral to the delivery of a comprehensive program, hold high potential for supporting students' informal learning in science: Supervised Agricultural Experience (SAE) and FFA. Agriculture teachers are encouraged to increase their commitment toward planning, designing, and delivering learning experiences that afford students substantial opportunities to acquire and apply scientific knowledge and understandings in the contexts of agriculture, food, fiber, and natural resources. Related professional development opportunities for agriculture teachers should be planned and delivered, or otherwise facilitated, that support this purpose. Moreover, in an era of scarce financial resources and "high stakes" testing, one in which student performance in core subjects is prized above all else, to merely suggest that agricultural education supports student learning in a core discipline such as science is insufficient. Empirically-based research aimed at measuring this supposition should be carried out and reported.

Introduction and Conceptual Framework

"When will we ever use that?" Or, "I'm never going to need this as an adult." These laments are often typical of students who have not made the real world connections necessary for them to cognitively place an important principle or concept into a future practical application. Moreover, while students struggle to make real world connections, society and the workplace are placing increasing demands on citizens and employees to be scientifically and technologically literate. To this end, science education scholars (Haury, 1993/2002; Haury & Rillero, 1994; National Research Council, 1996) posit that a *hands-on/minds-on* approach to learning facilitates student achievement in science.

However, other researchers (Britton, Huntley, Jacobs, & Weinberg, 1999; Parnell, 1995) have suggested that often the science taught in schools is too "abstract," and, it appears that for many students, it lacks the sufficient real world "connection" and relevant "context" necessary to be learned adequately and then applied. Consequently, many investigators (Balschweid, 2001; Bottoms & Sharpe, n.d.; Britton et al., 1999; Conroy, Trumbull, & Johnson, 1999; Glasgow, 1997; Hoachlander, 1999; Imel, 2000a; Imel, 2000b; Lake, 1994; Lynch, 2000, Maurer, 2000; Parnell, 1995; Shelley-Tolbert, Conroy, & Dailey, 2000) have concluded that it is very important to provide students with sufficient *context* while they learn.

Historically, agricultural education has been an appealing and robust authentic context in which students learned and then applied scientific laws, concepts, and principles (Conroy et al., 1999). To this end, Imel (2000b) argued that "contextual learning," i.e., learning "directly related to the life experiences or functional contexts" (p. 2) of the learner, is grounded in constructivist learning theory. Ideally, this includes learning that is rich in ample opportunities for contextualization and making real world connections through a variety of hands-on, applied learning media and experience-based activities (Conroy et al., 1999; Darling-Hammond & Falk, 1997). Secondary agricultural education, through the use of relevant curriculum delivered from a student-centered perspective by skillful teachers, has high potential for engaging students in active, hands-on/minds-on learning environments rich with opportunities for learning science.

Secondary agricultural education students are provided a plethora of learning opportunities involving the use of their time spent outside of school (Etling, 1993). For example, Supervised Agricultural Experiences (SAEs) are integral extensions of the classroom that require students to use theories and applications learned in the classroom in various real-world contexts involving the agriculture, food, fiber, and natural resources system. However, do these as well as other outside of school learning activities, that are facilitated and delivered through secondary agricultural education, include significant opportunities for informal learning in science to occur?

Purpose and Research Questions

The primary purpose of this study was to describe informal learning opportunities in agricultural education that may support student achievement in science. Accordingly, the study sought to answer four questions: 1) What is informal learning? 2) What is informal learning in science? 3) What have science education scholars suggested about the association between students' informal learning opportunities in science and their subsequent achievement? 4) What are components of secondary agricultural education that either provide or hold high potential for providing students with opportunities to learn science informally?

Procedures

Sources of data included findings, conclusions, implications, and recommendations made by theorists and practitioners about informal learning, especially as it related to student achievement in science, as well as additional sources describing components of the secondary agricultural education model supporting the same. The literature reviewed included national commission reports, articles from professional journals and magazines, books, papers from research conference presentations, on-line Internet publications, and other related resources. Studies appearing in these references were found through library system searches at a Land-Grant University and through selected on-line search engines available on the Internet. All references were subjected to internal and external criticism.

Findings

Informal Learning

The changing demographics of American society have refocused the thinking of many human development theorists regarding the potential of informal and non-school settings as significant and robust contexts for learning (Galper, 1987; McLaughlin, 2000). In support, Medrich, Roizen, Rubin, and Buckley (1982) maintained that,

> Children attend school seven hours a day, five days a week for thirty-six weeks a year.
> From the time a student begins schooling and finishes high school, each has spent approximately 11,000 hours in the classroom and 65,000 hours, sleep excluded, outside the classroom. (as cited in Gerber, Marek, & Cavallo, 1997a, p. 2)

Accordingly, Gerber et al. (1997a) opined that, "It is reasonable to assume that children may engage in autonomous learning activities during this time spent outside the classroom" (p. 2).

It may be important to note that some agricultural education researchers, e.g., Etling (1993), distinguish between "informal education" and "nonformal education," and consider the former "even less structured" and dealing "with everyday experiences which are not planned or organized (incidental learning)" (p. 73). However, Etling also maintained that

formal and nonformal education, "along with informal education, provide powerful learning opportunities which can strengthen and support one another" (p. 75). Many science education theorists and practitioners operationalize the two types of educational experiences—nonformal and informal—simply as *informal learning*. And, they assert that "the majority of students' science learning experiences actually take place outside of formal classroom settings and in informal learning environments" (Gerber, Cavallo, & Marek, 2001, p. 536).

Informal Learning in Science and Student Science Achievement

Researchers (Gerber et al., 1997a) have asserted "that enriched informal activities outside the classroom correspond to higher scientific reasoning abilities among students. Since reasoning ability is an important skill for science learning, these informal activities likely impact students' achievement in the formal classroom setting" (p. 9). Gerber et al. (1997a) also maintained that, "a wide range of school and community activities that involve students in informal learning experiences" (p. 10) should be developed, implemented, and supported. In agreement, Holloway (2002) concluded that, "Students who have the opportunity to participate in experiential, science–related extracurricular activities in a nonthreatening environment feel competent, particularly when adults are available to offer suggestions, support student inquiry, and provide enrichment activities" (p. 2).

Gerber et al. (1997a) reported findings about achievement in science associated with students' opportunities for *informal learning*, i.e., student learning in science that occurs outside of the science classroom. According to the researchers, informal learning experiences that could improve students' scientific reasoning ability include a variety of school and community activities, such as "scouting, 4-H, volunteer groups, hobby days, intramural sports, and partnership activities between the school and community resources (e.g., businesses, industries, museums, natural areas)" (p. 10). They suggested that teachers should "encourage students to become involved in extracurricular activities associated with the school and community" (p. 11). In support, Horton and Konen (1997) stated that, "Clearly, 4-H can play a role in initiating and nurturing effective science learning environments." What is more, Gerber et al. (1997a) contended that these informal learning experiences "stimulate cognitive conflict and promote social interaction" (p. 10) thus improving students' scientific reasoning abilities.

Dori and Tal (2000) extended the premise of merely "spontaneous" informal learning experiences that may support classroom-based or formalized learning in science to include a "model for combined formal and informal science learning" (p. 109) by design, i.e., a continuum of planned and connected formal—informal experiences in science education. For example, they maintained that, "STS [science-technology-society] programs often lie along the continuum between formal and informal education, as the target of learning is exposure to real-world problems" (p. 109). Further, Dori and Tal posited that, "Informal education alongside a formal one is most appropriate, as it addresses the community at large. In particular, it may enable
future adult citizens to act wisely in situations involving environmental quality" (109).

Similarly, Swick (1987) posited an "ecological approach" to learning and social development, i.e., schools, industry, and communities committed to supporting the common goal of citizens acquiring skills that will influence their surroundings in a productive manner.

McLure and McLure (2000) analyzed data collected by ACT, Inc. (American College Testing) from the nearly one million ACT-tested high school students who were members of the graduating class of 1998. Of the students completing the ACT Science Reasoning test, 920, 572 responded to questions about their "Out-of-Class Science Accomplishments" (p. 14); about one-third of the students reported one or more accomplishments. Out-of-class science accomplishments were operationalized as distinct activities, and included the following:

> "Wrote an independent paper on a scientific topic which received the highest possible grade given in my school";
>
> "Performed an independent scientific experiment (not as part of a course)";
>
> "Participated in a National Science Foundation summer program for high school students";
>
> "Won a prize or award (of any kind) for scientific work or study";
>
> "Placed first, second, or third in a regional or state science contest"; . . .
>
> "Participated in a scientific contest or talent search." (McLure & McLure, 2000)

The researchers found that as the number of out-of-class science accomplishments reported increased so did students' ACT Science Reasoning test scores (p. 14). "This pattern persisted for both male and female students . . . , for each racial/ethnic group, and for each family income group" (p. 17). McLure and McLure concluded that their findings suggest "higher science achievement scores are linked to participation in out-of-school science accomplishments" (p. 38), and that, "Out-of-class science accomplishments may be an important means of helping students achieve in science" (p. 44).

Informal Learning in Science through Secondary Agricultural Education

Researchers (Dori & Tal, 2000; Gerber et al., 1997a; Gerber, Marek, & Cavallo, 1997b; McLure & McLure, 2000; United States Department of Education, 1998) in science education have suggested that students' informal learning experiences play a significant role in their learning science and, ultimately, in their science achievement. Gerber et al. (1997a) operationalized informal learning in science as student learning in science that occurs outside of the regular school day. Accordingly, a case can be made that selected learning opportunities in secondary agricultural education may also support student learning in science (Budke, 1991; Buriak, 1992; Conroy et al., 1999; Shelley-Tolbert et al., 2000), thus improving students' science achievement. Two components of secondary agricultural

education, integral to the delivery of a comprehensive program, may hold high potential for supporting student learning in science: Supervised Agricultural Experience (SAE) and FFA (Dyer & Osborne, 1995; Lee, 1998; Roegge & Russell, 1990). Summer enrichment programs focusing on agricultural sciences and, in some cases, biotechnology "themes" that are offered in several states also show promise.

Supervised Agricultural Experience (SAE)

Cheek, Arrington, Carter, and Randell (1994) stated that, "Supervised agricultural experiences (SAE) in agricultural education programs incorporate experiential learning and direct application of knowledge into the students' curriculum to enhance learning" (p. 1). Cheek et al. further asserted that, "SAE gives the student the chance to utilize the principles learned in class and apply them in real life situations" (p. 1). In addition, these researchers found that student achievement in agricultural education, as measured by teacher-developed, end-of-course examinations, was "positively related to student achievement in agriscience" (p. 4). Findings by Arrington and Cheek (1990), Dyer and Williams (1997) and Noxel and Cheek (1988) support the researchers' positions.

Camp, Fallon, and Clarke (1999) defined supervised agricultural experience as "the planned, supervised application of agricultural principles and concepts" (p. 167). Implicit in "agricultural principles and concepts" are those opportunities for student learning that are grounded in science. In fact, one of the eight SAE categories posited by Camp et al. was "Agricultural Research" (p. 167). The researchers stated that, "Scientific research into agricultural topics would fall into this category" (p. 168). Zilbert (1999) also supported that contention. Further, Lee (1998) opined that, "Emphasis on science-based instruction has resulted in a rapid rise in research and experimentation SE [Supervised Experience]" (p. 11). Lee also maintained that, "students should follow the scientific method in designing their plans" (p. 11) for supervised agricultural experiences. The other seven SAE categories posited by Camp et al. represent additional opportunities to complement student learning and achievement in science in a problem-based, contextual fashion. Although Dyer and Osborne (1995) concluded that a national effort was needed to identify the mission of SAE and to provide assistance to teachers in integrating SAE into science–oriented and specialty areas of instruction, SAE is, undoubtedly, an informal learning venue rich with opportunities to support students' science achievement.

FFA

The FFA Mission is as follows: "FFA makes a positive difference in the lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education" (*2002-2003 Official Manual,* p. 4).

Concomitantly, the mission of secondary agricultural education is to prepare "students for successful careers and a lifetime of informed choices in the global agriculture, food, fiber and natural resources systems" (*2002-2003 Official Manual,* p. 4). Both missions

are intentionally and irrevocably linked to one another through the common emphasis placed on future career success of students as well as by a myriad of historic, statutory, and contemporary ties and connections.

The involvement of secondary agricultural education students in FFA-sponsored activities clearly fits what science education researchers (Gerber et al., 1997a; Gerber et al., 1997b) maintain about informal learning experiences, i.e., the potential for stimulating "cognitive conflict" and promoting "social interaction," thus improving students' scientific reasoning abilities (Gerber et al., 1997a, p. 10-11). In addition, these and other researchers (Dori & Tal, 2000; Etling, 1993; Galper, 1987; McLaughlin, 2000; Swick, 1987) encouraged the involvement of students in "a wide range of school and community activities" (Gerber et al., 1997a, p. 10), including partnerships between the school and local community. In fact, the Public Education Network (McLaughlin, 2000) studied youth who participated in 120 different after-school community organizations in 34 cities (urban, suburban, and rural) across the United States, and reported that, "higher levels of participation in community-based organizations are associated with greater likelihood of academic success" (p. 4) for participating students when compared to American youth in general. Moreover, McLaughlin concluded that the more successful programs shared three common traits; they were youth-centered, knowledge-centered, and assessment-centered. The FFA component of a secondary agricultural education program is a rich vehicle for accomplishing these and similar aims. One of many possible examples is the participation of students in FFA Career Development Events (CDEs).

Career Development Events provide students an opportunity to explore a variety of agriculture-, food-, and environmentally-related "careers, ranging from agricultural communications to environmental and natural resources to livestock selection" (*2002-2003 Official Manual,* p. 49; National FFA Organization *Career Development Event Handbook 2001-2005*). In preparation for the events, students learn technical and academic content that integrates and relies on their understandings and application of numerous scientific terms, principles, concepts, and operations in areas such as agricultural mechanization, including dimensions of bio-systems engineering, agronomy, environmental science, food science, horticultural science, plant science, and poultry science. Connors and Mundt (2001) stated, "Career Development Events are an excellent bridge between what the students learn in the classroom or laboratory, the skills they have learned as part of the SAE program, and the competition and recognition available through the FFA. This bridge builds the transition into career success." (p. 7)

Many of the CDEs involve team activities that are cooperative learning exercises in which students work collaboratively to interpret and resolve problem-based scenarios, thus addressing science educators' calls for informal learning opportunities in science that "stimulate cognitive conflict and promote social interaction" (Gerber et al., 1997, p. 11). Moreover, as students prepare to participate in CDEs, frequently, an array of community resources (human and non-human) are called forth to assist in the effort. These student-adult (e.g., novice-expert) and student-resource/realia interactions are consistent with the position of science educators (Dori & Tal, 2000; Gerber et al., 1997a; Gerber et al., 1997b; Gerber et

al., 2001) regarding the positive impact of informal learning activities on student achievement in science. They also reflect long-standing, community-based instructional practices employed by many secondary agricultural education teachers.

McLure and McLure (2000) suggested "that higher science achievement scores[, as measured by the ACT Science Reasoning test,] are linked to participation in out-of-school science accomplishments" (p. 38), and, moreover, "Out-of-class science accomplishments may be an important means of helping students achieve in science" (p. 44). The National FFA Organization sponsors several activities that provide opportunities for student learning in science similar to those described by McLure and McLure, e.g., the National FFA Agriscience Fair (*2002-2003 Official Manual,* p. 43). This learning activity involves "students [grades 7-12] who are studying the application of scientific principles and emerging technologies in agricultural enterprises. . . . Areas of participation closely mirror those of the international science fair, but reflect an agricultural theme [or context]" (p. 43). Categories in the National FFA Agriscience Fair include "Biochemistry/Microbiology/Food Science; Environmental Sciences; Zoology (Animal Science); Botany (Plant/Soil Science); and Engineering Mechanical/Agricultural Engineering Science)" (p. 43).

The National FFA Organization also supports the "Agriscience Student Recognition and Scholarship Program" (*2002-2003 Official Manual*, p. 44), an effort that "recognizes high school students who are studying the application of scientific principles and emerging technologies in an agricultural enterprise" (p. 44). In addition, several National FFA Proficiency Awards require that students demonstrate science-related competencies and thus provide another venue for stimulating students' out-of-class science accomplishments (p. 45).

Summer Enrichment Programs in Agricultural Education

Further, McLure and McLure (2000) cited "participated in a National Science Foundation summer program for high school students" and/or "participated in a scientific contest or talent search" as examples of students' out-of-class science accomplishments that were positively related to their science reasoning achievement. In fact, several states (e.g., Georgia, Pennsylvania, and Virginia) sponsor enriched summer programs for high school students who aspire to be agricultural scientists and researchers. In the case of Virginia Governor's School for Agriculture, its "mission is to provide hands-on, cutting-edge scientific and academic instruction to future leaders and scientists to develop their understanding of the scope, opportunities, challenges, and both academic and scientific rigor of the broad fields of agriculture and natural resources" (Broyles & Camp, 2002, p. 1). The program in Georgia focuses on student learning in agriscience as well as biotechnology (Navarro, Marable, Byrd, & Edwards, 2002). The Georgia and Virginia programs demand that participants be academically-talented, and both states require program applicants to undergo a rigorous admission process.

Conclusions

Science education researchers (Dori & Tal, 2000; Gerber et al., 1997a; Gerber et al., 1997b; Gerber et al., 2001; McLure & McLure, 2000) have described informal learning in science as learning experiences supporting student achievement in science that occur outside of the science classroom, including a variety of activities occurring outside the regular school day in students' homes, workplaces, and communities. Researchers (Gerber et al., 1997a; Gerber et al., 1997b; Gerber et al., 2001) further contend that informal learning experiences involving scientific vocabulary, principles, concepts, laws, and understandings, and creating "cognitive
conflict" for learners while also stimulating "social interaction" between them, held high potential for helping students learn science better.

Investigators in agricultural education (Budke, 1991; Buriak, 1992; Conroy et al., 1999; Shelley-Tolbert et al., 2000) have asserted that selected student learning experiences in secondary agricultural education support student achievement in science. Moreover, this study described two fundamental components of secondary agricultural education—SAE (Arrington & Cheek, 1990; Camp et al., 1999; Cheek et al., 1994; Dyer & Osborne, 1995; Dyer & Williams, 1997; Lee, 1998; Noxel & Cheek, 1988; Roegge & Russell, 1990; Zilbert, 1999) and FFA (*2002-2003 Official Manual*; National FFA Organization *Career Development Event Handbook 2001-2005*; Roegge & Russell, 1990)—and a less prominent one—summer enrichment programs (Broyles & Camp. 2002; Navarro et al., 2002)—that appear to offer students significant opportunities for informal learning experiences in science. These experiences may be useful in addressing the calls of science educators' for students to experience cognitive conflict and social interaction in informal contexts involving science thus increasing their science achievement.

Discussion and Implications

Findings of this study suggest that components of secondary agricultural education, such as SAE, FFA, and summer enrichment programs, may be valuable informal learning venues in which students improve their understandings of science while experiencing the agriculture, food, fiber, and natural resources system. Optimistically, secondary agricultural education may indeed *support student learning across the curriculum*, and, perhaps, most acutely in the sciences. Intuitively, many agricultural educators hold that conviction.

In an era of scarce financial resources and "high stakes" testing, one in which student performance in core subjects is prized above all else, to merely "suggest" that agricultural education supports student learning in a core discipline such as science is insufficient (G. Shinn, personal communication, August 19, 2002; L. Case, personal communication, November 15, 2002). However, if significant associations exist that could be demonstrated with substantial empirical rigor, then it is more likely that stakeholders, including decision-makers who set priorities and allocate resources, would be inclined to learn more about secondary agricultural education and its potential for positively enhancing student achievement in select core subjects.

Recommendations for Research and Practice

Additional research should be conducted to demonstrate whether selected informal learning opportunities in secondary agricultural education, such as SAE (Dyer & Osborne, 1995), various FFA activities (Roegge & Russell, 1990), etc., are significantly related to student achievement in science. Investigators should focus on identifying student characteristics, teacher characteristics and behaviors, the nature of science-rich experiences set in the context of agriculture, food, fiber, and the environment, learning resources, and other variables that may influence relationships between students' informal learning in secondary agricultural education and their subsequent science achievement.

Science educators have demonstrated that students benefit from their participation in informal science learning activities. Accordingly, agriculture teachers should increase their commitment toward planning, designing, and delivering learning experiences that afford students substantial opportunities to acquire and apply scientific knowledge and understandings in the contexts of agriculture, food, fiber, and natural resources. To this end, related professional development opportunities for both pre-service and in-service agriculture teachers should be planned and delivered, or otherwise facilitated, by teacher educators and state staff personnel. Further, National FFA Organization staff should review existing activities and programs to determine whether sufficient opportunities exist for students to experience informal learning in science, as well as consider other activities that could be developed to achieve that purpose.

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Student Teaching Experiences for Agricultural Education—A National Study

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Abstract

The purpose of this study was to build a task list for the student teaching experience for the teacher education program in the United States. The objectives were to: (1) compile a list of clinical experiences for student teaching, in Agricultural Education, and (2) use an expert panel to determine what should be included in the student teaching experiences for students enrolled in the agricultural education program.

A modified Delphi technique was used to collect data via three questionnaires. Data were analyzed using mean scores and standard deviations of tasks rated on a five-point Likert-type scale. Those tasks that the panelists rated with a standard deviation of less than or equal to one were considered to have met consensus.

The population for this study consisted of agriculture teachers and agriculture teacher educators from across the United States. Agriculture teacher educator panelists were selected from the American Association for Agriculture Education (AAAE) membership directory at each state's land grant institution. The agriculture teacher panelists were the National Association of Agricultural Educators (NAAE) State Presidents. Thirty-five Delphi panelists responded that they were willing to participate in this study. Thirty-four panel members responded to Round I, thirty panel members responded to Round II, and twenty-three panel members responded to round III yielding an overall response rate of 85 percent.

Rounds I, II, and III resulted in sixty tasks that met consensus for the student teaching experience. Based on the findings, the researchers developed a task list for the student teaching experience to be considered for use by the Agricultural Education Teacher Education programs across the United States.

Introduction

Change is constant, inevitable, often uncomfortable, and usually problematic in areas such as education. Agricultural education is not immune from change or the problems associated with change. Herring and Norris (1987) contended that if agricultural education did not change its methods of teaching, it would die. Long before the Herring and Norris article, the Vocational Education Act of 1963 recognized the changing face of agriculture by expanding the definition of vocational agriculture to include the preparation of students for any occupation involving knowledge and skills in agricultural subjects. Although there have been some efforts to change teaching methodology in agricultural education, a review of literature notes that there has not been a dramatic change over the past eighty years. With new curricula such as Agriscience, Biotechnology, and Small Animal Care and more of the new agriculture teachers coming from a background that does not include a traditional agriculture program a concise task list should be created to assist with the training of new teachers.

The Committee on Agricultural Education in Secondary Schools Board on Agriculture of the National Research Council issued a report in 1988, titled *Understanding Agriculture—New Directions for Education*. This report called for major reform in agricultural education and also in teacher education programs. This report recommended the following:

> Teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers and other professional personnel to staff, administer and supervise educational programs in and about agriculture.
>
> Colleges of agriculture, particularly in land-grant universities should become more involved in teacher preparation and in-service education programs, curriculum reform, and development of instructional materials and media. (p. 7)

The report found that agricultural literacy programs were not available for those preparing to teach, other than for individuals entering vocational education careers.

Agricultural education programs in the public schools are dependent on agricultural teacher education programs (McGhee & Cheek, 1989) because they produce the teachers for the programs. Teacher education programs must be flexible and ensure that they provide the experiences that are needed to prepare the future teachers for our changing society.

According to McLean and Camp (1998), agricultural teacher educators have experienced pressure over the past 15 years to reform the process of preparing agricultural teachers. They further stated that there was a void of current data on curricular content or structure in agricultural teacher education programs. Camp and Bailey (1999) stated, "We can see that there is a long-standing and broad advocacy for and acceptance of field-based student

teaching apprenticeship as of a paramount importance in agricultural teacher education." (p. 62)

Conceptual Framework

John Dewey proposed the following question, "What constitutes an educative experience?" Dewey (1973) differentiated educative from miseducative experiences as

> The belief that all genuine education comes about through experience does not mean all experiences are genuinely or equally educative. Experience and education cannot be directly equated to each other. For some experiences are miseducative. Any experience is miseducative that has the effect of arresting or distorting the growth of further experience. (p. 25)

Dewey's statement provides a foundation for evaluating field experiences programs. Erdman's (1983) research indicated that in assessing and participating in early field experience programs, attention to the theory/practice dialectic can make early field experiences educative for the teacher educator as well as the preservice teacher. Perhaps that is what Dewey (1973) meant when he said we should all be "students of education" (p. 31).

Passe's (1994) research called the overall quality of the early field experience into question. He stated that each teacher education program should evaluate its own program to ensure that an early field experience applies the learning of the methods courses. Bowyer and Van Dyke (1988) stated that evaluation of students during early field experience is seldom consistent and usually cursory. Constructive criticism to "neophyte teachers" during the early field experience is meaningless because both the university supervisors and cooperating teachers are poorly prepared for this role (Morris & Curtis, 1983). The assignment of cooperating teachers is a constant problem (Cruickshank, 1984). The teacher education program most often does not have the power to choose cooperating teachers.

Other studies (Gibson, 1976; Goodman, 1985; Tabachnick, Popkewitz & Zeichner, 1979-80) reported that students in early field experience and student teaching were evaluated on their ability to keep students quiet and doing their work and their ability to follow a lesson plan. Goodman (1985) stated that educators should be critical of this type of evaluation and that the purpose of early field experience and student teaching experiences should become problematic.

Lynch (1997) recognized the need for substantive change in vocational teacher education. Vocational technical teachers have been prepared differently than general education teachers since the Smith-Hughes Act established a different system for vocational training (Lynch, 1997). He further stated that the path of teacher preparation in vocational education has been increasingly challenged by end-of-the century changes in the workplace and new knowledge about teaching and learning.

The main purpose of student teaching has remained the same for many years: "To provide a planned, carefully supervised learning experience that allows the student teacher to demonstrate resourcefulness as a teacher in a real world setting" (West, 1985, p. 8). McEwen and King (1998) stated that "regardless of the name by which it is called (student teaching practicum, preservice teaching experience, field experience, or internship), it is that period of time, near the end of the student's formal education, when prospective teachers get the opportunity to play the role of an experienced teacher" (p. 9). Student teaching is a critical component in the process of teaching excellent teachers (McEwen & King, 1998).

McLean and Camp (1998) stated that strong call for reform in agricultural teacher education preparation process has gained momentum over the past 15 years. Even with these pressures for reform there is a void of current data on curricular structure or content of agricultural teacher education programs (McLean & Camp, 1998). Swortzel (1995) stated that agricultural teacher education faculty must continually evaluate their programs to see that they are achieving their mission of preparing teachers who are literate in science, and agriculture and who are prepared to teach.

Almost without exception, student teachers, veteran teachers, and teacher educators describe student teaching as a critical part of the teacher education program (Camp & Bailey, 1999). However, as the authors stated, "we know very little about how student teaching is organized, managed, supervised, and evaluated in the profession" (p. 12).

Purpose and Objectives

The purpose of this study was to build a task list for the student teaching experience for the agricultural teacher education programs.

The following specific objectives were established to guide this study:

1. Compile a list of clinical experiences, for student teaching in agricultural education.
2. Use experts to determine what should be included in student teaching experiences for students enrolled in the agricultural education program.

Methods/Procedures

A modified Delphi technique was used to generate a task list for the student teaching experience. This study is a replication of the Dobbins & Camp 1999 study, "Clinical Experiences for Agricultural Teacher Educator Programs in North Carolina, South Carolina and Virginia," therefore the same researching technique was used.

The initial task list was developed from Table 2 (Dobbins & Camp, 1999), Tasks that Met Consensus for Student Teaching Experience. The researchers edited these tasks for

duplication and clarity. To ensure content validity and guard against researcher bias a team consisting of four graduate assistants from Clemson University, one teacher educator from Clemson University and the State Leader of Agriculture Education for South Carolina was formed. This committee reviewed the questionnaire to check for researcher bias and content validity. Data were collected by three mailed questionnaires both by land mail and electronic mail over an eight-month period in 2002.

The population of this study consisted of 155 Teacher Educators, 7,585 Agriculture Teachers from the fifty United States. The population was determined from the membership of the National Association of Agricultural Educators (NAAE) and the American Association for Agriculture Education (AAAE). Members of the sample were purposefully selected from each state through the AAAE Teacher Educator Directory based on their affiliation with student teaching. Each state's NAAE President was selected to represent Secondary Agriculture Teachers. A letter detailing the project was mailed along with a response card indicating their willingness to participate. Thirty-two teacher educators agreed to serve on the panel along with five agriculture teachers.

In Round I, the panel of experts responded to the first questionnaire that contained the original lists of tasks developed from the 1999 Dobbins & Camp study. This questionnaire included:

1. 67 tasks for the student teaching experience
2. a space for additional comments for the student teaching experience, and
3. questions to identify background information about the panelist members.

In Round II, the researcher included the tasks that did not meet consensus in Round I with the overall mean and standard deviation for each task, along with the respondent's comments. The questionnaire included:

1. 22 total tasks for the student teaching experience
2. a space for additional comments.

In Round III, the panel responded to a list comprised of tasks that did not meet consensus in Round II. The questionnaire contained sixteen tasks for the student teaching experience.

The collected data from the three questionnaires were analyzed using standard deviation and mean scores. The tasks were rated using a five-point Likert-type scale: 1=Strongly Disagree, 2=Disagree, 3=Not Sure, 4-=Agree, 5=Strongly Agree. Consensus was met for this study if the standard deviation was equal to or less than one and the mean was greater than three.

Findings

Of the sixty-seven tasks listed in Round I, forty-four met consensus (see Table I). Round I produced 419 additional comments. The additional comments were used to improve the tasks that did not meet consensus.

Several themes emerged from the comments. The themes were planning, time and cooperation. The teacher educators and the agriculture teachers both felt that teaching should be the first priority of the student teacher and that the student teacher should assume most of the cooperating teacher's duties. Both felt that reflection was important for the student teacher to improve; however, it should not be required daily. The respondents felt that advising and assisting with FFA activities was important such as planning for activities, Supervised Agriculture Experiences (SAE's) and Career Development Events (CDE's).

In Round II, there were 22 tasks to be evaluated by the panelists. Seven of these tasks met consensus (Table 1). Round II produced 143 additional comments that were used to improve the tasks that did not meet consensus. The general consensus among the comments received during Round II was "Getting the experience is important. The length of the experience is not so critical. For example, the student teacher does not have to have a bus duty assignment for two weeks to learn what bus duty is like," and "Student teacher should fully shadow their coop teachers."

Round III there were nine tasks that met consensus out of the sixteen tasks that were evaluated (Table 1).

Table 1.
Tasks That Met Consensus For Student Teaching Experience

Mean	Stan Dev	Round	Statement
			The student teacher will:
4.705	0.675	I	for at least part of the internship, have a full teaching load.
4.117	0.975	I	perform all of the associated duties of a teacher.
4.617	0.551	I	plan, in conjunction with the cooperating teacher, a teaching calendar for the time period of the Student Teaching Experience (STE).
4.529	0.787	I	keep accurate records and prepare appropriate reports as requested by the cooperating teacher, cooperating school district, and/or Agricultural Education Department.
4.852	0.435	I	plan and deliver effective instruction about agriculture to secondary or middle school students.
4.676	0.534	I	attend school faculty meeting in assigned school.
4.175	0.869	I	jointly plan the STE with the cooperating teacher and university supervisor.
4.794	0.478	I	develop and use instructional materials to match the learning environment and learning needs of individuals and groups.
4.705	0.523	I	supervise students in their Supervised Agricultural Experience programs (SAE).
4.176	0.833	I	become familiar with the policies and procedures of the local school's agricultural education program documented by the completion of specified activities and reports required by the State Agricultural Education Department.

Mean	Stan Dev	Round	Statement
			The student teacher will:
4.676	0.588	I	attend an area or district Agricultural Education meeting.
3.878	0.972	I	evaluate their performance as a teacher using an approved form issued by the cooperating school district.
4.470	0.614	I	coach a team or an individual for a Career Development Event (CDE).
4.500	0.634	I	meet professional agriculture personnel in the community.
4.529	0.662	I	advise the local FFA Chapter to include the plan of activities, meetings, special activities, and achievement recognition as documented by the completion of specific activities and reports.
4.617	0.603	I	examine an Individualized Educational Plan (IEP) and discuss with a special needs teacher.
4.323	0.767	I	interview one guidance counselor—discuss Agricultural Education and guidance programs.
4.558	0.704	I	demonstrate effective communications with students, teachers, parents, and community leaders substantiated by the completion of specific written documents and reports as required by the university supervisor.
3.970	0.936	I	plan and participate in recruitment activities to encourage student participation in agriculture classes.
4.500	0.707	I	participate in the university post-internship seminar designed primarily to promote continued professional growth through reflective practice.
4.411	0.701	I	attend the local program's advisory council meeting.
4.911	0.287	I	plan, demonstrate, evaluate teaching practices that are necessary in a laboratory setting.
4.176	0.903	I	demonstrate positive public relations through planned publicity for the assigned agriculture program and students. Public relations should include the total agriculture education program. Documentation should include media releases, photographs and work samples.
4.558	0.612	I	develop a reflective approach to professional practice during STE. (* reflective approach—after each day reflect over days activities and how to's)
4.382	0.853	I	maintain a daily and weekly journal of reflective exercises during STE.
4.470	0.861	I	supervise the completion of at least one FFA award application.
4.382	0.853	I	incorporate the use of new computer/agriculture technology in classroom instruction.
4.000	0.852	I	plan and conduct activities with a non-career & technology teacher designed to integrate core courses and agricultural education.

Mean	Stan Dev	Round	Statement
			The student teacher will:
3.529	0.895	I	read professional journals.
4.735	0.447	I	plan classroom instruction that will culminate with a laboratory activity.
4.441	0.746	I	demonstrate a familiarity with the school and community as documented by the completion of specific activities and reports as required by the university supervisor.
3.500	0.961	I	develop and teach an integrated lesson with non-career & technology (core subject matter) teacher.
4.735	0.447	I	be exposed to the professional organizations that have ties with agricultural education.
4.470	0.563	I	plan, manage and evaluate school and community resources such as the greenhouse and land laboratory.
4.647	0.645	I	develop a classroom management plan.
4.212	0.992	I	develop a teaching calendar based on the needs of the agriculture program.
4.411	0.556	I	visit farmers and agribusinesses in the local area.
4.823	0.458	I	observe a class in another department in the assigned school.
3.941	0.951	I	interview student and coordinator about a cooperative work experience.
3.794	0.880	I	interview the local career and technology director to determine procedures of personnel, financial and facilities management.
4.264	0.898	I	experience a mock employment interview with appropriate school officials.
3.647	0.981	I	meet local media representatives or district communication department staff who can assist in public relations.
3.735	0.790	I	attend local civic activities in the assigned location.
3.735	0.963	I	live in the community while student teaching if housing is available.
3.966	0.999	II	perform non-instructional duties that may be assigned to the cooperating teacher(s) during the school day such as bus duty, hall duty, lunchroom duty.
3.866	0.937	II	design a plan of activities that will assist them in weak areas such as FFA, SAE, etc.
4.400	0.621	II	evaluate student's SAE record books, if appropriate.
3.266	0.980	II	during the student teaching experience, write a newspaper article in regards to the assigned agriculture program with the cooperating teacher and university supervisor's approval.
3.566	0.773	II	observe an adult class, if available.

Mean	Stan Dev	Round	Statement
			The student teacher will:
3.566	0.971	II	tutor a special needs student and provide strategies to help the student become successful in class.
4.033	0.808	II	observe a Young Farmer or FFA Alumni Chapter meeting if appropriate.
4.605	0.499	III	observe the teaching techniques of the cooperating teacher in the secondary setting, where appropriate.
3.260	0.751	III	demonstrate methods and techniques for adult learners in both group and individual instruction, where deemed appropriate by the cooperating school and university center.
3.521	0.845	III	assist the cooperating teacher with the completion of all required State Department of Education forms due during the STE in relation to agricultural education.
3.565	0.992	III	observe how the local agricultural education program serves the school/community by conducting an examination and documenting observations, if time allows.
4.043	0.928	III	assist the cooperating teacher with the evaluation of an IEP and if time allows, conduct a case study of a student with special needs that is identified by cooperating teacher.
3.260	0.963	III	where appropriate, assist the cooperating teacher(s) in planning an adult education program.
3.913	0.792	III	where appropriate, assist the local agriculture teacher in conducting at least one adult education class.
4.217	0.795	III	document effective instructional strategies during STE to meet individual and group learning needs.

During Round III, there were six tasks that did not meet consensus. The respondents felt that these tasks were important; however, there is not enough time to complete them during the student teaching experience. Their comments suggested that these tasks be completed before the student teaching experience (Table 2). An item of disagreement was how long the student teacher experience should be. Many felt that eight weeks was long enough; however, eight weeks does not meet the National College Accreditation for Teacher Education (NCATE) standard of ten weeks. Consensus could not be gained on this item.

Table 2.
Tasks That Did Not Meet Consensus For Student Teaching Experience

Mean	Stan Dev	Round	Statement
			The student teacher will:
3.869	1.013	III	observe the teaching techniques of the cooperating teacher in adult education, where appropriate
3.652	1.228	III	perform a minimum of 8 weeks of supervised classroom and laboratory teaching experience during the student teaching experience.
3.608	1.117	III	where appropriate, assist with the planning and implementation of FFA Week activities with the cooperating teacher.
3.565	1.079	III	with the aid of the cooperating teacher, review several students permanent records for a greater understanding of the types of records kept on students, if the cooperating school will allow.
3.260	1.009	III	assist the local teacher with evaluating the local Agricultural Education program as documented by the completion of specific activities and reports as required by the State Agricultural Education Department.
3.260	1.009	III	maintain a daily journal on how teaching methods and activities were accepted by the students.

An area of concern that appeared in this study was adult education. Most respondents agreed that adult education is a vital part of an agriculture education program; however, all states do not require their teachers to conduct organized adult programs. Respondents rated items that pertained to Adult Education or Young Farmer programs as a low priority.

Due to a mean score less than 3.0, there was one task in Round I and two tasks in Round III that met consensus for not being included on the task list. The respondents felt that there was not enough time for the student teacher to complete all of these activities while concentrating on their classroom instruction (Table 3). Respondents felt that these activities were “great ideas but could/should be completed prior to the STE in other courses.”

Table 3.
Tasks That Met Consensus To Not Be Included For Student Teaching Experience

Mean	Stan Dev	Round	Statement
			The student teacher will:
2.500	0.961	I	interview a social case worker in relation to classroom activities for special needs students.
2.869	0.975	III	during a senior-level course or STE develop a list of addresses of magazine subscriptions, catalogs and online references used at the school which they can use as a resource.
2.130	0.814	III	during a senior-level course or STE conduct a case study of an agribusiness or agriculture enterprise, if time allows.

Conclusions and Implications

The findings of this study correlate with the findings of Dobbins & Camp (1999). Upon completion of three rounds of the Delphi a task list was generated. The task list will be beneficial to student teachers, cooperating teachers, university supervisors, teacher educators and agricultural teacher education programs.

The generated task list contained sixty tasks that the respondents felt were important to a successful student teaching experience. This list, however, can be modified to meet each student teacher and program's needs and expectations. Both the teacher educators and the agriculture teachers feel that classroom instruction should be the top priority for the student teacher; however, FFA, SAE and, where available, Adult Education should be included in the experience. Time, was a major concern of both groups surveyed. The student teacher along with the university supervisor and cooperating teacher should plan a course of action that the student teacher will follow during their student teaching experience.

The task list will be beneficial to the teacher educators as they mentor student teachers during their student teaching experience. It will also assist university programs as they develop their agricultural teacher education programs.

Limitations of this study include teacher educators made up the majority of the respondents and each state has different program requirements. The Delphi technique allowed each panelist to provide feedback on each item; however, the process of collecting, revising, interpreting data and provide feedback to the panel is time consuming. The task list that was developed by this method has the potential to enhance the requirements for the student teaching experience as determined by the teacher education programs in the United States.

Recommendations

The recommendations listed in this section are based upon findings of this study and impressions gained by the researchers while conducting the study.

1. A longitudinal study needs to be conducted in this area.
2. Similar research should be conducted across all educational disciplines to determine if they share the same concerns for a successful student teaching experience.
3. An identical study should be conducted which population is only secondary Agriculture Teachers

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Therapeutic Riding: An Educational Tool for Children with Disabilities as Viewed by Parents

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Abstract

The purpose of this research was to examine the perceived benefits that therapeutic riding has on children with disabilities through the eyes of their parents. The results indicated that there are noted changes in children who are in these types of programs. The results also showed that children developed a great deal of self-esteem working in these programs. They also learn to follow directions to the fullest working around the horses. It was perceived that children learn better socialization skills through interaction with horses. All of the parents believed that the children have to deal with social skills working within the program. Parents believed that they would like to see therapeutic riding in some way a part of the school curriculum or have an option to be able to use these programs. The parents stated that they felt very strong about the collaboration that is involved in keeping and building an effective learning environment within the therapeutic riding centers. Overall it was perceived that Therapeutic Riding could serve as a mechanism for the development of children with disabilities.

Introduction

Riding horses by individuals with disabilities has been around since the time of the ancient Greeks. Even during that time, it was recognized that riding was more than a means of transportation; but a way of improving the health and well-being of people with a disability (North American Riding for the Handicapped Association, 2000). In England during the early 1900's, it was acknowledged that riding for people with disabilities was a beneficial form of therapy. During this time, riding therapy for wounded soldiers was offered at the Oxford Hospital during World War I. British physiotherapists were exploring the possibilities of riding as therapy for all types of disabilities by the 1950's. In 1969, the British Riding for the Disabled Association (RDA) was founded with the enthusiastic support of the Royal Family (North American Riding For The Handicapped Association, 2000).

At the 1952 Helsinki Olympic Games, Liz Hartel brought attention to riding for people with disabilities when she won the silver medal for Dressage, despite being partially paralyzed in both legs from polio (Crawley & Cawley, 1994). Riding for people with disabilities began as a form of recreation in the United States, but as it evolved, therapeutic riding became a means of motivation for educators to use for the purpose of encouraging self-esteem in youth with challenges. In 1969, The North American Riding for the Handicapped Association (NARHA) was founded to serve as an advisory body to the various "riding for people with disabilities" groups across the United States and its neighboring countries. The organization provides safety guidelines and training, certifies therapeutic riding instructors, accredits therapeutic riding centers according to its own high standards, disseminates information, and offers low-cost insurance to its member organizations (North American Riding For The Handicapped Association, 1995).

Riders with disabilities today display their remarkable accomplishments in national and international sport riding competitions. Hippotherapy (physical therapy on horseback, using the horse as the therapist) has developed as a medical field recognized by most major countries. Medical doctors, psychiatrists, physical and occupational therapists, speech therapists, recreation therapists, and teachers all refer patients and students to riding programs for people with disabilities. Riding for people with disabilities has become a well-recognized and acclaimed method of improving the lives of those who refuse to let their disabilities limit them (Crawley & Cawley, 1994).

To be productive in today's world, children must learn not only problem solving skills, but also how to positively interact with their peers and adults. Professionals in the mental health and educational fields have identified therapeutic horseback riding as one method in working with children to redirect negative behavioral patterns, build self esteem, and develop social skills (Fischbach, 1999). Improved balance is one way Therapeutic Riding can benefit a student. As the horse moves, the rider is constantly thrown off-balance, requiring that the rider's muscles contract and relax in an attempt to rebalance. This exercise reaches deep muscles not accessible in conventional physical therapy. Stretching of tight or spastic muscles is also a good benefit. Sitting on a horse requires stretching of the adductor muscles of the thighs. Decreased spasticity is also a problem that Therapeutic riding could

help control. Spasticity is reduced by the rhythmic motion of the horse. The warmth of the horse may aid in relaxation, especially of the legs. Sitting astride a horse helps to break up extensor spasms of the lower limbs.

Sensory integration occurs when riding stimulates the tactile senses both through touch and environmental stimuli. The vestibular system is also stimulated by the movement of the horse, changes in direction and speed. The olfactory system responds to the many smells involved in a stable and ranch environment. Vision is used in control of the horse. The many sounds of a ranch help to involve the auditory system. All of these senses work together and are integrated in the act of riding. In addition, proprioceptors (receptors that give information from our muscles, tendons, ligaments and joints) are activated, resulting in improved proprioception.

Building a good educational base for these students is very important and Therapeutic Riding may aid the student's ability to learn. Reading is one major area Therapeutic Riding can aid. Remedial Reading is a basic skill everyone needs. Before one can read, it is necessary to recognize the difference in shapes, sizes, and even colors. These can be taught more easily on horseback, as part of games and activities (Fischbach, 1999). Remedial Math is also a base skill needed. Counting is learned by counting the horse's footsteps, objects around the arena, or even the horse's ears and legs. Number concepts are gained as the rider compares the number of legs on a horse to the number of his own legs. Addition and subtraction are taught through games involving throwing numbered foam dice and adding or subtracting the numbers, with the concepts being taught through games, resistance to learning is decreased (Fischbach, 1999).

Motor skills are also enabled through Therapeutic Riding. Sequencing, patterning and motor planning help students organize their daily activities. Something as simple as holding and using a pencil requires a great deal of motor planning. Knowing which comes first in a sequence of events is an important part of most activities. These and other similar skills are taught on horseback through the use of obstacle courses, pole bending, drill team, and many other games and activities. Improved hand-eye coordination greatly improves. Hand-eye coordination is necessary for such skills as writing. These skills are taught in tacking the horse, as well as various activities and exercises (Fischbach, 1999). Visual/spatial perception improves with the use of therapeutic riding. This includes awareness of forms and space, and understanding relationships between forms in the environment. Socialization is also aided through therapeutic riding. It is shown that students with negative social skills have difficulty developing positive relationships which in time leads to poor self-esteem and negative behavior. When their behavior becomes unmanageable in a regular school classroom, the students are placed in a day treatment class. There, they are challenged to redirect their negative behavior pattern which impedes their learning process (Fischbach, 1999).

Teachers reported significant improvement of students' behavior and attitude during therapeutic riding classes (Crawley & Cawley, 1994). Their sense of pride and accomplishment was obvious during the session. The students' motivation to ride provides incentive for positive behavior in the classroom.

Problem Statement

Dealing with children with physical and learning disabilities can be a tremendous task for the educational system. Developing a program that does more than fill a child's day is a goal educators face. Educators must seek new avenues for students to become more independent in their daily lives, a task which therapeutic riding could serve as a solution. There has been a limited amount of research done on therapeutic riding. This study will analyze the benefits of therapeutic riding as perceived by the parents of children enrolled in a therapeutic riding program.

Conceptual Framework

The conceptual framework for this study is built upon the concept of Inclusion. Inclusion is a philosophy that brings students, families, educators, and community members together to create schools and other social institutions based on acceptance, belonging, and community (Bloom, Permultter, & Burrell, 1999). The concept of inclusion seeks to "establish collaborative, supportive, and nurturing communities of learners that are based on giving all students the services and accommodations they need to learn, as well as respecting and learning from each other's individual differences" (Salend, 2001, p. 5). Inclusion is built upon four major principles: Diversity, Individual Needs, Reflective Practice, and Collaboration.

Diversity improves the educational systems for all students by placing them in general education environments regardless of race, ability, gender, economic status, learning styles, ethnicity, cultural background, religion, family structure, linguistic ability, and sexual orientation (Salend, 2001). Therapeutic riding provides a mechanism that allows students to be mainstreamed into general education environments to a certain extent, while simultaneously recognizing the students' individuality.

Individual Needs involves sensitivity to and acceptance of individual needs and differences (Salend, 2001). Therapeutic riding is an educational tool designed to develop the physical, social, and cognitive skills of students, thus, recognizing their individual needs.

Reflective Practice insist that educators reflect upon their attitudes, teaching and classroom management practices, and curricula to accommodate individual needs (Salend, 2001). Therapeutic riding provides a mechanism that if incorporated into public school curricula, would require all teachers who instruct special needs students to reflect upon their pedagogical practice.

Collaboration involves groups of professional educators, parents, students, families, and community agencies working together to build effective learning environments (Salend, 2001). In order for a program such as therapeutic riding to work effectively, parents and school officials would have to collaborate in order to create a high quality educational experience.

Purpose and Objectives

The purpose of this research study was to evaluate the effectiveness of therapeutic riding as an educational benefit for students who are mentally and physically challenged. In order to accomplish the purpose of this study, the following objective was developed:

1. To determine the effectiveness of a therapeutic riding program as viewed by the parents of youth with disabilities enrolled in a therapeutic riding program.

Methodology

The populations for this study were the parents of children enrolled at the Kopper Top Life Learning Center (Therapeutic Riding Center) in Gibsonville, North Carolina. The parents that took part in this study ranged in age from 30 - 45 years of age, and held occupations in such fields as education, construction, and the service industry. For this study, ten parents, representing five children, were randomly chosen from an analysis of clientele records with the assistance of the riding center director. University protocols in relation to research were adhered to in this study.

This study utilized a qualitative interpretive case study to accomplish the stated objective. The development of an interpretive case study begins with the establishment of a theoretical framework, followed by a set of questions to be answered by the research. The way the questions are framed and what they seek to know are influenced by the epistemological orientation of the researcher, how the researcher sees the world and the acquisition of knowledge. This is in part a reflection of the researcher's professional discipline and a review of its body of literature. With the researcher's focus established, the framework then addresses the problem to be investigated by the study, what is known about the topic, what is not known, why it is important to know it, and the specific purpose of the study. Because interpretive research is inductive, leading to constructs, hypotheses, and theory, it is sometimes confusing to think of it as also beginning from theory (Merriam, 1988). However, theory is present in all qualitative studies because no study could be designed without some question being asked explicitly or implicitly. The phrasing of a question and the development of a problem statement reflect a theoretical orientation. Even case studies which generate theory grounded in the data of the study itself are not conducted in a theoretical vacuum, but contain a "complex process of induction and deduction, guided by prior theoretical commitments and conceptual schemes (Schwandt, 1993). Insights that form the basis of grounded theory can come from existing theory, personal experience, and the experience of others (Merriam, 1988).

The interview schedule, which consisted of five questions and one lead-in question, was developed from a review of related literature concerning therapeutic riding. Interviews were recorded and transcribed verbatim and copies where given to the special education teachers interviewed for their approval. Respondents were insured confidentiality at the beginning of the interview session and were given a disclosure statement to review and sign, which was approved by the university's human subjects committee. The interviews took

place in early February of 2003 in the Agricultural Education program of North Carolina A&T State University, and consisted of a focus group format.

The interviews accomplished the following tasks: Interviews with the parents gave a perspective of the child before starting the program and how the child progressed during participation in the therapeutic riding program. In order to record the responses, video taping was conducted. In all cases any video recorded material was erased and no names were used in the study to protect the confidentiality of the parents, and most of all the children under study.

Triangulation was the case study method used to gauge the validity of this study. Triangulation is a technical term used in surveying and navigation to describe a technique whereby two known or visible points are used to plot the location of a third point. Triangulation is the process of using multiple data collection methods, data sources, analysts, or theories to check the validity of case study findings. Triangulation helps to eliminate biases that might result from relying exclusively on any one data collection method source, analyst, or theory (Merriam, 1988). Triangulation plays a part in the process of using multiple data collection methods, data sources, analysts, or theories to check the validity of case study findings. For this study, triangulation was done through an analysis of each child's physical/occupational therapist reports, school records, and other confidential documents in order to authenticate the responses given by the parents regarding their child and the educational benefits of therapeutic riding.

Reliability is the extent in which research can be replicated. Consistency, transferability, dependability, and conformability are terms used in discussing research reliability with qualitative studies (Guba and Lincoln, 1989). Addressing credibility happens when drafts of the report are sent to the research subjects to confirm or disconfirm the hypotheses (Guba and Lincoln, 1989). Transferability occurs when the researcher provides a descriptive detailed report that allows others to decide it the findings are applicable to other cases (Guba and Lincoln, 1989). Dependability was addressed in this study using detailed records of the data collection and analysis procedures. Each person interviewed received a copy of the transcript for verification or amendment. After approval was received from the aforementioned, all records were destroyed due the confidentiality (Guba and Lincoln, 1989). In the study, conformability was addressed by the researcher by including excerpts from the raw data that supported interpretations and conclusions.

Findings

The purpose of this section is to present key quotes (findings) from each question asked from the interview schedule:

Lead-in Question:

Before your child became involved in the therapeutic riding program what did you know about these types of programs?

Responses were as follow:

"I did not know anything about these types of programs and that they were around for a long time until I met a parent whose child was in a program."

"I have heard about them, but did not know that we had this type of program in our area. Once we visited the center and talked to the program director we gave it a try. This is the best thing that has happened to our child."

Research Questions:

Research question 1: As a result of the therapeutic riding program, have you noticed any change in the child's performance in school and at home?

"My son was so shy when we first started the program. He did not want to be around anyone and it was hard to get him involved in any activity. We have been involved with this program now for a great number of years and he is outgoing and wants to be involved in any and everything. The progress in school did get better and better as time went on because of the program bringing him out of his shell."

"This program has been a godsend to us. We have seen so much improvement in our child. At home she knows what is expected of her if she is planning on riding that week, and with what duties have to be done before she can ride and it has taught her responsibility. At the center they are no compromise in the child duties but at the same time they never ask a child to some thing that they are not able to do. I feel this is a great life lesson for them to learn now, because they will need it as reach adulthood. As far a school goes all of this carries over to the school and we have seen as much progress at school as we have at home."

Research question 2: Do you feel that therapeutic riding programs would be a benefit to all children with disabilities?

"With the progress that we have seen with our child, I can't see any reason why it would not benefit all children with or without a disability. I can say one thing it sure has helped us."

"They are many great programs out there for our kids, but I feel, anyway for us, this program has been the most successful one we have been involved with. I would highly recommend this type of program to anyone with a child with any type of problem."

Research question 3: Would you like to see therapeutic riding as a part of the state school curriculum?

"Yes I would, but I do not seeing it happening. All you hear about is the schools have no money. I think it would be a plus to have this but I guess we can only dream."

"That would be nice, but I don't see it ever happening. The school would be so scared to get involved with an activity that does have somewhat a little danger to it. They would be worried about getting sued because of some child getting hurt; even if all liability questions were answered they still would hesitate about making a program like this a part of the school curriculum."

Research question 4: What types, if any, of barriers do you see with this type of program?

"As far as the program itself I see no barriers, but one thing I see as a problem is money and finding programs close enough to get to."

"The only thing I really see is the money issues that everyone is talking about. There must be a way or a source for these centers to get some help to get what they need. One barrier we have is our program is so seasonal. If the center could get enough funds so they could have an indoor riding ring, we could keep the program going year around."

Research question 5: Would you recommend therapeutic riding programs to other parents of children with disabilities?

"I would and have recommended this program. Therapeutic riding is such a well round program in how it works and how it deals with so many different types of disabilities. I feel you can see a marked improvement in any child who goes and stays with the program for a period of time. The only thing else I have to say is that they are wonderful."

"The program was recommended to me and we are so thankful that it was and we would highly recommend it to anyone. It has brought so much happiness to my child and they look so forward to being able to go ride. It has helped teach them to follow directions better, helps them understand that there is a order in which jobs or tasks are to be done. We really love the program and how more parents of children with disabilities hear about programs and get involved in them. We are going to do our part in getting the word out."

Conclusion

From the findings reported by the parents, the following conclusions were reached:

1. Parents in this study indicated that before there child became involved in the therapeutic riding program they were not aware of the benefits of the program. Perhaps given the benefits that therapeutic riding offers, more advertising of such programs should be done.

2. Parents indicated that great improvements have occurred in relation to the child's social and academic development, particularly with the development of personal responsibility. With the aforementioned factor in mind perhaps therapeutic riding should be explored by more families given the perceived benefits for their child's overall development.

3. Parents stated that they would like to see therapeutic riding incorporated as apart of the public school curriculum, however, given the limited budgets that schools face, and the liability issues of having such a program, they do not see it as a reality. As more students become involved in the program nationally, and the educational benefits are clearly shown through more research, maybe schools will be more willing to incorporate it into their curriculum and seek external funding.

Recommendations

Several recommendations are made based on the findings from parent interviews and from information retrieved from the research literature. These recommendations are suggested in an attempt to increase awareness of the importance of therapeutic riding and to establish some form of dialogue referencing the importance of therapeutic riding to the parents and the benefits it would produce for the child's quality of life.

1. Perhaps public school systems should seek external funding through nonprofit and corporate sponsorships in order to provide therapeutic riding as a curriculum option for children with disabilities.

2. Experimental research should perhaps be conducted in order to provide quantitative data that could be utilized as a basis to support the incorporation of therapeutic riding into the public school curriculum.

3. More advertising of the benefits of therapeutic riding should be advertised by individuals in the profession if programs of its type are to have wider appeal to audiences nationally.

Recommendations for Further Study

Based on responses presented to the researcher by participants, this study left some questions unanswered and raised several additional questions, suggesting the following topics for additional research:

1. The study should be replicated in different regions of the country to see if the impact of therapeutic riding on children with disabilities is similar to the results found in this study.

2. Future researchers would be well advised to consider life history research when duplicating studies of this magnitude, keeping in mind that true research is very time-consuming but extremely beneficial.

3. Future research studies should include an interview of the physical/occupational therapists of the children under analysis.

4. Additional research should be conducted to include a larger sample of the population of past students who have been involved in therapeutic riding programs and now have reached adulthood. The research should incorporate a national directory to include names and addresses of past students and parents who are willing to be a spokesperson for therapeutic riding.

5. Future researchers would be advised to look at the school systems to study how and what it would take to make therapeutic riding a part of the state's public school curriculum, so that these types of programs can reach out and be beneficial to more children with disabilities.

6. Additional research should be conducted to document the day-to-day operation of the therapeutic riding centers within each state. This study should reveal what it takes to keep these centers in operation and components needed to keep the therapeutic riding center of high quality.

Implications

Based on the findings and conclusions presented by the parents, the researcher is led to present the following implications that are beneficial to individuals:

1. Documents in this study presented the fact that supports the use of therapeutic riding for improving a child's physical well-being.

2. This study has shown the parents wanted therapeutic riding as a part of the state public school curriculum.

3. Research within this study has shown parents na strong need for groups of professional educators, families, and community agencies working together to build effective learning environments.

5. The research also reflects the need of the aforementioned to find ways to find funding for these programs so the quality of the programs can progress to higher levels.

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Evaluating the Scope of Learning Style Instruments Used in Studies Published in the Journal of Agricultural Education

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Abstract

The purpose of this study was to determine the most commonly used learning style instruments within the field of agricultural education. Learning styles is a generic concept that frequently includes cognitive styles, personality styles, learning styles, sensory modes, and typologies like those associated with the work of Carl Jung. This paper seeks to describe the predominant instruments applied in the field of agricultural education and the purposes for which these instruments are used.

The primary agricultural education research journal (*Journal of Agricultural Education*) was evaluated for the purpose of the study. Articles were selected from the fourteen-year period from 1988-2002 and evaluated using procedures established by the researchers. Using the keywords, "learning styles," a total of 248 articles published in the 14 volumes of the Journal of Agricultural Education (JAE) were selected for examination. Of these 249 articles, 29 met the criteria set by the researchers for inclusion. It was determined that the most frequently used learning style instrument by researchers was the Group Embedded Figures Test (GEFT). More than half of the studies employed a descriptive design. The populations studied consisted primarily of college students with limited high school populations. This paper is intended to aid other researchers in identifying the most appropriate instrument for use in studying learning styles within the field of agricultural education.

Introduction/Theoretical Background

Learning styles is a generic concept that frequently includes cognitive styles, personality styles, learning styles, sensory modes, and typologies like those associated with the work of Carl Jung. Messick defines learning styles as "information processing habits representing the learner's typical mode of perceiving, thinking, problem-solving, and remembering" (1970, p. 188). Learning style may be determined to provide guidance to a student who is struggling academically or to modify delivery methods to better suit the diversity of learning styles in a typical classroom to ensure student learning.

Lemire (1996) postulates that students' learning styles are comprised of three categories. Learning style or modality describes how information enters the brain: visually, aurally, or tactically. Cognitive style refers to how the information is processed once the information gets to the brain. Finally, personality style refers to the primary characteristics of the individuals that are expressed in general ways through the personality.

Curry (1987) notes that learning involves more than one dimension. She suggests four levels that she represents as analogous to the layers of an onion. At the core of the onion are the personality traits of the learner. These traits are the most stable of the learning style levels. The second layer represents the information processing levels that include how information is received (modes) and how it is processed (cognitive). The third layer focuses on social interaction; how students act and relate in the classroom. The fourth layer deals with the instructional environment and students' preferences for how they receive instruction. All levels are intertwined to create a picture of how a particular student learns. Curry states that the use of only one psychometric instrument to evaluate learning style only provides a glimpse of a student's learning style. She recommends using at least three psychometrically reliable instruments to triangulate the various levels of learning style according to her model.

Various learning style instruments are available for use by teachers and researchers in the pursuit of understanding how students learn. There are modality models, cognitive models, and personality models. The following review will introduce major categories associated with learning styles and provide examples of instruments that measure the characteristics within each.

Learning Style/Modality Models

The learning style or modality model, which has its roots in neuro-linguistic programming (Lemire, 2001), argues that each person develops a model of the world based on how they receive sensory information: visually, aurally, or haptically (kinesthetic-tactile). Visual learners prefer to receive information via charts, maps, pictures, and diagrams. Aural learners prefer to hear their information in the form of lectures, tutorials, or discussions with other students. The Learning Channel Preference Test (LCPT) (O'Brien, 1989) is one tool frequently used to assess students' preferred learning mode. Students taking the LCPT self-rate themselves by responding to 36 statements relating to how they prefer to receive

information. An additional instrument is the Learning Style Profile (LSP) that measures as one of its' facets learning modality (Keefe & Monk, 1988).

Cognitive Models

Cognitive models describe how people process information. Pask (1988) describes students as either holistic (global) or serial (sequential) learners. Serial learners prefer to engage in learning through a series of logical steps from beginning to end, building to the big picture. In contrast, holistic learners prefer to see the "big picture" first and then link the smaller parts into the overall framework. Felder's Index of Learning Styles (ILS) (Felder, 1993) includes a scale to determine if a student is a global or sequential learner. This model also includes scales that assess whether students are sensing or intuitive learners, visual or verbal learners, and active or reflective learners. These latter scales are based on the works of Carl Jung and David Kolb.

Kolb's Experiential Learning Model (ELM) (1985) draws heavily on the works of Dewey and Paiget. Dewey (1938) wrote that learning should be grounded in experience and active in nature. Paiget (1952) believed that learning best occurred through the student's interaction with the environment. Kolb describes learning as a four-step process. Learners first involve themselves in a *concrete learning experience* and then, reflect on that experience from several perspectives. From this reflection, they develop an *abstract conceptualization*, creating generalizations or principles. Students then test these general principles in new situations through *active experimentation*. Kolb developed the *Learning Styles Inventory* (LSI) (Kolb, 1985) to assess students' learning styles. The LSI identifies students as divergers, convergers, assimilators, or accommodators.

Anthony Gregorc (1982) developed a model focusing on the cognitive aspects of Kolb's ELM. The *Gregorc Style Delineator* is an inventory that plots a student's position on two intersecting continuums, using self-descriptive words that students rank order. The first is a perceiving continuum ranging from concrete to abstract. The second is an ordering continuum ranging from sequential to random. The intersection of these two continua identify a learner as concrete sequential (CS), abstract sequential (AS), abstract random (AR), or concrete random (CR) (Terry, 2002).

Personality Models

One of the most well researched models for examining personality styles is the Witkin (Witken & Goodenough, 1981) model. This model uses the *Group Embedded Figures Test* (GEFT) to differentiate students as either field dependent or field independent. Students are asked to identify a simple figure embedded within a more complex figure. Field dependent learners are described as students who are influenced by the surrounding environment and interpret new information in the context in which it occurs. Field independent learners can look at a whole picture and isolate individual pieces.

Another well-known personality inventory is the Meyers-Briggs Type Indicator (MBTI) (Claxton & Murrell, 1987) which consists of four dichotomous scales: introversion versus extroversion (I-E), thinking versus feeling (T-F), sensing versus intuiting (S-N), and judging versus perception (J-P). The result is sixteen possible personality types. It is believed that these preferences are developed early in life and change very little through adulthood. Claxton and Murrell note that the MBTI is a very complex instrument with high face validity and reliability.

Instrument Reliability

Debate has long surrounded the assessment of student learning styles. Curry (1990) cites three basic problems associated with the use of learning style inventories: (1) confusion in definitions of learning styles, (2) weaknesses in reliability and validity, and (3) the identification of relevant characteristics in instructional settings, or aptitude-treatment interactions.

Psychometrics is the scientific field of constructing and validating psychological tests (Hoffman, 2002). One of Curry's criticisms of learning style assessment is that many of the instruments used are psychometrically weak. Tuckman states that "test reliability means that a test gives consistent measurements." He further describes the validity of an instrument as "the extent to which the instrument measures what it purports to measure" (1999, p. 200). Many of the learning style instruments currently in use, including Dunn, Dunn, and Price's Learning Style Inventory (Blixt and Jones, 1995), have been criticized for lack of data supporting their reliability and validity.

Purpose and Objectives

The purpose of this study was to determine the most frequently used learning style instruments in the field of agricultural education and the direction that research in the field has taken. Specific objectives of the study were as follows:

1. determine the most frequently used learning style instruments in studies reported in the *Journal of Agricultural Education* (JAE),
2. describe the populations studied, and
3. identify the types of studies conducted.

Methodology

This study used a descriptive design. The primary agricultural education research journal, *Journal of Agricultural Education* (JAE), was evaluated for the purpose of the study. Fourteen volumes of the JAE (1988-2002) were selected for analysis. Using the keywords "learning styles," a total of 249 articles published in the 14 volumes of the JAE were selected for examination. Inclusion in the study required the use of a learning style instrument to measure the learning styles of students. Those studies that mentioned learning styles in the literature review or referred to learning style instruments, but did not employ one were not

included. Of the 249 articles examined, 29 articles met the criteria set by the researchers for inclusion. Articles included in this study used one or more instruments to assess some aspect of the learning styles of their participants. The studies selected for inclusion examined relationships between students' learning styles and achievement or learning style and teaching style.

The researchers collected specific data from each article that was selected for inclusion in the study. The data included ten categories of information: article number, year, study design, instrument used, instrument characteristics, instrument reliability, sample size, comparisons made in the study, variables measured, and type of population.

The researchers then examined all articles included in the time period and extracted data from the articles selected for inclusion. Each article was reviewed and appropriate data was recorded in a chart. Data were analyzed using frequencies and percentages.

Findings

The fourteen JAE volumes reviewed in the study included 249 articles containing references to "learning styles." Of this number, 29 articles were classified as measuring learning styles using a learning style instrument. Table 1 provides a summary of the learning style instruments used in the studies examined. Of the instruments used, the most prominent (64.7%) was the "Group Embedded Figures Test." The Meyers-Briggs Type Indicator was a distant second at five studies (17.2%). Six of the twenty-nine (20.6%) studies used more than one instrument. This finding supports information collected in the review of literature that revealed both of these instruments as common in the study of learning styles.

Table 1.
Summary of Learning Styles Instruments Used in Journal of Agricultural Education Articles, 1988-2002 (n=34).

Instrument	Category[a]	n	%
Group Embedded Figures Test (GEFT)	P	22	64.7
Myers Briggs Type Indicator (MBTI)	P	5	14.7
Learning Style Profile (LSP)	C M I	2	5.9
Author's Instrument	L	2	5.9
Individual Learning Preference (ILP)	P	1	2.9
Learning Style Inventory (LSI)	C	1	2.9
Secondary Learning Style Inventory (SLSI)	C	1	2.9

[a] P = Personality, C = Cognitive, M = Modality, I = Instructional Preference, L = Learning Strategies
Note: 6 (21%) of the 29 studies used more than 1 instrument.

Evaluation of the individual studies reveals that more than 75% used the Group Embedded Figures Test (GEFT), either alone (58.9%) or in combination with an additional instrument (17.2%). See Table 2 for a summary of the instruments used for each study evaluated. While the Van Tilburg/Heimlich Teaching Style Preference instrument is not

listed as one of the instruments since it measures teaching styles and not learning styles, it is important to note that four of the studies used the instrument in conjunction with the learning styles instruments listed.

Table 2.
Summary of Studies using Learning Styles Instruments in Journal of Agricultural Education Articles, 1988-2002 – Combination of Multiple Instruments (n=29).

Instrument Combination	Category[a]	n	%
Group Embedded Figures Test (GEFT)	P	17	58.9
Group Embedded Figures Test (GEFT) & Myers Briggs Type Indicator (MBTI)	P	3	10.3
Group Embedded Figures Test (GEFT) & Author's Instrument	P, L	2	6.9
Learning Style Profile (LSP)	C, M, I	2	6.9
Individual Learning Preference (ILP)	P	1	3.4
Learning Style Inventory (LSI)	C	1	3.4
Myers Briggs Type Indicator (MBTI)	P	1	3.4
Myers Briggs Type Indicator (MBTI) & Author's Instrument	P, L	1	3.4
Secondary Learning Style Inventory (SLSI)	C	1	3.4

[a] P = Personality, C = Cognitive, M = Modality, I = Instructional Preference, L = Learning Strategies

More than 76% (22 out of 29) of the studies examined used instruments that assessed learning styles from the perspective of personality characteristics and did not include other dimensions of learning. Two studies used an instrument (LSP) that assessed learning styles across multiple categories.

Of the 29 studies examined, three of the studies used an author's instrument component that measured learning styles. While many studies reported using an author's instrument, only studies that used instruments measuring learning styles were included in the list of instruments. For example, author's instruments that merely collected data describing the participants, such as gender and age, were not included as learning style instruments. Research designs employed in the studies were predominantly descriptive and correlational (see Table 3) and the populations studied were primarily college students (see Table 4).

Table 3.
Research Designs Reported in Studies using Learning Styles Instruments in Journal of Agricultural Education Articles, 1988-2002 (n=29).

Design	n	%
Descriptive	16	55.2
Correlational	9	31.0
Experimental	3	10.3
Quasi-Experimental	1	3.4

Table 4.
Populations Studied Using Learning Style Instruments in Journal of Agricultural Education Articles, 1988-2002 (n=30).

Populations Studied	n	%
Undergraduate Students	13	43.0
Pre-Service Teachers	6	20.0
High School Students *	6	20.0
Teachers	3	10.0
Graduate Students	1	3.3
4-H Members	1	3.3

* Note: One study included both teachers and high school students. A second study used both undergraduate and high school students taking an online biology course.

Conclusions

The overall purpose of the study was to examine research being conducted on student learning styles in the field of agricultural education and determine the most commonly used learning style instruments. The goal was to provide a snapshot of past research that can assist in guiding future research. Based on the findings presented, it can be concluded that certain instruments are used more frequently than others. Specifically, the GEFT is used by the majority of researchers (76%). As revealed in the literature, the GEFT is an instrument with a personality model and is used to differentiate students as either field dependent or field independent. Given that the study of learning styles includes not only personality models, but also cognitive and modality models, one can conclude that by examining only one facet of student learning styles, these studies have made a limited contribution to the understanding of learning styles and their effects on student achievement.

It can be further concluded that college students have been studied much more frequently (20 out of 29) than high school audiences. It is possible that the paperwork required by the Institutional Review Board to study minors may in fact discourage studies focused on high school populations.

Instruments used most often in the *Journal of Agricultural Education* suggest two trends. Almost without exception, a well-documented instrument was used in conducting research related to learning styles. However, given the literature related to the instruments available and the questions surrounding certain instruments, one can conclude that researchers should consider including other instruments, such as the Gregorc Style Delineator or Kolb's Learning Styles Inventory, in their research.

Implications and Recommendations

Results from this study illustrate implications for both teachers and researchers interested in studying learning styles. In relation to the use of instruments, this study points out that certain instruments are more commonly used than other instruments in the field of agricultural education even though the literature surrounding learning styles encourages the use of multiple instruments to triangulate findings. It is important for researchers to select instruments based on reliability and validity and care should be taken not to "use an instrument just because it has always been used.

Both the GEFT and the MBTI fall into the "personality" category of learning style instruments (Lemire, 1996), however, both Lemire and Curry argue that student learning involves more than personality. Given that the majority of the studies used either the GEFT or the MBTI instrument, it is recommended that researchers consider instruments or combinations of instruments that address multiple learning style categories. For example, the Felder and Silverman instrument, the Index of Learning Styles (Felder, 1993), combines three facets of learning styles: personality, learning modality, and cognitive processing. This instrument allows a multi-modal approach. Recent studies (Zywno, 2003 and Livesay, et al., 2002) have found that the validity and reliability of the ILS meets acceptable standards, but further testing is required. Closer inspection of instruments such as the ILS is needed to advance the study of learning styles in the field.

Additional research is recommended to look further into actual reasons that authors use particular instruments. Because many authors chose to use the GEFT, the question arises as to "why." Reasons such as familiarity, convenience, and cost can only be hypothesized. Further research into this area may reveal the need for training in the area of studying learning styles or possibly the need for the development of an instrument that more closely meets the needs of agricultural education while taking into consideration the facts surrounding the measurement of learning styles.

This study has generated more questions than answers in the pursuit of understanding the measurement of learning styles within the field of agricultural education. While the number and type of instruments used to measure learning styles has been identified, the need to identify the most effective methodology possible for the field is yet to be determined.

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Impact of Intergenerational Service Learning on Students' Stereotypes Toward Older People in an Introductory Agricultural Computing Course

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Abstract

The purpose of this descriptive study was to measure the impact of intergenerational service learning on students enrolled in an introductory course in agricultural applications of microcomputers. Specifically, stereotypes toward older people were measured prior to and at the conclusion of service learning activities (computer instruction) with residents from a local retirement center. Due to various environmental factors, such as media, negative sterotypes regarding older people have evolved, supporting the theory known as Ageism. Intergenerational service learning activities have been found to support positive changes away from those Ageist stereotypes often held by college students. Although negative stereotypes were initially found in the pre-test, favorable changes were found in the post-test Mean scores and composite Mean scores. The largest improvement of students' stereotypes was found in the personality factor of the retirement center residents. An analysis of students' reflections of their intergenerational service learning experiences also supported the changed views toward the personalities of older persons. Recommendations were made for additional use of intergenerational service learning with courses where deemed appropriate and the addition of specific demographic-related questions.

Introduction/Theoretical Framework

"Aging as social experience requires the same political and philosophical attention being given to sexism and racism. When these three *isms* are imposed on women and men in some communities, their impact is devastating." (Thornton, J.E., 2002).

As America continues to grow and evolve through its relatively infant state, changing demographics based on a post-World War II phenomenon have begun to have multi-faceted impacts, socially and economically. According to the Census Bureau "middle series" projections, the elderly population will more than double between now and the year 2050, to 80 million. By that year, as many as 1 in 5 Americans could be elderly. Most of this growth should occur between 2010 and 2030, when the "baby boom" generation enters their elderly years (U.S. Census Bureau, 1996).

Traditional America remembers the times when the elderly and youth were naturally connected, as families were more geographically centered in location. Children, parents, and grandparents often lived in the same home/farm place or at least the same city. This close mix of different generations allowed students to gain economic, educational, and cultural independence through an exchange of family, religious, and cultural traditions. As the third millennium begins, many families in America have seen times change as the youth and the elderly are being separated by demands of today's fast-paced world and segregation of age groups. Many senior adults live and socialize in communities of the same age group (Brandes & Green, 1999). This phenomenon has resulted in a widened gap between the younger and older generations. A possible result from this separation (and also environmental factors) has been a phenomenon of increased negative stereotypes toward older people among youth as well as college students. Chumbler (1994) found that negative stereotypes toward older people existed among college students in views regarding irritability, health behavior, personality, and activity. Chumbler suggested that such views may "reflect a lack of sensitivity and awareness of older individuals on college campuses." Considering the wealth of knowledge and experience offered by seniors and the curiosity and creative minds of youth, a wealth of opportunities could be lost through such views (Chen, 1997).

Seeking solutions to reduce a widening gap between the young and old, professionals in gerontology have turned interest to the concept known as Intergenerational Service Learning (ISL). ISL is one tool that offers interaction between two distinct groups with very similar needs. The concept of intergenerational service learning is defined as "the combination of two distinct educational concepts that involve planned ongoing interactions between younger and older adults that are mutually worthwhile to both" (Newman & Smith, 1997). Intergenerational programs can improve the attitudes of elders and youth toward one another as a result of heightened interaction (Chapman & Neal, 1990). Matt Kaplan, Associate Professor of Intergenerational Programs & Aging at The Pennsylvania State University reflected on the merits of ISL, stating that "intergenerational programs have been found to diminish ageist stereotypes … older persons also benefit from intergenerational

engagement; serving as mentors, they are provided with invaluable opportunities to remain useful and vital and make a positive difference in their communities" (Kaplan, 2001).

Literature regarding the impact of ISL on student stereotypes of older people is limited. Brown and Roodin (2001) found that college students' views toward older adults improved in terms of reducing traditional cultural stereotypes through ISL activities. Other current studies documenting specific changes in students' stereotypes from ISL activities were not found.

Service Learning in Colleges

In the past 20 years, service-learning programs have found their way into primary, secondary, and higher education institutions throughout the nation. Much of this increased interest in service-learning may be due to efforts in federal funding. Two primary initiatives have fostered the growth service-learning: 1) federal legislation was passed in 1990 that created a commission to award grants for service-learning programs, and 2) the 1993 National Community Service Trust Act provided funding to states for the purpose of promoting service-learning in schools (National Commission on Service Learning, 2001). Additionally, programs such as Learn and Serve America, Higher Education (LSAHE) documented growth in service learning interest by universities through direct grants and sub-grants. The LSAHE funded approximately 100 higher education institutions and organizations with $10 million for service learning programming, and through sub-grants, approximately 500 institutions were involved (Gray, Ondaatje, & Zakaras, 1999).

As a result of the increased interest in service-learning, a plethora of research has been developed in many of the areas it affects. Service-learning provides researchers opportunities to investigate such areas as career development, personal/interpersonal development of students, social outcomes, and community relationships (Eyler, Giles, Stenson, & Gray, 2001). However, educators are often concerned about the impact of service-learning on academic achievement. Few studies exist that focus on the academic aspect of service-learning, as opposed to other studies that center on social/community oriented issues. Various studies found that academic achievement of students was higher than student counterparts when involved in service learning (Balazadeh, 1996; Gelmon, Holland, & Shinnamon, 1998).

However, integration of service-learning activities in academic core courses has not occurred as often (Antonio, Astin, & Cress, 2000; Gray, et al., 1998; Sagaria & Burrows, 1995). The use of service-learning in applying experiential applications to skill development courses (such as computer courses) in academic core programs would seemingly be practical as well as valuable to long-term retention.

The Theory of Ageism

Ageism is a theory driven by negative bias or stereotypic attitude toward aging and aged. Traxler (1980) postulated four primary factors that contribute toward the negative views of

aging. Woolf (2003) added support to Traxler's views on Ageism, using an array of related literature:

1. Fear of death in Western society – death is not viewed as a part of the course of life and it is considered to be synonymous with old age;
2. Emphasis on the youth culture in American society – media places a high value on youth, physical beauty, and sexuality and often ignores or negatively portrays older people;
3. Emphasis placed on productivity by American culture – economically the middle-aged are portrayed as carrying the burden and the young are seen to have economic potential, thus the view that older adults are financial liabilities, and
4. The manner of original research on aging – many of the gerontological studies were originally performed at long-term care institutions where institutionalized aging persons (5% of older population) were easier to access for study, thus creating a biased research base that did not consider the healthier population of older citizens.

The Theory of Reasoned Action

The theoretical model for this study consisted primarily of the perceptions of undergraduate students toward older people. The theoretical basis of this study is found in the Theory of Reasoned Action (Ajzen & Fishbein, 1980**;** Fishbein, 1967; Fishbein & Ajzen, 1975) which later expanded into the theory of planned behavior (Ajzen, 1988, 1991). The theory of planned behavior appends that human action is directed by three kinds of considerations: behavioral beliefs, normative beliefs and control beliefs. A combination of these three beliefs is thought to lead toward the formation of a behavioral intention. Greenwald (1989) supported this theory, reporting that individuals with positive attitudes toward a subject or situation tend to evaluate them positively.

In consideration of the theories of Ageism and Reasoned Action, one may purport that if stereotypes toward older persons exist, negative attitudes could translate into less favorable intentions in the workplace and in general society of the future. Realizing the rapidly approaching change of a large segment of our population, the baby-boomers, toward "senior status" implies a great need to avoid possible Ageist mindsets among college graduates. Additionally, as this large segment of population moves toward retirement, their presence as school volunteers, FFA Alumni, and as resource persons will create the need for agricultural educators to have an appreciation with unbiased beliefs for senior citizens.

Purpose/Research Questions

The primary purpose of the study was to measure the impact of intergenerational service-learning on the attitudes toward older people by students enrolled in an introductory course in agricultural applications of microcomputers. The study was organized around the following objectives:

1. Describe the demographic characteristics of students enrolled in the introductory agricultural computing course;
2. Describe students' stereotypes toward older people;
3. Describe students' stereotypes toward older people following intergerational service learning activities;
4. Identify changes, if any, in students' stereotypes toward older people following intergerational service learning activities; and
5. Discuss student perceptions toward older people as based on service learning reflections.

Methods/Procedures

To assess the impact of intergenerational service learning on students perceptions toward older people, a descriptive research design was used. The population of the study consisted of 15 undergraduate students enrolled in a freshman-level introductory microcomputer applications in agriculture course at a College of Agriculture at a Land Grant University in the Southeast. Although 15 students were enrolled in the course, useable data were collected from 14 of the students due to the illness of one student during administration of the posttest. Considering the nature of the the population of this study, the findings can only be generalized back to those students involved. The course provides an overview in such areas as microcomputer hardware and software including all aspects of the Microsoft Office package, use of Windows, Internet applications, and basic Web page development.

Instrumentation

The instrument, Chumbler's (1994) *Stereotypes Toward Older People Scale (STOPS),* was chosen to assess students' attitudes toward older people. Chumbler developed the instrument to assess college-age students' positive and negative stereotypes toward older persons. In developing the STOPS, Chumbler used a content analysis on the ten most previously used stereotypes toward older people instruments. Following assessments using an exploratory factor analysis, 14 of 28 items remained. The seven points on the scale are as follows:1=Never; 2=Rarely; 3=Occasionally; 4=Some of the Time; 5=Most of the Time; 6=Almost Always, and 7=Always. Based on findings from the exploratory factor analysis and an eventual confirmatory analysis, Chumbler found four major factors that accounted for 49.5% of the variance. The four factors were: health behavior; activity; irritability, and personality (See Table 1 for subscale groupings). Reliability for the overall STOPS via the Cronbach alpha procedure was .82 (Chumbler, 1994).

The pretests and posttests were administered during the first and final session of the course, respectively. Reliability analysis on the pre and post tests using the Cronbach alpha procedure reported an alpha of .78 and .71 respectively. Attrition occurred as one student did not take the posttest due to illness. At the beginning of the semester, the students were given an orientation on the concept of service learning and instructed to maintain a reflection diary during their activities to document their growth in the process. The service learning activities were conducted with a group of residents from a local retirement center located within five

miles of the university. After ten weeks of class instruction, the students began to meet with 12 residents of the retirement center (the residents were transported to a computer lab on campus for each meeting). During the initial visit, the students were assigned to work with a specific participant and the students individually polled them on specific computer skills they desired to learn. During each of the six sessions, students had designed specific lessons for the participants which typically lasted between 1.5 – 2 hours. Lessons ranged from introductory concepts of Microsoft Windows to instruction on graphics and scanning pictures to development of Web pages.

Analysis of Data

The data was coded and analyzed using SPSS 11.0 for Windows. Means and Standard Deviations were used to analyze the data.

Results/Findings

Objective 1. Describe the demographic characteristics of students enrolled in the introductory agricultural computing course.

As previously mentioned, useable data were collected from 14 of the students due to the illness of one student during administration of the posttest. Seven students were males (50%) and seven (50%) were females. One (7%) student was Black and thirteen were White (93%). Class ranks consisted of 10 freshmen (71%) and 4 sophomores (29%). Most of the students were enrolled in Agricultural Education 9 (65%); 2 in Agricultural Mechanics and Business (14%); 1 student was in Animal and Veterinary Sciences (7%), 1 in Packaging Science (7%), and 1 was undeclared (7%).

Objective 2. Describe students' stereotypes toward older people.

Findings from the pre-test STOPS administered prior to working with the older people (65 years of age and older) indicated that all four of the factor areas had high composite mean scores, ranging from 12.43 to 19.21 with a range of 3-21 and 4-28 for 3 and 4 statement factors respectively. The lowest composite mean score, 12.43, was labeled by Chumbler as "irritability." Mean scores of the four irritability statements ranged from M=2.92 to M=3.14, representing the Rarely and Occasionally scale categories. The statements (STOPS items) represented by the irritability factor include: get upset easily; talk to themselves; intolerant, and grouchy. The highest composite mean score, 19.21 represents a factor labeled by Chumbler as "personality." In Chumbler's study of 292 college students, a similar composite mean score of 19.20 was found for his "personality" factor. Mean scores of the four personality statements ranged from M=3.78 to M=5.64, representing the scale categories Occasionally, Some of the Time, and Most of the Time. The statements (STOPS items) represented by the personality factor include the following: meddlesome, set in their ways, old-fashioned, and think about the good old days.

The remaining factors had similar composite mean scores of 13.21 and 13.50, representing Chumblers labels of "health behavior" and "activity," respectively. Both factors were comprised of three statements. The three statements regarding "activity," had mean scores in the Some of the Time scale-category, ranging from 4.07 to 4.85. The three statements (STOPS items) were phrased with positive wording that included physically active, optimistic, and productive.

Objective 3. Describe students' stereotypes toward older people following intergerational service learning activities.

Mean scores of all of the statements following intergenerational service learning activities revealed "favorable" changes in students' post-test scores. The lowest composite mean score, 10.21, was represented by Chumbler's "irritability" factor. Mean scores of the four irritability statements (STOPS items) ranged from 2.21 to 2.85 (Rarely scale category) which included: intolerant; get upset easily; grouchy, and talk to themselves. The highest composite mean score, 14.78, was represented by Chumbler's "activity" factor. Mean scores of the four activity statements (STOPS items) ranged from 4.35 to 5.28 (Some of the Time and Most of the Time categories) which included: physically active, optimistic, and productive. Three of the four highest means of the post-test were represented in the activity factor.

Objective 4. Identify changes, if any, in students' stereotypes toward older people following intergerational service learning activities.

The composite score reflecting the least change following the intergenerational service learning activities was the health behavior with a change of -1.57. However, any change reflected by a negative number in the personality, irritability, and health behavior factors is a favorable increase. Due to the nature of the statements in the activity factor, a positive number increase will reflect favorable changes in students' stereoypes of older people. The increase for the actvitity factor was +1.28.

The greatest change in mean scores between the pre-test and post-test was reflected by the personality factor. The mean score change for the STOPS statement item "set in their ways" was -1.78. In addition, the STOPS statement item "old-fashioned" had a change of -1.57. The composite score change for the personality factor reflected a change of -4.57.

Table 1.
Pre/Post Test/Composite Mean Scores, Standard Deviations and Mean Score Changes of Students' Perceptions of Older People as Grouped by Chumbler's Factors

Item #/	Statement	Pre-test		Post-test		Change
Factor	Old people…	Mean	SD	Mean	SD	
1 (p)	are set in their ways	4.85	1.61	3.07	.99	-1.78
2 (p)	are meddlesome	3.78	1.36	3.07	.82	-.71
3 (p)	are old-fashioned	4.92	1.63	3.35	1.33	-1.57
4 (p)	think about the good old days	5.64	1.15	5.14	.77	-.50
	Composite score*	19.21	4.48	14.64	2.31	-4.57
7 (i)	are grouchy (cranky)	3.21	.69	2.57	.64	-.64
8 (i)	talk to themselves	3.14	1.09	2.85	1.16	-.29
9 (i)	get upset easily	2.92	1.07	2.57	.85	-.35
14 (i)	are intolerant	3.14	1.02	2.21	.89	-.93
	Composite score*	12.43	2.28	10.21	2.58	-2.22
6 (a)	are physically active	4.07	1.14	4.35	1.08	+.28
10 (a)	are productive	4.85	1.16	5.28	.72	+.43
11 (a)	are optimistic	4.57	1.01	5.14	.94	+.57
	Composite score**	13.50	2.56	14.78	2.19	+1.28
5 (h)	never fully recover from illness	3.71	.91	3.28	.91	-.43
12 (h)	walk slowly	5.00	1.51	4.42	.64	-.58
13 (h)	have health problems	4.50	1.16	3.92	.73	-.58
	Composite score***	13.21	2.42	11.64	1.74	-1.57

Mean score based on a scale of 1-7; Scale: 1=Never, 2=Rarely, 3=Occasionally, 4=Some of the time, 5=Most of the time, 6=Almost always, 7=Always
Factors – p=Personality; h=Health Behavior; a=Activity, and i=Irritability.
* = Four-item subscale; range = 4-28 (higher number indicates more negative stereotype toward older people).
** = Three-item subscale; range = 3-21 (higher number indicates more negative stereotype toward older people).
*** = Three-item subscale; range = 3-21 (higher number indicates **less** negative stereotype toward older people).

Objective 5. Discuss student perceptions toward older people as based on service learning reflections.

Students' reflections of their experiences were posted to a discussion board immediately following their interaction with the participants each week. Supporting the findings of changes in stereotypes regarding personalities, a common thread was found in many of the students' comments. In order to preserve anonymity of the students' comments

and the participants, all discussions referencing the participant have been changed to "my person."

Many of the students' comments centered around what they taught the participants, since they posted their reflections each week immediately following their activities. However, comments related to age concepts were generally found to be related to the participants' personalities and also regarding potential for learning from their many past experiences. The students expressed surprise that the participants had pleasant demeanor and that they shared commonalities. A sampling of the comments supporting this include:

> "What I got the most from working with this group is to not write off all older people as being grouchy and not willing to learn from the younger."
>
> "Working with my person I have learned how not to judge people before you really know who they are. I have learned not to classify people and just put them into groups without giving them a chance."
>
> "It was really exciting to see and to meet someone of such a different background and realize that we have some common interest."
>
> "My feelings…that old people (other than my grandparents that I grew up around) aren't as scarey as I thought."

Another common theme that was found in assessing students' reflections was related to the potential to learn from the participants. A sampling of the comments lends support to this concept:

> "My person has a rich history from his travels and experience. I enjoy talking to the elderly and hearing their stories. Overall, my first impression of my person was that I will enjoy working with him and learning from him as well."
>
> "A lot can be learned from older people but we hardly ever take the time to listen. Through this project, we are being forced to listen (in a good way) to the people who have been on this earth longer than we have."
>
> "I found out how much the older people know and how much I can learn from them. My person has traveled all over the world. She really wants to learn from us and is really interested in sharing with us and is interested in our lives and what we have to teach her."
>
> "I really learned a lot from my person. At first I thought she was going to be one of those "cranky" old ladies, but she really turned out to be very interesting."

In support of the findings from the quantitative data in this study, a theme of comments surrounding the concept of "personality" seemed to prevail in the students'

discussion/reflections regarding aging. Many students expressed initial aprehensions to work with the participants. However, during the course of the meetings, change in students views toward the participants quickly occurred. The students expressed mutual feelings of accomplishment as they had the opportunity to share their computer knowledge in turn for the wisdom and life experiences of the participants.

Conclusions/Recommendations/Implications

Results from the pre-test indicated students' initial perceptions toward older people were in the negative categories of Chumbler's STOPS instrument. This supports Chumbler's previous study that had similar composite Mean scores. One example of similarity is in the personality composite score between this (M=19.21) and Chumbler's study (M=19.20) which differed by .01. The personality factor was comprised of four statements; three of the statements had mean scores in the either Some/Most of the Time categories. The statements for personality with high mean scores included "Old People": are set in their ways; are old fashioned, and think about the good old days. Most of these are commonly portrayed personality characteristics within the media. The data supporting the high mean scores of the personality factor could be linked to one concept in Traxler's Ageism theory linking the emphasis placed on youth culture in American society. The theory elaborates that emphasis on youth culture stems toward media bias against older people. These findings might lead one to question the origin of students' initial stereotypes toward older people and how much environmental elements such as media affect the views of personalities of older persons.

Although initial stereotypes toward older people were negative, favorable improvements following ISL activities occurred across all four of Chumbler's factors (Personality, Activity, Irritability, and Health Behavior). This finding supports Brown and Roodins' (2001) recommendations that ISL can positively impact students' stereotypes toward older people. The largest change in students' stereotypes, Personality, was also supported by student reflections regarding their experiences with the participants from the retirement center. The comments from students consistently demonstrated an early bias regarding the general "personality" of older persons; however, the paradigm in this area quickly shifted. Of the four factors specified by Chumbler, it would reason the Personality factor changed the most as students had ample opportunities to observe personalities of the participants, but the change is less obvious with Activity, Irritability, and Health Behavior factors.

The general implications of this study are that students enrolled in this course possessed somewhat negative stereotypes toward older people. However, with the opportunity to interact with older persons (beyond grandparents), the changes in students' views were immense when considering the few contact hours. In addition, although many students at first seemed apprehensive, the overall view of the ISL activities was very favorable. Considering the potential for future agricultural educators and agricultural business employees to interact closely with older people (as FFA volunteers, colleagues, resource persons) the need for exposure to reduce stereotypes is very important. Teacher

Educators and other university faculty must realize the value of this growing population of baby boomers and seek to encourage student interaction with them when possible.

Based on supporting literature and the findings of this study, it is recommended that college/university faculty (including Agricultural Education) teaching courses with service learning components consider the benefits created through intergenerational activities. Such activities provide opportunities for Land Grant Universities to extend its outreach activities as faculty can share their research through students.

It is recommended that additional studies should be conducted using Chumbler's STOPS instrument with large populations. At this point, no other studies beyond this and Chumbler's have been cited in using the STOPS instrument. Use of the STOPS with large introductory freshman classes would provide valuable baseline data that would reflect an array of demographic data as well as determining if trends differ among colleges/majors.

A final recommendation is that all studies using the STOPS include specific questions related to students' prior contact with older people. Such data will help researchers determine if findings from the STOPS were influenced by different environmental factors (extraneous variables).

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The Impact of Service-Learning: A Quasi-experimental Assessment of Student Performance in an Introductory Microcomputer Course

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Abstract

The purpose of this quasi-experimental study was to measure the impact of service-learning on academic achievement of students enrolled in an introductory course in agricultural applications of microcomputers. The treatment consisted of a service-learning project that engaged students in the conversion and compression of digital video clips for integration into PowerPoint shows they developed for research faculty in the College of Agriculture, Forestry, and Life Sciences at Clemson University. Student performance was measured using a pretest and posttest developed from a test bank that accompanies the course text. No significant difference was found between the treatment and control groups in the study.

Introduction/Theoretical Framework

No other experiential teaching format better represents such an array of learning theories and social development ideals better than that of service-learning. Senator John Glenn (National Commission on Service Learning, 2001) best summarized this concept, stating:

> By its very definition, civic responsibility means taking a healthy role in the life of one's community, state, and nation. That means that classroom lessons should be complemented by work outside the classroom. Service-learning does just that, tying community service to academic lessons (p. 7).

In the past 20 years, service-learning programs have found their way into primary, secondary, and higher education institutions throughout the nation. Much of this increased interest in service-learning may be due to efforts in federal funding. Two primary initiatives have fostered the growth service-learning: 1) federal legislation was passed in 1990 that created a commission to award grants for service-learning programs, and 2) the 1993 National Community Service Trust Act provided funding to states for the purpose of promoting service-learning in schools (National Commission on Service Learning, 2001). Additionally, programs such as Learn and Serve America, Higher Education (LSAHE) documented growth in service learning interest by universities through direct grants and sub-grants. The LSAHE funded approximately 100 higher education institutions and organizations with $10 million for service learning programming, and through sub-grants, approximately 500 institutions were involved (Gray, Ondaatje, & Zakaras, 1999).

As a result of the increased interest in service-learning, a plethora of research has been developed in many of the areas it affects. Service-learning provides researchers opportunities to investigate such areas as career development, personal/interpersonal development of students, social outcomes, and community relationships (Eyler, Giles, Stenson, & Gray, 2001). However, educators are often concerned about the impact of service-learning on academic achievement. Few studies exist that focus on the academic aspect of service-learning, as opposed to other studies that center on social/community oriented issues. Overall, findings from studies on academic achievement of students engaged in service-learning have mixed results. Various studies found that academic achievement of students was higher than student counterparts when involved in service learning (Balazadeh, 1996; Gelmon, Holland, & Shinnamon, 1998). Similar studies of student achievement in college courses found no significant difference between students engaged or not engaged in service-learning (Kendrick, 1996; Strage, 2000). Many of the studies on service-learning have occurred within advanced college courses.

However, integration of service-learning activities in academic core courses has not occurred as often (Antonio, Astin, & Cress, 2000; Gray, et al., 1998; Sagaria & Burrows, 1995). The use of service-learning in applying experiential applications to skill development

courses (such as computer courses) in academic core programs would seemingly be practical as well as valuable to long-term retention. In a study of college of agriculture students' self-efficacy of computer skills, Johnson, Ferguson, and Lester (2000) found that students entering as freshmen scored low on computer knowledge assessment and scored below average or average on self-efficacy assessments of specific important skills needed while in college. In analyzing their findings of students' self-efficacy, Johnson, et al. (2000) reflected on similar work by Kinzie, Delecourt and Flowers (1994). Kinzie, et al. (1994) contended that student use of computers is based on their self-efficacy, which can be based on their experiences with the media. Johnson et al. concluded that various computer experiences affect students' self-efficacy ratings, which can serve as a predictor of computer skills and knowledge.

In the study by Johnson, Ferguson, and Lester (2000) findings reflected that 69% of the students rated their self-efficacy regarding presentation graphics software as below average. This study focuses on assessing the impact of service-learning upon students engaged in presentation graphics skills development (Microsoft PowerPoint) in an introductory computer class.

Theoretical Framework

The precepts of service-learning are initially based on the works of John Dewey. Dewey's writings (1916, 1938) often paralleled present-day service-learning concepts. In relation to the development of social development aspects by service-learning, Dewey reflected that actions directed toward the welfare of others stimulate academic and social development. Dewey's (1938) words also provided a basis for the concept of experiential learning as he stated that "there is an intimate and necessary relation between the processes of actual experience and education" (pp. 19-20).

In modern times, Kolb and Fry (1975) built upon Dewey's work, developing the experiential learning model. This model specifies four major elements that occur in the learning process: concrete experience; observation and reflection; the formation of abstract concepts, and testing in new situations. Kolb and Fry argued that learning can begin at any of the four stages; however, one may assert that in service learning the concrete experience would occur at the onset.

Purpose/Research Questions

The primary purpose of the study was to measure the impact of service-learning on academic achievement of students enrolled in an introductory course in agricultural applications of microcomputers. The study was organized around the following research question:

6. What differences in academic achievement, if any, were there among students that were engaged in service-learning and those not engaged in service-learning activities.

For the purpose of analysis, the research question was posed as null hypothesis.

HO_1: There was no difference in the academic performance of students who were engaged in service-learning activities and those who did not participate in service-learning activities.

Methods/Procedures

To determine the impact of service-learning on students' achievement, a non-equivalent control group quasi-experimental design was selected for this study. The Quasi-experimental design (Campbell & Stanley, 1990) allows the researcher to use intact groups with no random assignment to the treatment or the control.

The population of the study consisted of 35 undergraduate/graduate students at Clemson University enrolled in two sections of AGRIC 200, Agricultural Applications of Microcomputers during the spring semester 2002. AGRIC 200 is a freshman-level course designed to provide an overview of microcomputer hardware and software encompassing word processing, spreadsheet, database management, utility, and graphic communications in the College of Agriculture, Forestry and Life Sciences (CAFLS). Class size is set at a capacity of 19 students, 19 students were enrolled in Section 1 and 16 were enrolled in Section 2. A total of 21 students were males (60%) and 14 (40%) were females. Class ranks consisted of 19 Freshmen (54%), 11 Sophomores (31%), 3 Juniors (9%) and 1 each in the categories of Senior (3%) and graduate student (3%). Most of the students were enrolled in agricultural education 15 (43%); 8 students were in Animal and Veterinary Sciences (24%), 3 in Agricultural Mechanics and Business (9%); 2 each in Aquaculture, Fisheries and Wildlife (6%) and Crop, Soil, and Environmental Science (6%), and 1 each in Agricultural Economics (3%), Human Resource Development (3%), Horticulture (3%), and Turfgrass (3%). The class is a required course for students in many of these majors and others in CAFLS.

One pretest/posttest instrument was developed for the study. To guard against selection bias, a pretest instrument was administered to students in both sections during the first session of the semester. A posttest was administered to students on the final day of class to determine the impact of the service-learning activities used in Section 1.

Description of Treatments

As described above, students in both treatment groups were enrolled in the Spring semester of 2002 in either Section 1 or Section 2 of AGRIC 200, Clemson University's course entitled Agricultural Applications of Microcomputers 3(2,2). Students in both sections attended class once per week on a grueling schedule of 100 minutes of lecture followed immediately by 100 minutes of lab. All students used the required text for the course, Microsoft Office 2000; Introductory Concepts and Techniques (Shelly, et al., 2000) and both instructors used the same general format for instruction. Each class meeting included a PowerPoint based lecture, a quiz or exam, and lab time spent working on projects. Projects

were practical applications of concepts covered in the textbook and lectures and were completed by individuals, in pairs, or sometimes in small groups. The instructors circulated during lab time answering questions and occasionally interrupting the entire class to clarify answers to widely encountered problems. Both instructors supplemented the textbook with handouts. Web development was taught completely from handouts since this topic was not covered in the textbook we used. Topics presented in both sections included e-mail, World Wide Web, Windows 2000, computer hardware, Web development, and Microsoft Office applications: Word, Excel, Access, and PowerPoint. Both sections used Clemson's Collaborative Learning Environment (CLE) to handle information exchange and to manage grades.

Students in Section One met Monday evenings 5:15- 9:00 p.m. The instructor covered the course topics in the following order: 1) Internet, email, computer hardware and software; 2) Ethics, history of computers, and Windows 2000; 3) Microsoft Word (3 weeks of instruction); 4)PowerPoint (2 weeks of instruction); 5) Web development (2 weeks of instruction); 6) Access, and 7) Excel (2 weeks of instruction).

In addition to the lectures, quizzes, exams, and lab projects, students in Section One were required to work in groups to complete a service-learning project. This semester-long project consisted of designing and developing a professional PowerPoint presentation that gave an overview of research activities of specific research-oriented faculty in the College of Agriculture, Forestry, and Life Sciences. Students were more involved in the service-learning project over the second half of the semester. A culminating event for the students included presenting their team PowerPoint presentation to their respective faculty at a major presentation at the conclusion of the semester.

Students in Section Two met Tuesday evenings from 3:30 - 7:10 p.m. The instructor covered the course topics in the following order: 1) Internet, email, and the campus network; 2) Ethics, history of computers, hardware, and software; 3) Windows 2000; 4) Microsoft Word (3 weeks of instruction); 5) Microsoft Excel (2 weeks of instruction); 6) Microsoft Access; 7) Microsoft PowerPoint (2 weeks of instruction), and 8) Web development (2 weeks of instruction).

Students in section two were required to work in groups to produce a PowerPoint presentation covering some aspect of South Carolina Agriculture in addition to the lectures, quizzes, exams, and lab projects. This presentation was delivered to the instructor and class peers on the day of the final exam. Students were involved in this project over the last third of the semester with much of the work being finalized in the last week.

Instrumentation

A pretest and posttest instrument was used to collect data for the study. The pretest and posttest were identical and consisted of 50 multiple-choice questions, 41 of which were derived from the course-text ancillary test bank, plus 9 questions developed by the instructors. The questions had been used to evaluate student knowledge in previous semesters. The topics evaluated by the questions included Microsoft Windows 2000, Word,

Excel, Access, Web design, and PowerPoint. The PowerPoint section of the instrument consisted of eight questions and the remaining 42 were equally distributed between the other topics mentioned. Seven of the PowerPoint questions originated from the test bank and one was developed by an instructor of the course. A post-hoc reliability analysis of the posttest revealed an alpha level of .71.

The pretest and posttest were administered during the first and final session of the course, respectively. Attrition occurred as two students in Section One did not take the posttest. Data of the students that missed the posttest were deleted from the database.

Analysis of Data

The research hypothesis was analyzed using analysis of covariance (ANCOVA). The ANCOVA was deemed appropriate for the study at it measures covariance between the pretest and posttest between the control and treatment class sections. An alpha level of .05 was established a priori for the ANCOVA. The researchers realize that a small *N* and a low number of variables in the study may present limitations to the findings. Due to the nature of the course, student enrollment is kept to a minimal number.

Results/Findings

Tables 1 and 2 represent the findings from an analysis of covariance. Knowledge test scores of students involved in service-learning activities and those not involved increased during the semester. The mean cumulative score by students on the PowerPoint section of the computer knowledge exam who participated in the control (class project) was 4.12, whereas the mean cumulative score of students that participated in the treatment (service-learning) was 4.35 (Table 1). Posttest mean scores were not adjusted in the analysis process. The posttest score for the control group was 5.87 and the mean score for the treatment group was 6.82.

The null hypothesis was developed to determine if there was a difference in student achievement on the PowerPoint section of the pretest/posttest knowledge assessment. Although a higher value in the mean score of the treatment group was detected, results of the ANCOVA (Table 2) showed no statistically significant difference between the mean scores. Therefore, the null hypothesis stating that there was no difference in the academic performance of students who were engaged in service-learning activities and those who did not participate in service-learning activities was not rejected.

Table 1.
Pretest and Posttest Means of Students' Scores on Knowledge Assessment of PowerPoint

Group	Pretest Mean	Posttest Mean	
		Adjusted	Unadjusted
Control (*N* = 16)	4.12	5.87	5.87
Treatment (*N* = 17)	4.35	6.82	6.82

Table 2.
Analysis of Covariance of Students' Scores on PowerPoint Knowledge Assessment

Source	*df*	*MS*	*F*	*p*
Intercept	1	105.81	47.93	.000
Covariate (Pretest)	1	7.34	3.324	.078
Error	30	2.20		

Conclusions/Recommendations/Implications

Conclusions

Students who participated in service-learning activities in AGRIC 200 did not achieve any higher PowerPoint scores than those participating in a traditional class PowerPoint group project. These findings are similar to those from other studies on service learning that found no significant difference in learning (Kendrick, 1996; Strage, 2000).

Recommendations

Although caution must be taken when considering time commitments required by service-learning, the researchers recommend that future courses in AGRIC 200 should consider integrating service-learning activities. As noted by the researchers previously, many variables (including sample size and number of variables) may have impacted the outcomes of the study.

Recommendations for Future Research

More research is needed to explain the effectiveness of service-learning activities in introductory computer classes. Based on the nature of this study, the results cannot be generalized to other populations or subject matter. Such studies could include an analysis of the social concepts traditionally studied with courses that integrate service-learning.

Additional studies for future studies should investigate possible relationships between commitments of time required in service learning to students' achievement. Similarly, student perceptions toward service-learning in computer courses should be considered.

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The Role of the Cooperative Extension Service as Perceived by North Carolina Cooperative Extension Service Administrators

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Abstract

The purpose of this study was to ascertain the attitudes and perceptions of North Carolina Cooperative Extension administrators about the role, function, and current issues of Cooperative Extension. This research was a descriptive study using a modified Delphi technique. The population for this study consisted of 23 administrators' positions in North Carolina's Cooperative Extension that included all current North Carolina Extension administrators (state specialists and district directors). Each administrator was mailed and emailed a letter explaining the purpose and the process of the study as well as an invitation to participate. Shortly afterwards an email containing a hypertext link to a website where the instrument was located was sent to each individual. Only 11 administrators participated in the study.

This study used a, HTML questionnaire. Dillman (2000) suggested that University faculty, government employees, and other professionals who use email regularly are good candidates for email surveys. The open-ended questions used in Round I were pilot tested by a panel of Cooperative Extension Administrators of the University of Missouri-Columbia.

Findings of the study revealed that administrators in North Carolina believe in the Cooperative Extension mission; however, they believe that it should reflect more than it does. They believe that community development, leadership development, and environmental education are or should be a part of the overall extension mission. They predict that funding will be affected due to competition and poor political support. Also they believe that extension has to work hard to develop linkages within the community to help with marketing.

Introduction

The Cooperative Extension Service (CES) is the largest educational system of its kind in the world and operates as the outreach arm of land grant colleges. Cooperative Extension is comprised of a Federal office in the Cooperative State, Research, Education, and Extension Service (CSREES) of the United States Department of Agriculture and State Extension Services situated within the land grant college complex (Hightower, 1973; Report to Congress, 1981). The original mandate of the extension service was to assist people of rural America in identifying and solving their farm, home, and community problems. The mandate remains, however, the nature of Cooperative Extension has changed in order to meet the demands of a changing society. As a result, extension has undergone organizational changes and program improvements, such as revising its mission and organizational culture. In addition to internal changes, extension has focused on other improvements such as changing its image, revising program curricula, and updating delivery methods. Such changes are the responsibility of the organization's leaders and administrators. An organization's activities and direction are related to the attitudes of its administration (Yukl, 1998). This study examined the perceptions of North Carolina state extension administrators who are responsible for allocating funds, providing organizational support, and implementing policy.

Conceptual Framework

Based on both the literature review and the theoretical framework presented earlier in this study, a conceptual model is presented Figure 1, illustrating administrative influence on the direction of change in an organization. In the case of Cooperative Extension, where policy makers and administrators may or may not be one in the same; this means that the administration must support new directives for major changes to successfully occur.

The model illustrates the team approach practiced by CES. Where state administrations, state personnel, and federal administration, elect representatives to serve on the ECOP thereby giving each group equal voice in policy decisions. However, once policy has been implemented the balance of power changes. For instance at the state level local agents enjoy great freedom to plan, implement, and evaluate programs. However Land-grant administrators, state specialist and directors are responsible for implementing policies and initiatives, determining statewide issues, developing training programs, evaluating programs and conducting research. From a theoretical perspective this implies that the perception's of the administration influences the type of programs state's implement.

The intent of this study is to determine the perception of state administrators regarding policy and issues of the Cooperative Extension system using the assumption illustrated by this conceptual model as a base for discussion.

Conceptual Framework

Administrative Guidance of Organizational Change

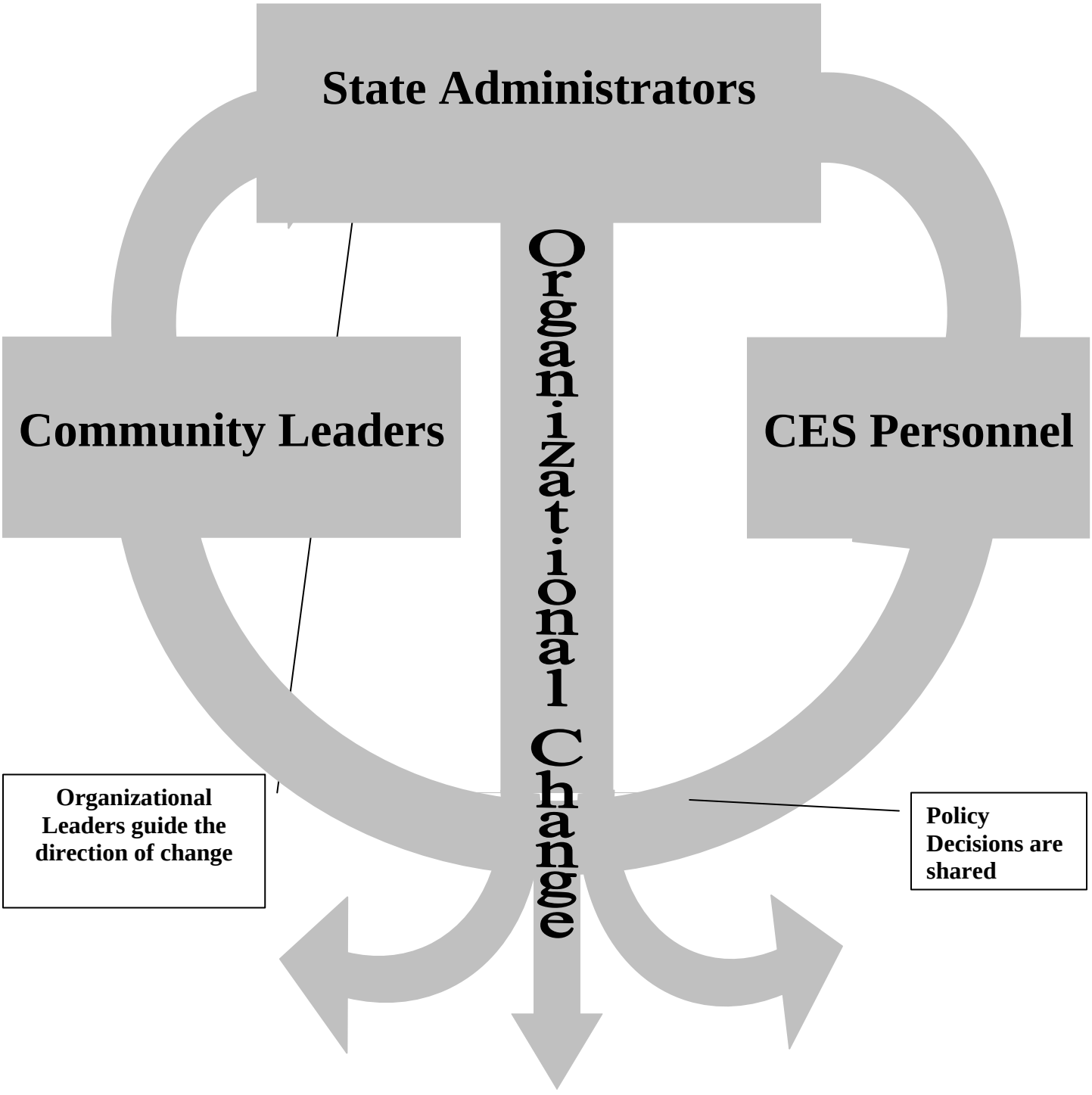

Figure 1. Administrative Guidance of Organizational Change.

Purpose and Objectives

The purpose of this study was to ascertain the attitudes and perceptions of North Carolina Cooperative Extension administrators about the role, function, and current issues of Cooperative Extension. This research was a descriptive study using a modified Delphi technique to answer the following questions:

1. What is or should be the primary mission of the Cooperative Extension Service in the next 3-5 years?
2. What are the major funding issues faced by the Cooperative Extension System in the next 3-5 years?
3. What are the major societal issues facing the organizational structure of the Cooperative Extension System in the next 3-5 years?
4. What are the major political issues faced by the Cooperative Extension System in the next 3-5 years?
5. What future issues do administrators predict for the Cooperative Extension System in the next 3-5 years?

Methodology

This study was conducted using a modified Delphi procedure. The traditional Delphi procedure is a method of obtaining consensus among a group of experts (Linstone & Turoff, 1975). The major modification to the Delphi for this study was the use of a computer mediated process. Conducting a Delphi through computer mediation allows for a more stringent anonymity process (Turoff & Hiltz, 1998). A traditional Delphi uses a somewhat quasi- anonymity process; generally pen names or some other form of tracking in order to personalize the instrument after the second round so that participants can see how they answered in the previous round. This study provided group ratings but did not track individual participant responses. The advantage of this modification to the Delphi is that it prevents individuals from influencing the views of others, and improves the quality of responses by removing the pressure of forced consensus.

Panel Selection

There were 23 administrators in North Carolina's Cooperative Extension. Seventeen were affiliated with the state's 1862 institution while the rest were affiliated with the 1890 institution. Each administrator was sent a letter explaining the purpose and the process of the study and shortly afterwards an email containing a hypertext link to a website where the instrument was located. Only 11 of the 23 administrators decided to participate in the study.

Instrumentation

The purpose of the instrument was to develop questions that would elicit responses regarding the role, function, and current issues of Cooperative Extension. The instrument

was designed using the following procedures of a typical Delphi. The instrument developed contained open-ended questions. The three questions included were as follows:

1. What are the major funding, social, and political issues faced by the Federal systems of the Cooperative Extension Service in the next 3-5 years?
2. What is, or should be, the primary mission of state and local extension programs in the next 3-5 years?
3. What future issues would you predict for the Cooperative Extension System in the next 3-5 years?

Reliability and Validity

There was a question of reliability and validity of the Delphi process. Careful administration of the Delphi procedure will strengthen the reliability of the method. According to Hill and Fowles (1975) validity of the Delphi method may be examined in two ways. First, ask the question: are the forecasts accurate predictions of the future? The second question refers to the potential validity of the method rather than just the data that is derived from the process. In other words does the instrument actually retrieve useful information (i.e., is this instrument accurately measuring what it was intended to measure?) Weatherman and Swenson (1974) suggested that the selection of panel members, clarity of the instrument, and independence of responses are critical to the validity and reliability of the study when using the Delphi method.
To address these issues the open-ended questions used for the instrument in Round I were tested and validated by a panel of Cooperative Extension Administrators of the University of Missouri-Columbia. The group was instructed to examine the questions and to identify other questions that might be needed, as well as make suggestions for improving clarity.

Delphi Rounds

Round One

The process began with three open-ended questions on a one-page web-instrument that asked participants to provide in writing, insights about issues that Extension will face in the next 3-5 years. The pre invited participants in this research study included all (N=23) current North Carolina Extension administrators (state specialist and district directors). An email was sent with an URL to a website containing the instrument as a web instrument on 2/24/2002, resulting in 11 responses (47% response rate). One week later 3/3/2002, in an attempt to improve the response rate another email was sent. Table 1 presents categories that emerged from an examination of the most common themes in the first round.

Table 1.
Key Themes Supported by First Round Responses

Issues	
Inadequate funding	Re-designing the infrastructure and marketing of educational programs
Community development	Program relevance
Interdisciplinary	Focus on leadership development
Focus on serving a more diversified population	Environmental issues
	Urbanization

Round Two

The resulting series of statements that emerged in round one were sent to 11 participants in an email on April 1, 2002, along with an URL to a web instrument containing the issues identified in round one in statement format to be rated on a 5-point Likert-type scale, where 1 represented "Strongly Agree", 2 "Agree", 3 "Disagree" 4 "Strongly Disagree", and 5 represented, "Not applicable" (1 = SA, 2 =A, 3 = D, 4 = SD, 5 = NA). Each of the participants was encouraged to provide any additional comments and/or questions as related to any of the statements from round one. The responses from the second round of surveys were collected and analyzed by calculating the mean, median, mode and interquartile range in order to identify both the range of consensus and the areas of conflicting views using the Statistical Package for Social Sciences (SPSS), version 10.0. A follow-up email was sent on April 5, 2002. Responses were received from 11 panel members. One week later 4/12/2002, in an attempt to improve the response rate another follow-up email was sent. The results of round two are presented in Table 2. Interquartile range (IQR) scores indicate consensus on every item with the exception of 4 and 9. Consensus was considered to have been achieved when interquartile scores were equal to or above the 50th percentile. Statements falling below the 50th percentile were considered to have conflicting views.

Table 2.
Means, Standard Deviation and Frequency of Responses for Round Two (N=11)

	Statements	Frequency		M	SD	IQR
Q1	Inadequate funding due to political support is an issue that will be faced by both the state and Federal systems of the Cooperative Extension Service in the next 3-5 years.	SA	7	1.09	.30	1
		A	4			
		D	-			
		SD	-			
		NA	-			
Q2	Inadequate funding due to program relevance is an issue that will be faced by both the state and Federal systems of the Cooperative Extension Service in the next 3-5 years.	SA	2	2.09	.70	2
		A	7			
		D	1			
		SD	1			
		NA	-			
Q3	Inadequate funding due to increased competition is an issue that will be faced by both the state and Federal	SA	2	1.90	.30	2
		A	6			

	systems of the Cooperative Extension Service in the next 3-5 years.	D SD NA	3 - -			
Q4	Inadequate funding due to interdisciplinary conflicts is an issue that will be faced by both the state and Federal systems of the Cooperative Extension Service in the next 3-5 years.	SA A D SD NA	2 1 8 - -	2.09	.70	3
Q5	Community development is or should be a part of the primary mission of state and local Extension programs in the next 3-5 years.	SA A D SD NA	5 6 - - -	2.09	.70	2
Q6	Focusing on leadership development is or should be a part of the primary mission of state and local Extension programs in the next 3-5 years.	SA A D SD NA	4 6 1 - -	2.09	.53	2
Q7	Focusing on environmental issues is or should be a part of the primary mission of state and local Extension programs in the next 3-5 years.	SA A D SD NA	2 7 1 1 -	1.90	.53	2
Q8	Utilizing interdisciplinary resources is or should be a part of the primary mission of state and local Extension programs in the next 3-5 years.	SA A D SD NA	2 8 - - 1	1.72	.46	2
Q9	Urbanization issues will negatively affect the Cooperative Extension System in the next 3-5 years.	SA A D SD NA	1 2 5 3 -	1.90	.83	3
Q10	Urbanization issues will positively affect the Cooperative Extension System in the next 3-5 years.	SA A D SD NA	8 - 3 - -	2.18	.60	2
Q11	Multicultural concerns will greatly affect the Cooperative Extension System in the next 3-5 years.	SA A D SD NA	2 7 2 - -	3.0	.77	2
Q12	Re-designing the infrastructure and marketing of	SA	3	1.81	.60	2

educational programs will be important to the Cooperative Extension system in the next 3-5 years.	A	6	
	D	1	
	SD	1	
	NA	-	

Round Three

The resulting series of statements that emerged in round two were sent to participants in an email on April 19, 2002, along with an URL to a web instrument containing the statements from round two to be rated on a 5-point Likert type scale, where 1 represented, "Strongly Agree", 2 "Agree", 3 "Disagree" 4 "Strongly Disagree", and 5 , "Not applicable" (1 = SA, 2 =A, 3 = D, 4 = SD, 5 = NA). Participants were also encouraged to take the round two survey if they had not done so already. A follow-up email was sent on May 3, 2002. Eleven persons responded. The results of round three are presented in Table 3. Interquartile range scores indicated consensus on every item with the exception of statement 11. Note that six of the items (detonated by an asterisk *) for this round were modified slightly in order to better determine the group's position on particular issues. This modification was based on percentile rankings and additional comments.

Table 3.
Means, Standard Deviation and Frequency of Responses of Round Three (N=11)

	Statements	Frequency		M	SD	IQR
Q1	Inadequate funding due to political support is an issue that will be faced by both the state and Federal systems of the Cooperative Extension Service in the next 3-5 years?	SA	9	1.36	.50	1
		A	1			
		D	1			
		SD	-			
		NA	-			
Q2	Inadequate funding due to program relevance is an issue that will be faced by both the state and Federal systems of the Cooperative Extension Service in the next 3-5 years?	SA	2	2.18	1.0	2
		A	6			
		D	3			
		SD	-			
		NA	-			
Q3	Inadequate funding due to increased competition is an issue that will be faced by both the state and Federal systems of the Cooperative Extension Service in the next 3-5 years?	SA	1	2.09	.70	2
		A	10			
		D	-			
		SD	-			
		NA	-			
*Q4	Extension is successfully competing with the private sector to meet the social and economic needs of society.	SA	2	2.54	.82	2
		A	6			
		D	3			
		SD	-			
		NA	-			
*Q5	Community Development is the primary mission of state and local Extension programs?	SA	2	1.54	.52	2
		A	6			
		D	3			

		SD	-			
		NA	-			
*Q6	Providing leadership training is a part of the primary mission of state and local Extension programs?	SA	1	1.72	.64	2
		A	8			
		D	2			
		SD	-			
		NA	-			
*Q7	Educating the community about environmental issues is a part of the primary mission of state and local Extension programs?	SA	2	2.18	1.0	2
		A	8			
		D	1			
		SD	-			
		NA	-			
*Q8	Focusing on interdisciplinary research and collaboration with other disciplines will affect the success of Extension in the next 3-5 years?	SA	3	2.09	1.0	2
		A	8			
		D	-			
		SD	-			
		NA	-			
*Q9	Focusing on increasing the percentage of persons served in urban communities will affect the success of Extension in the next 3-5 years?	SA	4	2.90	.94	2
		A	4			
		D	3			
		SD				
		NA	-			
Q10	Urbanization issues will positively affect the Cooperative Extension System in the next 3-5 years?	SA	-	2.27	.46	2
		A	5			
		D	3			
		SD	2			
		NA	1			
Q11	Multicultural and diversity concerns will have a negative affect on the effectiveness of the Cooperative Extension System in the next 3-5 years?	SA	-	2.0	.63	3
		A	3			
		D	5			
		SD	3			
		NA	-			
Q12	Re-designing the infrastructure of the Cooperative Extension System will become an important issue in the next 3-5 years.	SA	3	2.0	.89	2
		A	7			
		D	1			
		SD	-			
		NA	-			

* detonates modified questions

Data from rounds one and two were analyzed using four measures of central tendency: mean, median, mode, and interquartile range. This statistical information on how the group as a whole rated various statements was summarized and sent electronically to the participants in round three, where they were given one final opportunity to rate each of the

items based on the new information**,** along with any additional comments made during round two.

Conclusions

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

1. The mission of extension in North Carolina is to help people put research-based knowledge to work to improve the quality of life. This is similar to the original mandate set forth in the Smith-Lever Act. Administrators in North Carolina believe in the mission; however, they feel that it should reflect more then it does. They feel that community development, leadership development, and environmental education are or should be a part of the overall extension mission. Perhaps with the creation of national goals for the overall extension system this mission will change and include these elements.

2. The prediction is that funding will be affected by competition from the private sector and poor political support. Large corporations spend millions of dollars to convince people that their product/service is the best. This often results in consumers believing that "the more you pay the better it is", in other words when you pay for information/services you get better quality and more reliable services, thus the ole saying "you get what you pay for". Extension offers it services for free, unless the consumer is familiar with extension, they may hesitate to participate (Deyoung, B., 1988; Maddy, D., and Kealy, L., 1998; Hogan, M., 1994; Frederick, A.L., 1998).

3. Political support is also affected by competition from the private sector, in the form of advertising. The affects of corporate marketing and advertising on an individual that already has a poor perception about agriculture is detrimental to extension. Along with that formula, we live in an age where "Big Government" is seen negatively. Some perceive government sponsored programs, like extension, are in the same category as social welfare programs and are usually the first to be cut in regards to funding.

4. The rapid growth rate of the urban sector is another problem that will affect extension. Currently 48% of North Carolina is urban while the remainder (52%) resides in rural districts (Matthews, 1999). Farms in North Carolina are disappearing at a rate of more than one a day and are being replaced by buildings and parking lots. This means that extension will have to change its target audience. It also means that extension has to work hard to develop linkages within the community to help with marketing.

Recommendations for Further Research

The following recommendations are made for future research studies:

1. Further research should be conducted to examine the differences in extension mission statements and visions from state to state to determine what each state believes to be the mission. This would serve as an important step toward developing a national mission statement.

2. Further research should be conducted in North Carolina to determine diversity related issues such as the level of knowledge and perceptions of extension personal.

3. Further research should be conducted to examine the effectiveness of web surveys versus email or paper surveys among extension personnel. Using the internet to deliver surveys is more economical than using paper. As researchers move toward using this medium more, it will be important to understand how it changes the effectiveness.

4. Further research needs to be conducted with extension administrators in other states to determine if the results of the current study are unique to one state. Such research is needed in order to develop a standard mission statement that every state can use. In order to compete with corporations, extension must begin to view itself as a business rather than a government agency. The ECOP has taken the first step by establishing national goals for the extension system.

5. Research should be conducted to examine the effectiveness of using mass media marketing plans to promote Extension.

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Choosing to Use the Web: Comparing Early and Late Respondents to an Online Web-based Survey Designed to Assess IT Computer Skills Perceptions of County Extension Agents

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Abstract

Research was conducted to compare early versus late respondents to an online Web-based survey designed to assess perceived computer IT skills of a population of cooperative extension agents. Two-hundred ninety-nine respondents returned the survey, 21 returning by paper and 278 by electronic form. Response rate to the survey was 90.3%. Results showed that, overall, respondents self-rated their overall computer IT skills to be either "average" or "above average." In general, demographics for early and late online respondents tended to be comparable, although late online respondents tended to skew more female than early online respondents. In addition, more early online respondents rated their IT computer skills as average or above average than did late online respondents.

In addition to the finding that a large majority of respondents rated their IT computers skills as at least average or above, results of this study provided some support for the use of Web-based survey techniques in terms of achieving an effective response rate and, to a lesser extent, comparability of early and late respondents. Recommendations stemming from this research include supporting further refinement of Web based survey techniques, including developing a model for comparing relevant variables, such as prior experience with Web surveys, computer and Web competencies, level, type and speed of computer access and overall motivation to use computers, as a means to verify and insure validity of online survey results .

Introduction

The use of self-administered surveys has been viewed as a vital tool for social science researchers, including those in agricultural education (Fraze, Hardin, Brashears, Haygood & Smith, 2002). Traditionally, survey data has been collected in a variety of formats by a wide range of researchers attempting to describe and understand demographic, perceptual and performance factors related to psychological and psychosocial processes. In education research, surveys are considered to be the most commonly used method of data collection activity (Ary, Jacobs & Razavieh, 2002). But, although survey methods have the advantage of being efficient in terms of instrument development and testing and analysis, dissemination of survey instruments via telephone and mail can be expensive, time consuming and prone to non-response and coverage error (Dillman & Bowker, 2001).

In increasing numbers, researchers, including those in agricultural education, have begun to turn to Web-based surveys methods as a mechanism to reduce time and expense and potentially, for discrete populations of respondents for whom the variables of interest would theoretically hold salience, enhance response rate and time of return over traditional mailed methods. In an attempt to ascertain the utility and validity of Web-based surveys, as well as develop procedures for optimal utilization of these methods, recent studies in the discipline have been conducted to assess perceptions of respondents and potential differences between those who respond via the Web and those who respond on paper (Fraze, Hardin, Brashears, Haygood & Smith, 2002; Ladner, Wingenbach & Raven 2003). For example, in a computer technology assessment study of American Association of Agricultural Education (AAAE) members, Wingenbach, Lander and Newman (2002) found that Web surveys were perceived by AAAE member respondents as a valid and reliable method for data collection, although those respondents who returned their surveys via the Web were significantly more positive in terms of their perceptions than those who returned the survey via hard copy paper instrumentation. In a study of educational preferences of 323 Cooperative Communicators of America members, Brashears, Bullock and & Akers (2003) found Web survey methods 74% less expensive than other survey methods.

Theoretical/Conceptual Framework

Since the advent of the Web, researchers have sought to understand how individuals make the decision to utilize the online environment for information processing purposes as opposed to other more traditional methods. From a theoretical standpoint, adoption behavior, commonly thought of as how early or late in a diffusion cycle one adopts a new product, idea or innovation, is a construct developed from Rogers and Shoemaker's diffusion of innovations framework. In their original conceptualization, Rogers and Shoemaker defined adoption behavior as the relationship between the time at which an individual chooses to adopt a technological innovation and the time at which other members of his/her social system do so (Rogers & Shoemaker, 1971). Rogers (1995) described the usual process of implementing an innovation as being comprised of knowledge, persuasion, decision-making,

implementation, and confirmation. But he also argued that prior attitudes toward an innovation frequently intervened between knowledge and decision (attitude and behavior), and that there are instances where attitudes and actions are not consistent.

Daft and Lengal (1986) extended the diffusion of innovations framework to focus on the decision to use a specific information channel. They argued that the information richness, defined as the ability of information to change understanding within a time interval (p. 560) of an informational channel influenced the decision making processes of managers. The researchers argued that individuals cognitively weigh a combination of evaluative factors when making the decision as to what channel would be most effective to utilize. When faced with a volitional choice, such as making use of a technological innovation to complete an information transmission activity like filling out a web survey, information richness theory posits that individuals evaluate the information richness of a channel, combined with attitudes and perceptions toward the channel's appropriateness for a given task. Within this framework, face to face and telephone are seen as the most information rich channels, followed by print and then electronic forms of communications such as web and email.

Although the first electronic surveys conducted via the Internet were in fact predominately done through e-mail (Solomon, 2001), the advent of the World Wide Web introduced electronic surveys created in hypertext markup language (HTML) – known as "Web-based surveys" (Solomon, 2001, p.2). Due to their low cost relative to conventional surveys (paper-based, face-to-face, computer-assisted telephone surveys, etc.), and their ability to quickly return copious amounts of data from the tremendous populations they reached, Web-based surveys experienced explosive growth (Dilman & Bowker, 2001; Yun & Trumbo, 2000; Solomon, 2001). But if individuals draw on different types of evaluative information in order to choose whether and how to respond to web based surveys, how comparable and representative are results from these types of surveys?

Research suggests that validity may be an issue with some forms of web based surveys, depending on the administration technique. Perhaps more so than conventional surveys, those conducted via the Web may be subject to various sources of potential survey error. Coverage error, or the error resulting from drawing a sample that does not adequately represent a population, is of particular concern in Web-based surveys – especially those of the general public (Coomber, 1997; Dilman & Bowker, 2001; Solomon, 2001). Though this situation is seen as mitigating in the future as more individuals use the Web (Coomber, 1997), currently not everyone has access, and/or is reluctant to use the web for certain activities, which can create sample bias issues. According to Dillman & Bowker (2001), however, "Some populations – employees of certain organizations, members of professional organizations, certain types of businesses, students at many universities and colleges, and groups with high levels of education – do not exhibit large coverage problems. When nearly

all members of a population have computers and Internet access, as is already the case for many such groups, coverage is less of a problem" (p. 5).

Non-response error, though, remains a concern for all surveys, both Web-based and conventional. As Bosnjak & Tuten (2001) put it: "Non-response is of particular importance to researchers because the unknown characteristics and attitudes of non-respondents may cause inaccuracies in the results of the study in question" (p. 2). Dillman & Bowker (2001) indicate that response to Web-based surveys is likely to be low, and can potentially cause non-response error. Addressing ways of reducing survey error as they pertain to Web-based surveys, Dillman & Bowker (2001) contended that proper use of the introductory page, choice of first question, visual appearance of questions, and use of graphical symbols or words to convey level of completion of the survey are all ways to reduce potential sources of error. Extending from Dillman's own work on the subject (2000), they contended that non-response error can be reduced by including an email invitation cover letter to ask for participation from respondents before sending out the actual survey, as well as a series of timed email reminders urging participation after the survey has been sent out. As a means to combat non-response due to reluctance to use the Web, they advised that a paper-based version for the instrument should be sent to those who do not respond to the initial waves of the electronic version of the survey.

Another potential issue for web based surveys is time of response. Studies suggest that respondents who choose to fill out a survey online are likely to return the survey more quickly, often within the first few days, although the overall rate of response may be lower than that of traditional paper-based methods. For example, in an experimental study of Web-based versus paper-based respondents, Ladner, Wingenbach, and Raven (2002) found that although paper based respondents had an overall higher rate of response, during the first week, Web based respondents returned their surveys at a significantly higher rate than did paper based respondents. Based on their findings, the researchers proposed a survey methodology for the Web they termed the Web/Paper Survey Data Collection Model, or W/PSDC, also referred to as the Bi-Modal Survey Model (Brashears, Bullock & Akers, 2003; Fraze, Hardin, Brashears, Haygood & Smith, 2002). This approach gives individuals a period of time to complete a Web-based survey instrument, but then sends a paper copy of the survey instrument to those individuals who have not completed the Web-based version.

Although promising new techniques have been developed, and surveying via the Web has been shown to be more cost efficient and preferred by some respondents over traditional methods, questions remain as to its effectiveness and representativeness. Can web methods generate effective response rates? And, if a significant portion of online respondents do return surveys earlier than other respondents, how comparable are early versus late online respondents in terms of their responses to variables under study?

Purpose and Objectives of the Study

This study was initially conducted to assess the use of information technology (IT) by a statewide population of county Extension agents. Ten years previously Ruppert (1992) had conducted a similar survey in the same state which indicated that although 92.7% of respondents had access to a computer, and used it on average, 28.64 hours week, 54.4% did not have a computer on their desk. Many agents shared a computer with a colleague or staff. Less than one third of the respondents reported they used a computer at home. Female agents had less access to a computer than males, and fewer females had a computer on their desk than did males. Ruppert also found that "age, program area, typing, computer training and computer resource contact were all significant demographic and situational independent variables that affected the overall computer use mean score of county agents" (Ruppert, 1992, p. 102).

Based on the above, the purposes of this study were two-fold: first, to follow up on the 1992 study with a view toward assessing county Extension agents' current use and perceptions of information technology, and second, to utilize survey results to assess the degree to which use of a web-based survey technique could be utilized to yield both an acceptable response rate and comparable online respondents with respect to time of response and variables of interest. As such, objectives for the study were to:

(1) Describe respondents to a bi-modally administered Web-based survey of a state's county extension agents in terms of their demographic characteristics and selected variables under study, in this case, gender and self rated computer IT skills.

(2) Compare early and late online respondents with respect to gender and self-rated computer IT skill.

Methods and Procedures

The population for this descriptive survey study was county Extension agents in the employ of a state Cooperative Extension Service. At the time the study was initiated, this population numbered 331. The descriptive survey instrument utilized in the study was adapted from an IT computer skill assessment instrument developed by Albright (2000) that had been used to assess county extension faculty IT use in Texas. The instrument contained 99 items that collected information on software skills, patterns of computer IT use, and future software training needs of county extension faculty.

In addition to specific demographic characteristics associated with the respondent, the instrument included items asking the respondent if they could perform specific computer technology skills associated with eight types of computer software (i.e., e-mail, word processing, etc.). Respondents were also asked to estimate the average number of hours they

"were on the computer" per week, and to respond to a series of five point Likert type items asking them to rate their overall IT skills. The instrument was reviewed by a panel of experts for face and content validity, and then pilot tested with a small group of agents.

After minor refinement of the survey, the full Web-based survey was subsequently introduced by a message e-mailed to all county agents from the Dean for Extension. The study commenced with a follow-up e-mail message from the researchers containing specific information on the survey's rationale, a hyperlink to the World Wide Web site hosting the survey instrument, and the agent's unique, individualized access code. Six reminder messages were subsequently sent to those who had not responded. After the sixth wave, agents who had not filled in the Web-based instrument were sent a survey packet via conventional mail. The information in this package contained language indicating that the survey could alternately be filled out online, and provided the URL to the site and the individual's unique access code. A single reminder message was sent by post two weeks thereafter to those agents who had not returned the paper survey, or who had not completed it online.

Two hundred ninety-nine agents, or 90.33% of the population, ultimately completed the survey. Of these, 278 filled out the survey online, while 21 completed the paper version of the survey. To assess reliability of the final instrument, Chronbach's alpha statistic was calculated, resulting in a standardized item alpha of .83 for the overall scale. Based on the fact that this was a census study, data analysis, conducted with SPSS 10.0, consisted of frequency distributions and descriptives which were calculated for all appropriate survey items.

Findings

Objective one. Describe county agents in terms of their demographic characteristics and self rated overall computer IT skills.

By gender the respondents were 57.86% female, and 42.14% male, a figure close to that of the general population of county Extension agents (58.01% female and 49.99% male) as verified by consulting the current personnel employee database. The majority of respondents (63.54%) indicated that their age fell between 41 and 50 years. Most respondents (69.90%) reported work experience, including both inside and outside of Extension, of 16 or more years. Table 1 presents this information.

Table 1.

Number of Respondents by Gender, Age and Years of Work Experience (N = 299*)*

Characteristic	***N***	***%N***
Gender		
Male	126	42.14
Female	173	57.86
Age Group		
20-30	35	11.71
31-40	51	17.06
41-50	97	32.44
51-60	93	31.10
61-70	19	6.35
No response	4	1.34
Years Work Experience		
Less than 5 years	22	7.36
5-10 years	31	10.37
11-15 years	34	11.37
16+ years	209	69.90
No response	3	1.00

Agents were asked to self-rate their overall computer IT skills on a scale from "poor" to "excellent." As shown in Table 2, 84.95% of the respondents reported their skills to be either "average" or "above average." By gender, 85.37% of the males, and 84.97% of the females rated their skills as being either "average" or "above average."

Table 2.

Self-rated Overall IT Skills for All Respondents (N=299)

Overall IT Skills Rating	*N*	*%N*
Very Poor	3	1.00
Poor	18	6.02
Average	129	43.14
Above Average	125	41.81
Excellent	22	7.36
No Response	2	0.67

When asked about average computer use per week, one hundred-thirteen agents (37.79%) responded that they use their computers, both at home and at work, over 20 hours a week. Another 78 agents (26.09%) reported computer use at between 16-20 hours per week.

Table 3.

Hours of Computer Use per Week for All Respondents (N=299)

Level of Use	*N*	*%N*
1-5 Hours/week	18	6.02
6-10 Hours/week	44	14.72
11-15 Hours/week	46	15.38
16-20 Hours/week	78	26.09
20+ Hours/week	113	37.79

Objective two. Describe early and late online respondents with respect to self-rated computer IT skill and hours of computer usage per week.

To assess the early and late online groups, the online respondents (n=278), were divided into percentage quartiles (Glenn D. Israel – Personal communication, October 2002). The first (n=65) and last (n=65) quarters of these respondents were chosen to form the early and late groups, respectively. Demographics for the early online respondents and late online respondents were then assessed. Results indicated that both early and late online groups were essentially comparable. The average age range for both early and late online respondents was 41-50; average years of work experience 11-15 years; and hours of computer usage per week 16-20 hours. With respect to gender, however, as is shown in Table 4, based on visual inspection, the percentages of male (44.62%) and female (55.38%) early online respondents are essentially equal to the percentages of gender for all respondents. This changes for the late online respondents, with females (64.62%) constituting a greater percentage of this category.

Table 4.

Frequency and Percent by Gender for the Early and Late Online Response Groups

Response Group	Male		Female	
	N	*%N*	*N*	*%N*
Early Online Respondents	29	44.62	36	55.38
Late Online Respondents	23	35.38	42	64.62

The analysis then examined the Early Online Respondents and Late Online Respondents in terms of self-rated computer skills. Results indicated that, for early online

respondents, 89.23% of the respondents reported their skills to be "average" or "above average." For late online respondents, 83.08% rated their skills as being "average" or "above average", indicating, upon visual inspection, slightly more early respondents rating their skills as average or above average (n=58) than late respondents (n=54).

Table 5.

Self-rated Overall IT Skills for Early and Late Online Respondents

	Early Online Respondents		*Late Online Respondents*		*Diff.*
Overall IT Skills Rating	*N*	*%N*	*N*	*%N*	
Very Poor	1	1.54	2	3.08	-1
Poor	2	3.08	5	7.69	-3
Average	31	47.69	28	43.08	+3
Above Average	27	41.54	26	40.00	+1
Excellent	4	6.15	4	6.15	0

Finally, respondents were asked to evaluate the convenience of, and their intent to respond in future to an online Web based survey. Over two-thirds (68.56%) of the respondents rated Web-based surveys to be of average, above average, or high convenience. Over three-quarters (76.55%) said they would be likely, more than likely, or highly likely to respond to a Web-based survey. Agents' response when asked to estimate how many Web-based surveys they had participated in ranged from a high of 45 to a low of 0 (mean = 5.60).

Discussion, Conclusions, and Recommendations

This study sought to explore the comparability of early and late respondents to a web based survey. Findings of the study showed that respondents were 57.86% female, and 42.14% male, a figure close to that of the general population of county Extension agents (58.01% female and 49.99% male) in Florida. The majority of respondents (63.54%) indicated that their age fell between 41 and 50 years. Most respondents (69.90%) reported work experience, including both inside and outside of Extension, of 16 or more years. With respect to overall computer IT skills, 84.95% of the respondents self-reported their skills to be either "average" or "above average." By gender, 85.37% of the males, and 84.97% of the females rated their skills as being either "average" or "above average." When asked about average computer use per week, one hundred-thirteen agents (37.79%) responded that they use their computers, both at home and at work, over 20 hours a week. Another 78 agents (26.09%) reported computer use at between 16-20 hours per week.

Results describing early and late online survey respondent groups showed that they were essentially comparable in terms of age, (41-50); average years of work experience (11-15 years); and hours of computer usage per week (16-20 hours). With respect to gender, based on visual inspection, the percentages of male (44.62%) and female (55.38%) early

online respondents were essentially equal to the percentages of gender for all respondents. This changes for the late online respondents, with females (64.62%) constituting a greater percentage of this category for this group. In terms of self-rated computer skills, results indicated that, for early online respondents, 89.23% of the respondents reported their skills to be "average" or "above average." For late online respondents, 83.08% rated their skills as being "average" or "above average", indicating, upon visual inspection, slightly more early respondents rating their skills as average or above average (n=58) than late respondents (n=54). Finally, respondents were asked to evaluate the convenience of, and their intent to respond in future to an online Web based survey. Over two-thirds (68.56%) of the respondents rated Web-based surveys to be of average, above average, or high convenience. Over three-quarters (76.55%) said they would be likely, more than likely, or highly likely to respond to a Web-based survey.

Results of this study suggest that the Web-based bi-modal methodology used to administer the survey was, in general, effective, in terms of generating both a high response rate and comparability on selected variables under study. The overall response rate was extremely high, indicating that Web based methods can generate high levels of response when multiple waves in both electronic and print form are utilized.

Overall, these findings provide some support for the effectiveness of Web based surveys, although a key implication of these findings is the need to carefully consider the influence of the variables of interest before undertaking this approach. In this study, although statistical comparisons cannot be made, the pattern of response between early and late online respondents with respect to gender and self rated overall computer IT skills did appear to vary somewhat.

Limitations of this study include that it was conducted with respondents from one state's Cooperative Extension Service, thus limiting its generalizability, and that variables under study that could be relevant were limited in number. Due to the growing popularity of online survey methods, a need exits to continue and expand on this research, perhaps utilizing large sampling frames and multivariate techniques in order to develop a better understanding of individual decision making processes with respect to choosing and manner of responding to a web based survey.

Specific recommendations stemming from this research include the following:

- When conducting any web-based study, take care to carefully consider the relevance of the study and topic to the sample or population being targeted. In the case of the present study, the topic was highly relevant to the population, and may have had a bearing on final response rate as a result.

- Carefully consider potential sources of bias and non-comparability beforehand, as well as utilize other sources of data to provide verification, where possible, of population and sample distributions.
- When collecting data via a web based instrument and Bi-Modal survey technique, develop a data collection plan that includes multiple waves in a variety of sources, such as email and web.
- Conduct studies to further refine bimodal Web-based survey techniques, including developing a theoretical model to compare relevant variables, such as prior experience with Web surveys, computer and Web competencies, level, type and speed of computer access and overall motivation to use computers, as a means to verify and insure validity of online survey results.

In conclusion, these results suggest the profession has much to gain from further exploration of the possibilities presented by Internet based research in terms of cost efficiencies and implied productivity increases. In times where faculty resources are stretched thin, there is a critical need to maximize research productivity in terms of efficiency and effectiveness. Efforts to develop rigorous and reliable methods and procedures to utilize the Internet to expand research capabilities, therefore, have the potential to make a lasting and needed contribution to the discipline.

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When Findings Collide: Examining Survey vs. Interview Data in Leadership Education Research

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Abstract

The purpose of the study was to determine the impact of an agricultural leadership program on rural community development beyond self-report survey data typically collected for program evaluation. Participants in the study were graduates of the program from 1982 to 2002 (*N*=290). Quantitative and qualitative research methods were used. Each participant was asked to complete a then-post survey that addressed areas of knowledge related to rural community development, if participants were acting as change agents, knowledge of community needs, and leadership role in community improvement. Paired samples t-test were used to describe the data. Additionally, extreme case sampling was used to identify eight participants for face-to-face interviews.

In spite of self-report survey findings of change in knowledge, skills, and behavior, qualitative findings did not reveal important changes in skills or behavior related to leadership after completing the program. It was evident through the interviews that participants had not made an impact on community development. The program was found to be an awareness program only and was marginally successful in integrating rural community development process into the program. It was concluded that participants were not acting as change agents, and the program was not developing leaders to meet community needs. The participants were taking a minimal leadership role in improving their communities, bringing into question the data collection methods when in-depth interviews trump survey results.

Introduction

Agricultural leadership programs have a 70-year history in the United States. There is a need for leadership programs that teach citizens how to cope with the barrage of change in the rural environment. In particular, citizens must be educated and prepared with essential knowledge, skills, and abilities in order to assume leadership positions that concentrate on the concerns of rural America. The current array of agricultural leadership programs demonstrates a significant societal investment towards the important goal of fostering community participation by rural citizens (Rossing & Heasley, 1987). Effective rural community development (RCD) is dependent on local leaders' knowledge, skills, and willingness to assume key roles in the development process (Mulkey, 1989).

Realizing the need to train more leaders to improve the quality of life for rural citizens, a major land-grant university in the southwest founded an agricultural leadership program in 1982. The goal of the program was to teach adults (ages 25-45) involved in agriculture or agribusiness leadership skills to impact policy at local, state, and national levels. Ten classes of approximately 30 participants each had been completed at the time of the study. The program objectives included 1) increasing participants' awareness of the agricultural industry, 2) expanding participants' understanding of U.S. economic, political, cultural, and social systems, 3) increasing participants' ability to analyze and react to complex problems affecting rural communities, 4) increasing participants' leadership involvement and activities at the local, state, or national level, and 5) helping participants increase and use their skills to solve community-based problems.

The program for the most recent class, held between August 2000 and March 2001, consisted of 13 seminars, a seven-day trip to Washington, D.C., and a two-week trip to New Zealand in March 2001. The weekend seminars (Friday afternoon to Sunday evening) focused on personal development issues, tours of agricultural research facilities, tours of specialty agricultural enterprises, tours of the state capital and discussions with state leaders, visits with agricultural association leaders and media personalities, visits to farm shows, and the future of rural America, including economic and demographic trends in the state.

A review of the literature found that most evaluation studies of agricultural leadership programs were limited to documenting claims via self-report survey methods (Bolton, 1991; Howell, Weir, & Cook, 1979; Lee-Cooper, 1994; Olson, 1992; Whent & Leising, 1992). These studies found that participants were satisfied with their experience, but failed to document program impacts in terms of community improvement. Few evaluation studies triangulated the data with follow-up procedures involving multiple methods (Rohs & Langone, 1993). Therefore, this study adds to the literature by documenting the impact of one adult leadership program on rural community development (RCD) using participant self-report data (mail survey) and face-to-face interviews as measures for understanding the program's outcomes.

Purpose of the Study

Given the importance of effective leadership to rural community development processes and the challenges associated with survey data, the study sought to determine the impact of an adult agricultural leadership program on rural community development using a mixed-methods approach. Specifically, the objectives of the study were to:

1. Determine if the leadership program taught rural community development processes to participants.
2. Determine if the graduates applied lessons learned in the leadership program to serve as change agents within their communities.
3. Determine if there were difference in the findings based on the type of data collected (survey vs. interview) in determining program impacts.

Methods for Data Collection and Analysis

The population for the survey were all graduates of the program from 1982 to 2001 (N=290). A census was used for the survey based on the database kept by the director. Three individuals were excluded from the study, due to death (n=1) and wrong addresses (n=2).

Three data collection techniques were used for the research: 1) a then-post survey, 2) open-ended questions on the survey, and 3) face-to-face interviews with eight participants. Of the 125 participants who returned the survey (43% response rate), eight supplied extreme cases regarding the positive impact that the program had made on them in regard to integrating RCD processes into the program. Based on the survey responses, the individuals exemplified model change agents within their communities. Therefore, the sample for the face-to-face interviews was purposefully selected from subjects who completed the survey using a process known as *extreme case sampling*. Extreme case sampling involves people with unusual characteristics. In this case, the eight individuals were chosen based on their above average self-reported understanding of, and commitment to, RCD.

Survey Methods

An original survey was developed for the study based on Pigg's (2001) work. The instrument was a then-post design with Likert-type scales. Respondents were asked to read each question, reflect on their knowledge or behavior before entering the program (then), and rate themselves accordingly using a Likert-type scale. A second column adjacent to the first contained an exact copy of the scale and asked the respondent to reflect on their knowledge or behavior after completing the program (post) and rate themselves a second time. The ratings included strongly agree, agree, disagree, and strongly disagree and were scored 1-4, respectively. Not sure/not applicable was coded 0 for the analysis. The two scores were

compared using a t-test to determine differences in perception from before and after the program at a single point in time. The Cronbach coefficient alpha for internal consistency for all survey questions was 0.96.

The then-post design was chosen to control for several challenges to validity including *overestimation of changes in knowledge* and *response-shift bias* among participants. When pretest-posttest information is collected, actual changes in knowledge and behaviors may be altered if the participants overestimate their knowledge and skills on the pretest. Similarly, pretest overestimation is likely if participants lack a clear understanding of the attitude, behavior, or skill the program is attempting to affect (Pratt, McGuigan, & Katsev, 2000).

Changes in participants' frame of reference due to the program is called *response-shift bias* (Pratt et al., 2000; Rohs, 1999). To avoid this source of error for self-report surveys, a then-post method was used to collect retrospective data at the conclusion of the program as participants rated themselves within a single frame of reference and at a single point in time.

Although the then-posttest controls for response-shift bias and overestimation, other challenges to validity arise such as *memory-related problems, social desirability responding,* and *effort justification* (Howard, Millham, Slaten, & O'Donnell, 1981; Pratt et al., 2000; & Sprangers, 1987). Evaluators using retrospective tests must consider memory-related problems that influence the recall process. Clarifying a defined period, such as "since you began this program," may facilitate recall (Pratt et al., 2000). When using retrospective tests, instead of representing the accurate treatment, they represent impression management as a possibility (Sprangers, 1987). *Effort justification* occurs when subjects do not experience any benefit of the training, and in an attempt to justify the effort spent, adjust their initial pre-treatment ratings in a downward direction or their post-treatment in an upward direction (Sprangers, 1987). Control for *memory-related problems, social desirability,* and *effort justification* was attempted by using objective measures (Pratt et al., 2000; & Sprangers, 1987). Interviews were also used to probe participants on exact behavior changes to triangulate results.

A panel of experts consisting of four faculty members with expertise in leadership education or RCD processes confirmed content, construct, and face validity of the survey. A pilot test was conducted with 30 randomly selected participants from the population. Seventeen people returned the pilot survey. The pilot surveys were analyzed and minor revisions were made. Because only minor revisions were required, the pilot data (n=17) were pooled with the final survey data (n=108) for a final response rate of 43% (n=125). The Dillman (2000) four-phase mailing approach was used for both the pilot survey and the final survey.

The double-dipping method was used to determine differences between the respondents and non-respondents (Lindner, Murphy, & Briers, 2001). Along with an early to late respondent comparison, a random sample of 10% (n=20) of the non-respondents was administered portions of the survey via telephone. The two groups were compared on gender, employment status, level of educational attainment, and marital status with a Pearson Chi-Square. There were significant differences between non-respondents and respondents in gender, employment status, and marital status. There were no significant differences between the early to late respondents on any variable. Thus, results of the study can only be generalized to the survey respondents.

Survey data were analyzed using SPSS® v. 8.0. An alpha level of .05 was set *a priori* to determine statistical differences among variables. The statistical tests used were descriptive, t-tests, and Cohen's *d* effect size (Cohen, 1988).

Qualitative Methods

Eight people were selected to be interviewed based on their survey responses for extreme cases, which demonstrated an in-depth knowledge of RCD processes. The participants were telephoned and asked to participate in an interview. The researcher drove to their places of business and conducted the interviews in their respective offices. The interviews followed a semi-structured outline. Probing questions allowed the researcher to explore emerging themes and to confirm hypotheses (Merriam, 1998).

To establish validity for the interviews, each interview was recorded and transcribed. The transcriptions were sent to the interviewees to validate their statements (Merriam, 1998). The qualitative analysis software program ATLAS.ti® was used to organize the data from the open-ended survey questions and the interviews. Both data sets were analyzed and reported following Creswell's (1998) procedures:

1. *Organization of data.* The interviews were recorded and transcribed, cleaned by a research assistant who listened to the interview and read the transcript to check for accuracy. The text was then loaded into the qualitative data program ATLAS.ti®.
2. *Categorization of data.* The data were clustered into meaningful groups (coded) using ATLAS.ti® as an organizational tool.
3. *Interpretation of the data.* Statements that fell into like codes were examined for specific meanings in relationship to the purpose of the study.
4. *Identification of patterns.* The data and their interpretations were examined for themes and patterns that characterized the program and allowed the researchers to draw conclusions.

5. *Synthesis.* An overall representation of participants' responses was created where conclusions and recommendations were drawn based on the data presented.

Findings and Conclusions

Survey respondents were married (90%), well-educated, middle class working adults who were civically engaged. One-hundred and thirteen men (90%) and 12 women (10%) responded to the survey. Their mean age was 43 years. The majority (54%) graduated college and 32% had earned graduate credit. Forty-seven percent earned $30-$50,000 annually and 100% voted in the last presidential election. Sixty percent volunteered 5-10 hours per month in social service activities and 69% were involved in 5-10 hours of economic development activities per month. They lived in their communities for an average of 24 years and the average community size was 30,000 people.

Did the leadership program teach rural community development processes to participants?

The survey findings showed that participants had significantly greater awareness of the rural community development (RCD) process after participating in the program. A paired samples t-test resulted in significant differences for each variable from the then-post survey (Table 1). The effect size, Cohen's *d*, was 1.58 (Cohen, 1988).

Table 1.
Paired Samples (Then-Post) t-test Results

Survey Question	*n*	*Then Mean*	*Post Mean*
I know how my community fits on a global level.	125	2.66	1.74*
I envision new possibilities for my community.	124	2.81	1.93*
I strive to make the community better for everyone.	125	2.31	1.67*
I appreciate local business.	125	2.06	1.50*
I have pride in my community.	125	1.98	1.69*
I understand the community development process.	124	2.85	1.80*
I understand the importance of community development in rural Oklahoma.	123	2.58	1.41*
I understand why some rural Oklahoma communities are diminishing.	124	2.47	1.35*
I know how important quality education is to the success of rural Oklahoma communities.	125	2.22	1.41*
I know how important quality jobs and careers are to the success of rural Oklahoma communities.	125	2.24	1.34*
My involvement in social services is a high priority.	124	2.87	2.35*
My involvement in economic development in my community is a high priority.	12	2.76	1.94*

*Significantly different.
Scale: 1= Strongly agree, 2=Agree, 3=Disagree, 4=Strongly disagree

Interview Findings. Findings from the eight purposefully selected interviewees were synthesized and claims are presented to triangulate the study with additional data sources. Participants were assigned numbers to protect their identity; thus, a number in the text or in brackets refers to a unique individual.

The community development process includes: problem identification, assessment of the community's organizational structure to address the problems, developing the necessary capacity, and the design and implementation of action programs to address problems (Mulkey, 1989). After reviewing the literature, it was determined that if the leadership program were developing leaders with adequate knowledge of RCD processes, the interviewees would be able to identify new economic and social development opportunities for their communities. The participants were not able to articulate new opportunities for their communities. Therefore, as a result of the program, the participants did develop an awareness of RCD processes, but did not possess adequate knowledge or skills to act as change agents.

All eight participants were asked what they learned about RCD in the program [1, 29, 90, 134, 168, 208, 272, 290]. They all agreed that there must be communities to support agricultural families and community development is necessary for rural areas because of out-migration to urban areas.

Each interviewee was directly asked what s/he learned about the RCD process in the program. The answers included statements such as the program made them aware of rural development, and how important local communities were for rural development. A response to knowledge of rural development was "the whole experience drove the point home that our local communities are very important to the survival of rural agriculture" [290]. When participant 290 was asked to expand on his knowledge of RCD, he stated, "we heard from a lot of agricultural support industry type of people… I have some knowledge of rural development, but I don't necessarily have an understanding of the needs of the communities we visited."

Understanding why RCD processes is important and the challenge it presents for communities was an essential element for increasing awareness of RCD for two participants [29, 134]. The interviewer asked participants 29 and 134 if they would be able to work in RCD with the knowledge they gained from the leadership program. Both participants acknowledged that they could not, but would have liked to have had more RCD seminars in the program. One of the eight interviewees believed the leadership program helped him to understand that, "agriculture is not the driving force behind rural America anymore. It is going to take younger leaders to bring in the other 60% of the economic activity to rural communities" [1]. Participant 1 was the only person to understand that economic development programs extend beyond agriculture and that agriculture is not the driving force of the economy in all rural communities (Knutson, Penn, & Flinchbaugh, 1998).

Exposure to other communities working in development efforts gave five participants a visual picture of RCD [29, 168, 208, 272, 290]. Seminars such as these were beneficial in

increasing participants' awareness of RCD, but did not offer specific instruction in the process.

Five interviewees perceived the major benefit of the leadership program as helping agriculture by focusing on agricultural production. They were content with the awareness of RCD gained from the program because the leadership program "is an agricultural program" and not perceived to be a RCD program [1, 90, 168, 272, 290]. "This is an agricultural program, so we spent two to three days doing a lot of traveling and talking to a lot of agricultural folks; it [RCD] wasn't the primary focus of the program" [290].

Written qualitative data from the open-ended survey questions were used to triangulate the interview findings. Sixty-four respondents (51%) answered the open-ended question: What was most beneficial to your community development efforts? Eight (12%) of the sixty-four respondents [18, 19, 27, 134, 150, 177, 217, 240] believed that knowledge of RCD was beneficial to development efforts. One respondent did not believe that RCD should be expected from an agricultural leadership program. "I did not understand community development to be a part of program's stated goal to develop effective *spokespersons* for agriculture" [197].

Five of the interviewees [29, 208, 134, 272, 290] thought that more seminars in RCD would give them a more in depth understanding of the concept. More community examination and talking with community leaders were specifically mentioned by three participants as ways to increase their RCD abilities [29, 208, 272].

According to participant 29, general awareness of rural development was not enough. The interviewee called for the leadership program to provide a very detailed approach in specific areas of community leadership. He wanted the participants to be aware of other similar communities who are utilizing RCD processes. According to him, after going through the program, the participants should be able to use their resources, not only invite new business to their communities, but also improve upon the potential of the community.

Based on the responses from the interviewees, it was concluded that the participants had a general awareness of RCD processes but lacked knowledge and skills for initiating change. The participants did not have an in depth understanding of the development possibilities for their communities. Half of the participants interviewed would like to see the focus of the program shift to meet the current and future needs of people in agriculture and rural communities [208, 272], and skill building on how to manage and facilitate change [29, 134, 208].

Mulkey (1989) claimed that leaders should have adequate knowledge and skills of community development processes. Mulkey (1989) further argued that the process of development at the community level is fundamentally different from simple community growth measured in economic or demographic terms. Heekathorn (1993) also stated that one of the most important components of leaders is their ability to mobilize resources at the community level.

Did the graduates apply lessons learned in the leadership program to serve as change agents within their communities?

The survey findings showed that program participants had a significantly different self-perception of being able to serve as change agents within their communities before and after the program. The specific survey questions that operationalized this research question dealt with promoting change in communities. The survey findings indicated that participants believed they were serving as change agents within their communities, except for actually knowing how to bring about change (Table 2).

A paired sample t-test was run on all survey questions. Results revealed that all then-post questions except, "I know how to change things in my community", were significantly different. The Cohen's *d* of 1.18 illustrates a large effect size for this variable (Cohen, 1988).

Table 2.
Paired Samples (Then-Post) t-test Results

Survey Question	*n*	*Then Mean*	*Post Mean*
I think that it is the responsibility of every citizen in my community to reach its goals.	125	2.47	*1.89
I believe that citizens have the same responsibility as government officials to reach community goals.	124	2.46	*1.78
I aggressively work at developing new local leaders.	122	2.94	*2.07
I regard change as a source of vitality	124	2.53	*1.69
I know how to tackle problems in systematic ways.	124	2.44	*1.71
I seek out different perspective to generate new ideas.	123	2.54	*1.50
I know how to change things in my community.	124	2.86	2.32
My involvement in improving environmental conditions is a high priority.	124	2.67	*2.15
I am actively involved in nonprofit organizations.	124	2.34	*1.81

*Significantly Different.
Scale: 1= Strongly agree, 2=Agree, 3=Disagree, 4=Strongly disagree

*Interview Findings***.** Hughes (1998) and Williams (1989) suggested that leadership programs should teach participants to become change agents in their communities. Change is difficult in communities because people are resistant to change and construct barriers to prevent discussion and action promoting change (Hughes, 1998). Community leaders must be equipped to handle these types of situations. Community leadership is about building better communities. Before community leaders can implement change, they must have knowledge of existing attitudes and perceptions with respect to those factors that impact economic development objectives and outcomes (Williams, 1989). If the leadership program were developing change agents, the interviewees would be able to identify the change process and would be actively promoting change within their communities. This was not the

case; therefore, the program increased awareness of change agent status among participants, but did not have an impact on promoting change within communities.

Eight participants were interviewed [1, 29, 90, 134, 168, 208, 272, 290]. Out of the eight interviewees who were asked how the leadership program altered their feelings on change, two did not believe it altered their feelings on the concept of change [134, 168]. Six participants responded that the program did affect their perceptions toward change positively by increasing awareness regarding its importance [1, 29, 90, 272, 208, 290]. They all understood the importance of change for the survival of rural communities.

The interviewees were asked if, after the program, they could promote change. Three participants stated that they believed they could promote change after participating in the program [1, 272, 290]; three participants did not believe the program equipped them to promote change [29, 143, 208], and two participants believed they were not altered as a result of the program in regard to change [90, 168].

Interviewee 272 believed the only way he could promote change was to communicate new ideas to members of his community. While involved in the program, 272 would come back from seminars motivated to promote change, but after the program, the motivation tapered off. "The only thing I can do to promote change is to initiate the idea of change, plant the seed to other community members. We would always come back so fired up. Since the program ended, I have not had enough time to devote like I should" [272].

Participant 290 believed he could promote change, but did not follow a specific model to do so. When 290 was directly asked what impact he had made promoting change in his community, he did not believe he had made an impact affecting change. "I can promote change in my community, but I do not follow a particular agent of change…and I have not had a big impact promoting change in my community". When 290 was asked why he has not had a big impact promoting change in his community, he stated, "I think it is because nobody has asked."

When 29 was asked about promoting change, he reflected on his classmates. He stated, "I don't think they [classmates] ever learned or they ever felt comfortable enough even after it was over to be a type of catalyst to create change in their own community" due to the lack of knowledge of resources and potential development opportunities in their communities. He went on to say that he did not believe that his classmates grasped what was available, or what they could achieve in their communities.

Skill building to manage change would have enabled three participants to encourage change [29, 143, 208] if it were taught in the program. "I didn't pick up that is what they were trying to teach. I could have used more in that area…I don't know how to start off on my own, how to do it, and what it is you do [to promote change]. I have my ideas, but I still need someone to say step-by-step what to do. I don't feel equipped" [143].

Four participants believed that the program needed to introduce more alternative views regarding sustainable agriculture and the environment into the seminars [29, 168, 208, 272]. “It is painful for me to say, but I think the program directors should look beyond agriculture when developing the guidelines for the program. It was clearly more focused on the agricultural aspects of each community” [29]. “I think the participants need to be presented with the ideas of alternative practices by someone non-threatening” [208]. “Introducing these different views and ideas would help participants “to have more understanding of the bigger picture” [168].

Community development requires new behaviors and action. Breaking with past habits and established ways of doing business often requires an innovator, or a set of innovators, willing to assume risk and do things differently (Cornell, 2000). Hughes (1998) suggested that leadership programs should teach participants to become change agents. He further concluded that change is difficult in communities because people are resistant to change and erect barriers to prevent discussion and action promoting change. Community leaders should be able to deal with these issues to promote change.

Based on the responses from the interviewees it was concluded that the leadership program is not developing change agents that are capable of bringing about change in their communities. The interviewees did have an awareness of the importance of change, but they did not know the processes or possess the skills to becoming a change agent. Of the three interviewees who believed they could promote change [1, 272, 290], two reversed their thoughts during the course of the interview by stating they did not believe they had made a noteworthy impact promoting change in their communities [272, 290]. Three interviewees did not believe the leadership program gave them the necessary skills to promote change in their communities [29, 143, 208]. Most respondents were uncertain when directly asked what they learned about promoting change.

Was there a difference in the findings based on the type of data collected (survey vs. interview) in determining program effectiveness?

All variables for the then-post survey were statistically significant at the .05 level, indicating that participants perceived they had gained knowledge and skills from the agricultural leadership program. However, when the eight purposefully selected participants were asked about their understanding of rural community development processes, it was found that they were not participating actively in community development activities, thus, they were not acting as change agents in their communities.

When comparing the findings from the survey data vs. the interview data, it can be concluded that the survey respondents *overestimated* their knowledge and skills regarding RCD processes on the survey (Pratt et al., 2000) due to *social desirability* (Howard et al., 1981) and *effort justification* (Sprangers, 1987).

Recommendations, Discussion and Implications

The agricultural leadership program did create awareness among participants regarding the importance of RCD as stated in the objectives; however, it failed to move participants into action by producing community leaders. The qualitative data suggested that awareness was inadequate for participants to lead community development efforts as participants lacked both knowledge and skills for effecting change. Program designers should move beyond providing an awareness-only program and provide opportunities to increase participants' skills in RCD processes by integrating more seminars and workshops into the program that focus on the mechanics of RCD. These experiences should also focus on new development opportunities where participants can engage in discussions with successful community leaders.

Townsend (2002) reported that one-shot programs develop awareness but were not effective in changing behavior. When an extended and sustained leadership class was provided, attitudes and leadership behaviors changed after the class. The agricultural leadership program used in this case study provides the long-term contact needed to change behavior; thus, the potential for incorporating knowledge and skill development exists but is currently under utilized. Program designers should integrate a leadership project or practicum into the program. Asking participants to create and implement a plan for community development within their home towns would serve to develop leadership skills, needs assessment skills, change agent skills, and increase participant impact on community development, at least in the short term. By experiencing success in a community development project, participants may also become more motivated to repeat the experience and become truly effective leaders rather than bystanders in their communities.

The study should alert other researchers' attention to the fact that self-report survey methods of evaluation may be inadequate for determining program impacts. Participants could not authenticate actual changes in behavior made after participating in the program. Survey-based studies may actually be documenting participants need for *effort justification* rather than tangible program impacts.

Other methods to determine participant impact on community development should be used to triangulate self-report survey data such as observation, interviews with participants and other community members, and collecting data other than participant satisfaction with the program. Program evaluators should also considering abandoning self-report survey research in favor of more credible data if funds for evaluation are limited. The financial and human resources used in developing the survey for this study could have been used toward randomly selecting more interviewees for face-to-face interviews as this study found that the survey data was invalidated by the in-depth interviews.

Recommendations for further research include conducting a longitudinal study of the program to document changes in the program based on the initial findings using interviews and observations as primary data sources. Also, the program designer should incorporate a

participant-centered documentation process of the participants' impact on community development for internal evaluation purposes.

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An Examination of Kentucky University Freshmen Attitudes Regarding Agricultural Education and the Agricultural Industry

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Abstract

This study assessed the attitudes of university freshmen majoring in agriculture at a land grant and three non-land grant institutions in Kentucky. Perceptions of high school agricultural programs, university agricultural programs, and the agricultural industry were analyzed, along with demographics of university agriculture freshmen. Demographics indicated that freshmen students majoring in agriculture within Kentucky were white, female, had agricultural experience, completed high school agriculture course work, had a farm background, participated in 4-H, and were members of the National FFA Organization.

Freshmen majoring in agriculture in Kentucky are supportive of high school agriculture programs; however those students with personal experience in secondary agricultural education expressed more positive attitudes than those who did not experience agricultural education firsthand. Students with an agricultural education experience agreed that more students should be encouraged to enroll in high school agriculture programs, and high school agriculture is a good preparation for college study in agriculture. Students who had taken agriculture in high school believed that college-bound students should be encouraged to enroll in high school agricultural courses; however, students who did not take high school agriculture were uncertain. Freshmen majoring in agriculture were also uncertain if high school agriculture courses were beneficial for higher achieving students. In addition, they were uncertain whether high school agriculture courses were beneficial for lower achieving students.

Students were in disagreement that only students with farm backgrounds should pursue careers in agriculture, and if only students pursuing careers in agriculture should enroll in high school agriculture programs. Disagreement was shared by all groups when asked if only students majoring in agriculture should major in college agriculture. However, students with high school agriculture program experience were stronger in their disagreement for this statement. Students also disagreed that college agriculture was easier than other subjects. Respondents strongly disagreed with the statement that agriculture courses at the university level were better suited for male students.

Freshmen majoring in agriculture generally held positive attitudes toward the field of agriculture. Agreement was shared by all groups that agriculture is a scientific area of study and a highly technical field. However, uncertainty exists relating to the image of agriculture.

Introduction/Theoretical Framework

Enrollment in agriculture programs at both the university and high school levels has fluctuated considerably over the past 20 years. Enrollment at the University programs of agriculture has also changed. Manderscheid (1988) reported a 24% decline in Land Grant University agriculture enrollments and a 13% decrease in non-Land Grant University agriculture enrollments across the nation from 1978 to 1988. Paralleling this decrease in university agriculture program enrollments were cutbacks in faculty positions. According to the American Association for Agricultural Education (AAAE), university agricultural education faculty membership decreased from a 1984 high of 326 faculty members to today's membership of 242 active faculty members (AAAE, 2003).

While universities were responding to decreased numbers by downsizing agricultural education departments and programs, high school enrollments in agriculture courses were rebounding. Several states modernized agriculture curricula as suggested by the National Research Council (1988) and reaped almost immediate results in the form of increased student numbers. By 2001-2002, 742,732 students across the nation were enrolled in agricultural education (National FFA Organization, 2003).

For the 2002-2003 academic school year in Kentucky, 28,974 students were enrolled in high school agriculture courses (Career and Technical Education, 2003). Courses are classified into career clusters of agricultural business, agricultural mechanics, exploratory agriculture, forestry, horticulture, and production agriculture.

At the university level, colleges, schools, and departments of agriculture also are reporting increased enrollments. Litzenberg, Whatley, and Scamardo (1992) reported that, with the exception of the North Central region, agricultural education enrollments had recovered to early 1980 levels. According to USDE, 1992 enrollments in colleges of agriculture nationwide had increased by 18.9% (USDE, 1996). However, the demographic composition of today's agriculture classes has changed from that of the 1980s.

Dyer, Breja and Andreasen (1999) studied backgrounds and attitudes of freshmen in the College of Agriculture at Iowa State University. They reported a majority of the freshman majoring in agriculture had completed at least one high school agriculture course, were members of FFA, 4-H, possessed an agricultural experience while in high school, and were from a farm or rural background. However, the majority of students with a farm, FFA or 4-H background had lessened from previous years.

With an increasing number of freshmen coming from urban backgrounds and/or situations in which they have gained no knowledge of or experience in agriculture, new problems and opportunities have emerged. According to Russell (1993), this lack of agricultural background and/or experience jeopardizes the long-term future of the agricultural industry. Russell (1993) warned of an impending lack of experience, referred to as "brain drain" (p.14). He warned the number and quality of individuals trained and experienced in

agriculture will continue this downward trend. Colleges, schools and departments of agriculture must provide information, not only in agriculture, but also about agriculture. However, losses in enrollment translate to losses of dollars from instructional budgets. The needed resources to provide this instruction may not be available.

Fishbein and Ajzen (1975) provided the theoretical framework for this study. They determined that intentions to participate in an activity could be predicted based upon knowledge, observation, or other information about some issue. This model suggested that a person's intent to pursue study in a field of agriculture, or to become actively involved in an agricultural career, may be predicted by analyzing his/her beliefs about agriculture.

The problem addressed by this research was to identify students entering colleges or universities who are likely to complete a program of instruction and seek employment in the industry of agriculture, and examine their attitudes. The conceptual model for this study emphasized the need to study those factors that influence a student's selection and pursuit of field of study and corresponding career choice.

Purpose/Objectives

The primary purpose of this study was to assess the attitudes and intentions of university freshmen majoring in agriculture toward their high school agricultural programs, university agricultural programs, and the agricultural industry. The study addressed the following questions:

1. What are the backgrounds of university freshmen majoring in agriculture?

2. What were the attitudes of university freshmen enrolled in agriculture regarding secondary agricultural education programs?

3. What were the attitudes of university freshmen regarding agriculture as a major area of study and an industry?

4. What was the influence of high school agriculture programs experiences on the attitudes of students who are now pursuing agricultural majors?

Methods/Procedures

This study was descriptive in nature. Four universities with programs of agriculture (one land grant and three non-land grant) in Kentucky were included in this study, with a population of 524 students. A student roster from each university college admissions office served as the population frame for this census study. Surveys were distributed by agricultural education faculty members at each university in the Fall 2002 academic semester.

A two-part questionnaire used in this study was developed by Dyer, Lacy, and Osborne (1996) and was used with their consent. The instrument was reviewed for content and face validity at that time. Part I of the questionnaire addressed demographic information and contained closed-ended and partially closed-ended questions. Part II of the instrument was divided into attitudes toward three constructs: Agriculture as an Area of Study, High School Agriculture Programs, and University Agriculture Programs. These sections used a five-point Likert-type scale (1=Strongly Disagree, 2=Disagree, 3=Uncertain, 4=Agree, 5=Strongly Agree). Dyer, et al. reported reliability estimates for the three constructs using Cronbach's Alpha (r=.85, .78, .88, respectively). Data were analyzed using descriptive statistics, using measures of central tendency and variability.

Survey instruments were distributed to each student during a scheduled class in October/November 2002 by an agricultural education faculty member at each university. Surveys were completed and returned to the faculty member, and follow-up contacts were made in December 2002 requesting instruments from non-respondents. Completed data collection instruments were received from 365, which resulted in a 72.5% response rate.

Data were entered into a personal computer and analyzed using SPSS 10.0. Descriptive statistics were used to summarize and analyze the data since the purpose of the study was to describe the attitudes of the respondents.

Results/Findings

Research Question 1: What are the backgrounds of university freshmen majoring in agriculture?

A slight majority of the student respondents were female (52.1%, *n*=190) and large major of the respondents were Caucasian (93.1%, *n*=339). Six African American (1.6%), two Hispanic (0.5%) and four persons with other ethnicity types were also identified (1.1%).

In university agricultural programs throughout Kentucky, 45 percent (n=166) of the respondents were majoring in Animal Science, 58 students (15.9%) studying Agricultural Economics, and 40 (11.0%) students majoring in Ag Biotechnology.

One-third of the respondents (34.2%, *n*=125) had a farm background. An additional 23.0% (*n*=84) of the students were from medium urban backgrounds (population 10,000 to 99,000). Sixty three (17.3%) students studying agriculture come from small towns less than 10,000 and 10.1% (*n*=37) of the respondents have a rural, non farm background. The remaining 54 respondents (14.8%) indicated their background was from a population over 100,000.

Fifty-seven percent (n=210) of the respondents reported having taken agriculture in high school, 55.1% (*n*=201) indicated they were members of FFA; and 48.5% (*n*=177) had been involved in 4-H. Forty-one percent (n=150) of the students who completed high school

agriculture courses rated the program as "good", 14.8% indicated the program was "average" and 13.4% indicated the quality of the secondary agriculture program was "poor."

The majority of the respondents (60.8%, *n*=222) indicated they had both paid and unpaid work experiences in agriculture. Forty-four respondents had an unpaid work experience only, and 34 (9.3%) students had only a paid work experience. Sixty-five (17.8%) students indicated they had no type of agriculture work experience prior to enrolling in the university agriculture program.

Research Question 2: What were the attitudes of university freshmen enrolled in agriculture regarding secondary agricultural education programs?

A majority (55.5%) of university freshman majoring in agriculture reported course work in high school agricultural education, whereas 155 students (45.5%) reported no high school course work in agriculture.

Respondents were very supportive of high school agriculture programs (Table 1). More than three-fourths (77.9%) of freshman majoring in agriculture agreed that college bound students should be encouraged to enroll in high school agriculture programs, and 72.9% of the respondents agreed that more students should be encouraged to enroll in secondary agriculture.

A majority (67.4%) of the respondents agreed that high school agriculture is a good preparation for college study in agriculture. Most (63.8%) respondents agreed high school students should take some course work in agriculture; however 59.0% of the respondents believed only students pursuing careers in agriculture should enroll in high school agriculture courses. Freshmen (44.5%, n=161) majoring in agriculture agreed that high school agriculture should become more scientific.

Students were uncertain in many areas regarding the statements on high school agriculture courses (Table 2). Students are uncertain if high school courses are beneficial for higher-achieving students (42.9%), high school courses are beneficial for lower-achieving students (41.1%), high school agriculture is easier than other subjects (38.7%), and that high school agriculture should become less vocational (42.8%). Likewise, respondents disagreed with statements regarding high school secondary agricultural education programs. Two hundred forty-seven students (68.4%) disagreed that high school agriculture programs are better suited for male students.

Table 1.
Attitudes of University Freshmen Regarding High School Agriculture Programs

Statement	Agree* F (%)	Uncertain F (%)	Disagree** f (%)
College-bound students should be encouraged to enroll in high school agriculture programs.	284 (77.9)	61 (16.7)	20 (5.5)
More students should be encouraged to enroll in high school agriculture programs.	266 (72.9)	79 (21.6)	20 (5.5)
High school agriculture is good preparation for college study in agriculture.	244 (67.4)	100 (27.6)	18 (4.9)
Most high school students should take some course work in agriculture.	233 (64.1)	89 (24.5)	41 (11.3)
Only students pursuing careers in agriculture should enroll in high school agriculture courses.	215 (59.0)	93 (25.5)	56 (15.4)
High school agriculture should become more scientific.	161 (44.5)	149 (41.2)	51 (14.1)
High school agriculture courses are beneficial for higher-achieving students.	154 (42.4)	156 (42.9)	53 (14.6)
High school study in agriculture is easier than other subjects.	135 (37.3)	140 (38.7)	86 (23.8)
High school agriculture courses are beneficial for lower-achieving students.	134 (37.0)	149 (41.1)	79 (21.8)
High school agriculture should become less vocational.	114 (31.4)	155 (42.8)	93 (25.6)
High school agriculture classes are better suited to male students.	35 (9.6)	79 (21.8)	247 (68.4)

*The term "agree" includes the combined responses of "strongly agree" and "agree."
**The term "disagree" includes the combined responses of "strongly disagree" and "disagree."

Table 2.
Attitudes of University Freshmen Regarding University Agriculture Programs

Statement	Agree* f (%)	Uncertain f (%)	Disagree** f (%)
More students should be encouraged to enroll in university agriculture programs.	266 (72.9)	79 (21.6)	20 (5.5)
College agriculture classes are better suited to male students.	22 (6.0)	57 (15.7)	284 (78.2)
College study in agriculture is easier than in most other subjects.	68 (18.6)	97 (26.6)	199 (54.6)
Most college students should take some course work in agriculture.	215 (59.0)	93 (25.5)	56 (15.4)
Only students pursuing careers in agriculture should enroll in college agriculture courses.	83 (22.7)	46 (12.6)	236 (64.0)

*The term "agree" includes the combined responses of "strongly agree" and "agree."
**The term "disagree" includes the combined responses of "strongly disagree" and "disagree."

Research Question 3: What were the attitudes of university freshman regarding agriculture as a major area of study and an industry?

Respondents (59.0%, *n*=215) indicated most college students should take some course work in agriculture. Seventy-two percent (*n*=266) stated that more students should be encouraged to enroll in university agriculture programs. Likewise, a majority of students (64.0%, *n*=236) disagreed that only students pursuing careers in agriculture should enroll in college agricultural courses. Over half (54.6%, *n*=199) of the students majoring in agriculture disagreed that college study in agriculture is easier than in most other subjects. When asked if college agriculture classes are better suited for males, 78.2% (*n*=284) disagreed.

University freshmen majoring in agriculture attitudes toward the field of agriculture were generally positive. As indicated in Table 3, respondents viewed the field of agriculture as both scientific (94.5%) and technical (80.8%). Almost three-fourths (74.0%) of the students believe the image of agriculture is improving, and that 41.9 percent believe that most people have a positive image of agriculture. Students disagreed (88.0%) with the statement that only students with farm backgrounds should pursue careers in agriculture.

Table 3.
Attitudes of University Agriculture Freshmen Regarding the Agricultural Industry

Statement	Agree f (%)	Uncertain f (%)	Disagree f (%)
Agriculture is a scientific area of study.	346 (94.5)	16 (4.4)	3 (0.8)
Agriculture is a highly technical field of study.	295 (80.8)	58 (15.9)	12 (3.3)
The image of agriculture is improving.	270 (74.0)	70 (19.2)	25 (6.9)
Most people have a positive image of agriculture.	153 (41.9)	115 (31.5)	97 (26.6)
Only students with farm backgrounds should pursue careers in agriculture.	22 (6.1)	21 (5.8)	317 (88.0)

*The term "agree" includes the combined responses of "strongly agree" and "agree."
**The term "disagree" includes the combined responses of "strongly disagree" and disagree."

Research Question 4: What was the influence of high school agriculture programs experiences on the attitudes of freshmen students who are now pursuing agricultural majors?

High School Agriculture Program

Table 4.

Comparison of Attitudes - High School Agriculture Program vs. Non-Program Graduates

Statement	No High School Agriculture			High School Agriculture	
	M	SD		M	SD
Agriculture is a scientific area of study.	4.43	.59		4.50	.67
Most people have a positive image of agriculture.	3.23	.89		3.19	1.02
Agriculture is a highly technical field of study.	3.90	.75		4.20	.77
The image of agriculture is improving.	3.82	.79		3.96	.87
More students should be encouraged to enroll in university agriculture programs.	3.79	.85		4.09	.90
More students should be encouraged to enroll in high school agriculture programs.	3.74	.95		4.39	.76
College-bound students should be encouraged to enroll in high school agricultural courses.	3.63	.99		4.21	.86
High school agriculture is good preparation for college study in agriculture.	3.60	.87		4.22	.90
High school agriculture should become less vocational.	3.23	.86		2.93	1.20
High school agriculture should become more scientific.	3.43	.73		3.36	1.07
Only students with farm backgrounds should pursue careers in agriculture.	1.59	.92		1.59	.92
High school agriculture courses are better suited to male students.	2.11	1.02		1.91	1.06
College agriculture courses are better suited to male students.	1.91	1.03		1.80	.93
High school study in agriculture is easier than in most other subjects.	3.10	.74		3.24	1.21
College study in agriculture is easier than in most other subjects.	2.50	1.03		2.52	1.14
High school agriculture courses are beneficial for higher-achieving students.	3.07	.79		3.55	.99
High school agriculture courses are beneficial for lower-achieving students.	3.07	.85		3.25	1.16
Most high school students should take some course work in agriculture.	3.40	.88		3.93	.91
Most college students should take some course work in agriculture.	3.35	.94		3.76	.95
Only students pursuing careers in agriculture should enroll in high school agriculture.	2.57	1.00		2.12	1.10
Only students pursuing careers in agriculture should enroll in college agriculture.	2.62	1.12		2.28	1.18

Students who had completed high school agriculture courses expressed more positive attitudes toward educational programs in agriculture than those non-program graduates. (Table 4). Program graduates agreed (*M*=4.39) that more students should be encouraged to enroll in high school agriculture programs, however non-program graduates were uncertain (*M*=3.74). Program graduates of high school agriculture programs agreed (*M*=4.22) that high school agriculture is good preparation for college study in agriculture, and graduates without high school agriculture courses were uncertain (*M*=3.60). When asked if college bound students should be encouraged to enroll in high school agricultural courses, program graduates agreed (*M*=4.21) and non-program graduates were uncertain (*M*=3.63).

All respondents, both program graduates (*M*=3.36) and non-program graduates (*M*=3.43), were uncertain if high school agriculture should become more scientific. When asked if high school agriculture should become less vocational, non-program graduates were uncertain (*M*=3.23) and program graduates disagreed (*M*=2.93). Both groups were uncertain if most high school students should take some course work in agriculture. However, program graduates were more in agreement (*M*=3.93) than non-program graduates (*M*=3.40). Uncertainty was evident for both groups with the statements that high school agriculture courses are beneficial for higher achieving students and high school agriculture courses are beneficial for lower achieving students. Non-program graduates rated each statement the same (*M*=3.07). However, program graduates more strongly agreed that high schools course are beneficial for higher-achieving students (*M*=3.55), than for lower-achieving students (*M*=3.25).

All respondents disagreed (*M*=1.59) with the statement that only students with farm backgrounds should pursue careers in agriculture. Disagreement was also exhibited regarding only students pursuing careers in agriculture should enroll in high school agriculture programs. Program graduates disagreed more strongly (*M*=2.57) than non program graduates (*M*=2.12) on this statement.

University Agriculture Program

Respondents disagreed with many statements regarding the university agriculture program. Disagreement was shared by both program graduates (*M*=2.28) and non-program graduates (*M*=2.62) that only students majoring in agriculture should enroll in college agriculture; however, students enrolled in high school agriculture programs were stronger in their disagreement for this statement.

Both non-program graduates (*M*=2.50) and program graduates (*M*=2.53) disagreed that college agriculture is easier than most subjects. Strong disagreement was stated regarding agriculture courses at the university level are better suited for male students. Those respondents who studied agriculture at the high school level (*M*=1.80) strongly disagreed, whereas those who had no agriculture course prior to enrolling at the university (*M*=1.91).

Agricultural Industry

Respondents strongly agreed that agriculture is a scientific area of study. However, those students who were involved with high school agricultural education programs more strongly agreed (*M*=4.50) with the statement than non program graduates (*M*=4.43).

High school program graduates (*M*=3.19) and non-program graduates (*M*=3.23) were uncertain whether most people have a positive image of agriculture. However, both groups are uncertain but lean to agreement that the image of agriculture is improving. Again, program graduates (*M*=3.96) are more in agreement with this statement than those students who did not take agriculture in high school (*M*=3.82).

When asked if agriculture is a highly technical field of study, program graduates agreed (*M*=4.20). However, those who graduated high school without enrolling in agriculture were in less agreement (*M*=3.90).

Conclusions

A slight majority of university agriculture freshmen in Kentucky are white, female, and had a farm background. Students studying agricultural education at the high school level perceive its quality as good. These students were also members of the FFA and some had involvement with 4-H. Prior to enrollment at the university, students had experiences in both paid and non-paid agriculture activities. Students major in a variety of agriculture programs; however the most frequent major was animal science.

Entering freshmen majoring in agriculture are supportive of high school agriculture programs. Students who had completed high school agriculture courses either agreed or disagreed with statements more strongly than those students who had not experienced agricultural education at the secondary level. Agricultural education program graduates also expressed more positive attitudes toward educational programs in agriculture than those non-program graduates**.**

Program graduates agreed that more students should be encouraged to enroll in high school agriculture programs, and agricultural education is good preparation for college agriculture studies. Students who had taken agricultural education in high school believed that college bound students should be encouraged to enroll in high school agricultural courses; however, those students who did not take high school agriculture were uncertain. Students are unsure if most high school students should take some course work in agriculture, curriculum should become more scientific, or the curriculum should become less vocational. Freshmen majoring in agriculture also are uncertain if high school agriculture courses are beneficial for higher achieving students, and also if high school agriculture courses are beneficial for lower achieving students.

Students disagreed that only students with farm backgrounds should pursue careers in agriculture, and if only students pursuing careers in agriculture should enroll in high school agriculture programs. Disagreement was shared by all students when asked if only students majoring in agriculture should enroll in college agriculture; however, those enrolled in high school agriculture programs strongly disagreed with this statement. Students also disagreed with the statement that college agriculture is easier than in most subjects. Strong disagreement was evident for asking if agriculture courses at the university level are better suited for male students.

University freshmen students majoring in agriculture attitudes toward the field of agriculture were generally positive in their attitudes. Agreement was shared that agriculture is a scientific area of study and that agriculture is a highly technical field; however, uncertainty exists among all students whether the image of agriculture is improving. Disagreement between program graduates and non-program graduates existed when asked if agriculture is a highly technical field of study. Program graduates agreed with this statement; however those who graduated high school without enrolling in agriculture were uncertain.

Recommendations

In this state, more female students are enrolled in university agriculture programs than male students. In the past, students enrolled in colleges, schools and departments of agriculture have been traditionally male. Faculty members teaching agricultural courses should be made aware of demographic trends such as gender, geographic location, prior agricultural work experience, etc. These trends influence the classroom and the student learning that occurs in the classroom. Faculty and administrators must be aware and adapt to the needs and learning styles of the students they teach. As student demographics change, we must adapt and improve our teaching strategies to enrich and challenge our students. In return this will benefit the careers of our students, university agricultural programs, and the agricultural industry.

This study included all university freshmen students majoring in agriculture across the Commonwealth of Kentucky (one land grant and three non-land grants). Further study should be conducted to analyze the "type of student" enrolled in the land grant university compared to the non-land grant university. Factors such as high school GPA, ACT scores, technical agriculture background, and the agricultural education experiences should be taken into consideration.

Analyzing the attitudes of university faculty in agriculture would be of benefit. Determining faculty perceptions of the secondary agricultural education program, university programs of agriculture, and the agricultural industry as a whole would be insightful and be worth investigating this area further.

Longitudinal studies should be conducted to compare university agricultural freshmen students' demographics, attitudes of the recruitment process, and issues surrounding retention over time. A follow-up study on these students throughout their university experience should

occur. This research also should be replicated to study other entering classes of freshmen to compare groups over time.

Discussion/Implications

As state and federal budgets tighten and accountability for schools at all levels becomes more crucial, professionals in agriculture must be aware of the attitudes of the clients—our students. University agricultural educators are vital to the success of state high school agricultural education programs and have an important role in the colleges of agriculture as educational specialists. Teacher educators in agriculture must serve in a public relations role to administrators, other faculty members, high school teachers and prospective students in sharing the importance of agriculture in higher education. This is not important only for agricultural education programs, but for all programs.

In this study, a finding was that freshmen students in Kentucky believe the high school programs could be more scientific. Are agricultural education programs preparing teachers to teach at a higher level? Are the students in high school agricultural education being challenged and held accountable?

As agricultural education curriculum is assessed one must take in account those attitudes of students who were a part of the agricultural education program and who are college-bound. However, we must not also forget those high school students who are preparing for entrance into the workplace immediately after high school graduation. This finding points out that there is not clear cut direction for the high school agriculture program. Are programs changing to meet the needs of the college bound AND the graduate going into the work place? A balance must be found and implemented; making the job of agriculture educators even more difficult.

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University Freshmen Attitudes Regarding Decisions to Attend University Programs of Agriculture in Kentucky

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Abstract

This study assessed the viewpoints and attitudes of university freshmen majoring in agriculture regarding recruitment into university programs of agriculture. Three hundred and sixty-five university freshmen at one land grant and three non-land grants in the Commonwealth of Kentucky were surveyed. Results indicated that a majority of the freshman students majoring in agriculture within this state were Caucasian, female, possessed a farm background, had agricultural work experience, completed high school agricultural education, were members of FFA, and were members of 4-H.

Career opportunities are the most important factor influencing a student to major in agriculture. Other factors include love of animals, reputation of faculty, scientific nature, financial aid, and environmental concern. The students' parent/guardian is the most influential person in determining choice of college, school, or department of agriculture. Other persons who were identified as influential include the university agricultural program representative, friend of the prospective student, high school agriculture teacher, university representative, high school counselor, brother or sister of student, other relative, other person, or other teacher.

Campus visits are the most helpful source for informing freshmen students about the college, school or department of agriculture. Sources also ranked by university freshmen included contacts with faculty, brochures, website, interaction with current students, letters from staff and phone calls from university representatives.

It was recommended that faculty members examine their university agricultural programs to evaluate if the recruitment process is meeting the needs and expectations of the students. Further research should be conducted to include a national study to assess university students' attitudes regarding entrance standards, the recruitment process including public relations strategies, marketing agriculture as a major, and university entrance standards. Faculty attitudes of the recruitment process and issues of retention of agriculture students should also be examined in depth.

Introduction/Theoretical Framework

Enrollments in high school and university programs of agriculture have wavered in the past. During the last 20 years, enrollment trends have influenced how high school and university programs conduct business of educating future agriculturalists. In the 1980's enrollment dipped significantly. This enrollment change also impacted the university level in the late 1980s.

Manderscheid (1988) reported a 24 percent decline in Land Grant University agriculture enrollments over the 1978-1988 period; in non-landgrant programs the decrease was 13 percent. Paralleling this decrease in university agriculture program enrollments were cutbacks in faculty positions. This low decline has influenced the number of faculty positions even today. According to the American Association for Agricultural Education (AAAE), university agricultural education faculty membership decreased from a 1984 high of 326 members to today's membership of 242 active members (AAAE, 2003).

Universities responded to fewer students by downsizing agricultural education departments and programs. However, at the same time enrollments rebounded as the curricula were modernized when suggested by the National Research Council (1988). By 2001-2002, 742,732 students in the nation enrolled in agricultural education (National FFA Organization, 2003). For the 2002-2003 academic school year, Kentucky enrolled 28,974 students in a high school agriculture courses (Kentucky Career and Technical Education, 2003). Courses were classified into career clusters of agricultural business, agricultural mechanics, exploratory agriculture, forestry, horticulture, and production agriculture.

At the university level colleges, schools, and departments of agriculture also were reporting increased enrollments. Litenber, Whatley, and Scamardo (1992) reported with the exception of the North Central region, agricultural education enrollments had recovered to early-1980 levels. According to USDE, 1992 enrollments in colleges of agriculture nationwide had increased by 18.9 percent (USDE, 1996). However, the demographic composition of today's agriculture classes has changed from that of the 1980s.

Dyer, Breja and Andreasen (1999) studied backgrounds and attitudes of freshman in the College of Agriculture at Iowa State University. They reported a majority of the freshman majoring in agriculture had completed at least one high school agriculture course, were members of FFA, 4-H, possessed an agricultural experience while in high school, and were from a farm or rural background. However, Dyer, Breja and Andereasen (1999) noted the majority of students that were from a farm or rural background had narrowed when compared to students at the Iowa State University College of Agriculture from previous years.

With more freshmen coming from urban backgrounds or situations in which they have gained no knowledge of or experience in agriculture, new problems and opportunities emerge. According to Russell (1993), this lack of agricultural background and experience jeopardizes the long-term future of the agricultural industry. Russell warned of an impending

"brain drain" in the agricultural industry if students' lack of experience in agriculture continues. Colleges, schools and departments of agriculture must provide information, not only in agriculture, but also about agriculture. However, losses in enrollment translate to losses of dollars from instructional budgets. The needed resources to provide this instruction may not be available.

This research addressed how students who are likely to complete a program of instruction and seek employment in the industry of agriculture are identified and recruited. Fishbein and Ajzen (1975) provided the theoretical framework for this study. They determined that intentions to participate in an activity could be predicted based upon knowledge, observation, or other information about some issue. This model suggested that a person's intent to pursue study in a field of agriculture, or to become actively involved in an agricultural career, may be predicted by analyzing his/her beliefs about agriculture.

Purpose and Objectives

The primary purpose of this study was to assess the attitudes and intensions of university freshmen majoring in agriculture toward recruitment and retention of university agriculture programs. The study addressed the following questions.

1. What are the demographics of freshmen students enrolled in university agricultural programs?

2. What factors and/or persons determined or influenced agricultural students to choose the university attended?

3. What are the future plans of freshmen students majoring in agriculture?

Procedures

This study used a descriptive survey focusing on university programs of agriculture located in the Commonwealth of Kentucky. Four universities (a land grant and three non-landgrant) with colleges, schools, or departments of agriculture were included in this study. A student roster from each university college admissions office served as the population frame for this census study, with a total population of 543 students (N=543). Freshmen majoring in agriculture at universities across Kentucky were administered the survey in November, 2002.

A survey was distributed to each student during a scheduled class in November 2002 by an agricultural education faculty member at each university. Surveys were completed and returned to the faculty member and follow-up contacts were made in December, 2002 requesting instruments from non-respondents. Completed data collection instruments were received from 365 respondents, resulting in a 72.5% response rate.

The two-part questionnaire used in this study was developed by Dyer, Lacy, and Osborne (1996) and was used with their consent. The instrument was reviewed for content and face validity at that time. Part I of the questionnaire addressed demographic information and contained close-ended and partially close-ended questions. Part II of the instrument was divided into three constructs: Attitudes Toward Agriculture as an Area of Study; Attitudes Toward High School Agriculture Programs; and Attitudes Toward University Agriculture Programs. These sections used a five-point Likert-type scale (1=Strongly Disagree, 2=Disagree, 3=Uncertain, 4=Agree, 5=Strongly Agree). Dyer, et al. reported reliability estimates for the three constructs using Cronbach's Alpha (r =.85, .78, .88, respectively).

Data were entered and analyzed using SPSS 10.0 and Microsoft Excel. Descriptive statistics were used to summarize using measures of central tendency and variability. Factors, persons or sources ranked most influential in the decision making process to attend the university agriculture program were ranked based on a value point system. The highest ranked response was given the largest numeric value, sum of the responses were totaled and the entire grouping ranked.

Findings

Research Question 1: What are the demographics of freshmen students enrolled in university agricultural programs?

Demographics analyzed include gender, ethnic background, geographic background and students' agricultural education background. A majority of the student respondents was female (52%, *n*=190), although variation was found across programs (Table 1).

A large majority (97%, *n*=339) of the freshman indicating agriculture as their major in this state were Caucasian. As shown on Table 1, one-third (34%, *n*=125) of the students' geographic background was from a farm. However in two of the four universities, 50% or more of the students possess a farm background. An additional 23% (*n*=84) of the students were from urban backgrounds (population 10,000 to 99,000). Sixty three (17%) students are from small towns less than 10,000. Ten percent (*n*=37) of the respondents have a rural, non farm background. Fifty-four freshmen (15%) indicated they were from a population over 100,000 which included both large metropolitan and suburban metropolitan areas.

Table 1.
Demographics of University Freshmen Majoring in Agriculture

	UK (*n*=164)	WKU (*n*=78)	Murray (*n*=94)	Morehead (*n*=29)	Total (*n*=365)
Gender (*n*=364)					
Male	80 (49%)	46 (59%)	33 (35%)	15 (52%)	174 (48%)
Female	83 (51%)	32 (41%)	61 (65%)	14 (48%)	190 (52%)
Ethnicity (*n*=351)					
African American	5 (3%)	0	1 (1%)	0	6 (1.7%)
Caucasian	146 (94%)	74 (99%)	90 (98%)	29 (100%)	339 (97%)
Hispanic	2 (1%)	0	0	0	2 (0.6%)
Other	2 (1%)	1 (1%)	1 (1%)	0	4 (1.1%)
Geo. Location (*n*=363)					
Large Metro >100,000	19 (12%)	2 (2%)	5 (5%)	1 (3%)	27 (7.4%)
Suburb of Metro >100,000	11 (7%)	2 (2%)	14 (15%)	0	27 (7.4%)
Urban 10,000 – 99,000	45 (28%)	20 (26%	14 (15%)	5 (17%)	84 (23%)
Small Town <10,000	33 (20%)	7 (9%)	18 (19%)	5 (17%)	63 (17%)
Rural , Non-farm	10 (6%)	8 (10%)	16 (17%)	3 (10%)	37 (10%)
Farm	44 (27%)	39 (50%)	27 (29%)	15 (52%)	125 (34%)

Incoming freshman majoring in agriculture have a variety of agricultural/youth program experiences prior to enrolling at the university (Table 2). These experiences include, but are not limited to enrolling in secondary agricultural education courses, membership in FFA and 4-H, and participation in other agricultural experiences, both paid and non-paid. Table 2 shows the number and percentage of involvement by entering freshmen students for each category for each agricultural program.

A majority (58%, *n*=210) of respondents participated in high school agricultural education program. Almost all of the university agriculture programs had a majority of students enroll in agricultural education classes, with only one university program having a majority of students who did not enroll in high school agriculture. Most students were members of FFA (57%, *n*=201) and members of 4-H (53%, *n*=177).

Of the students who did not take high school agriculture, 68.5% stated the reason he or she did not enroll was agriculture was not offered in his or her school. Other reasons students did not participate in high school agricultural education program included he or she was not interested (15.1%, *n*=22); too busy with college preparatory courses (11.6%, *n*=17); took other electives such as band (2.7%, *n*=4); and agricultural education was not promoted (2.1%, *n*=3).

Table 2.
Agriculture Experience Prior to Enrollment in the University Agriculture Program

	UK (*n*=164)	WKU (*n*=78)	Murray (*n*=94)	Morehead (*n*=29)	Total (*n*=365)
Secondary Ag Ed Classes					
Yes	76 (46%)	63 (81%)	51 (54%)	20 (69%)	210 (58%)
No	88 (54%)	15 (19%)	43 (46%)	9 (31%)	155 (42%)
Member of FFA (n=355)					
Yes	74 (46%)	59 (80%)	49 (53%)	19 (70%)	201 (57%)
No	87 (54%)	15 (20%)	44 (47%)	8 (30%)	154 (43%)
Member of 4-H (n=332)					
Yes	84 (53%)	43 (63%)	33 (42%)	17 (65%)	177 (53%)
No	75 (47%)	25 (37%)	46 (58%)	9 (35%)	155 (47%)
Type of Ag Experience					
None	44 (27%)	6 (8%)	13 (14%)	2 (7%)	65 (18%)
Paid	12 (7%)	4 (5%)	14 (15%)	4 (14%)	34 (9%)
Unpaid	18 (11%)	5 (6%)	16 (17%)	5 (17%)	44 (12%)
Both Paid & Unpaid	90 (55%)	63 (81%)	51 (54%)	18 (62%)	222 (61%)

Sixty-one percent (*n*=222) of the freshmen studying agriculture in Kentucky indicated they had both a paid and non-paid agriculture experience prior to enrolling at the university. Sixty-five students (18%) reported that they had no prior experience in agriculture before studying it in college. Twelve percent (*n*=44) stated they have an unpaid agriculture experience, whereas 9% (*n*=34) indicated they had a paid agriculture experience prior to enrolling.

Research Question 2: What factors and/or persons determined or influenced agricultural students?

Freshmen students indicated career opportunities as the most important factor to influence him or her to attend the college, school, or department of agriculture (Table 3). Students' love of animals was ranked as the second most important factor. Freshmen ranked the positive reputation of the faculty as the third most important factor for their college choice. Ranking fourth, students expressed the scientific nature of agriculture as an important aspect in their decision making process. Financial aid and scholarships were a factor and ranked fifth. Students were environmentally concerned and ranked this item sixth regarding influence of college choice.

Table 3.
Factors Ranked as Most Influential in Choosing University Program of Agriculture

	UK (*n*=164)	WKU (*n*=78)	Murray (*n*=94)	Morehead (*n*=29)	Total (*n*=365)
Career Opportunities	1	2	2	1	1
Love of Animals	3	1	1	2	2
Reputation of Faculty	2	3	5	3	3
Scientific nature	3	4	3	4	4
Financial Aid	5	5	6	5	5
Environmental Concern	6	6	4	6	6
Unsure of Interest	7	7	7	7	7
Other	8	8	8	8	8

Kentucky freshmen agriculture majors ranked their parent/guardian as the person who most influenced their choice of college, school, or department of agriculture (Table 4). The agriculture representative from the college, school or department of agriculture was ranked second as the most influential in helping make the decision. Friends were ranked third and the high school agricultural education teacher was ranked as the fourth most influential person who provided an influence in freshmen choosing the college to attend. The university representative from the admissions office was the fifth most influential person ranked by freshman majoring in agriculture. The students' high school counselor was indicated as an influence in determining choice of college, school or department and was ranked sixth. Family members play a role and the brother or sister of the freshman was ranked seventh in influence. Other people in the freshman's life as a relative, friend, or teacher ranked eighth, ninth, and tenth as a person of influence in this decision.

Table 4.
Persons Ranked as Most Influential in Choosing the University Agriculture Program and/or University

	UK (*n*=164)	WKU (*n*=78)	Murray (*n*=94)	Morehead (*n*=29)	Total (*n*=365)
Parent/Guardian	1	2	3	2	1
Agriculture Representative	2	4	2	3	2
Friend	5	1	3	4	3
High School Ag Teacher	3	3	5	1	4
Univ. Rep/Admissions	4	6	1	6	5
High School Counselor	6	5	6	5	6
Brother/Sister	7	7	7	7	7
Other Relative	8	9	9	10	8
Other Person	9	8	8	8	9
Other Teacher	10	10	10	9	10

Sources most helpful also were ranked in informing students about the program of agriculture (Table 5). Brochures, website, campus visits, letters from staff, phone calls, contacts with faculty, contacts with students and other sources of information were listed as

sources. Freshman students indicated visits to campus were the most helpful source in informing them about the college, school or department of agriculture; therefore they ranked it first. Campus visits were ranked first by all universities. Contacts with faculty ranked second most helpful, and brochures ranked third. Students identified the website as fourth most helpful and ranked contacts with other students fifth. Staff letters were identified as sixth; phone calls ranked seventh; and other sources were ranked eighth.

Table 5.
Sources Ranked Most Helpful in Informing about the Program of Agriculture and/or University

	UK (*n*=164)	WKU (*n*=78)	Murray (*n*=94)	Morehead (*n*=29)	Total (*n*=365)
Campus Visits	1	1	1	1	1
Contacts with Faculty	2	3	3	6	2
Brochures	3	5	2	3	3
Website	6	2	4	2	4
Contacts with Students	4	4	5	7	5
Letters from Staff	5	6	6	5	6
Phone Calls	7	7	7	7	7
Other	8	8	8	8	8

Research Question 3: What are the future plans of freshmen majoring in agriculture?

Freshmen respondents (72%, *n*=246) indicated they do not plan to change majors and/or universities in the future (Table 6). Respondents (85%, *n*=284) also plan to pursue an agricultural related career after graduation. Again, all universities involved in this study had a majority of students stating they wanted a career in agriculture.

Table 6.
Future Plans of University Freshmen Majoring in Agriculture

	UK (*n*=164)	WKU (*n*=78)	Murray (*n*=94)	Morehead (*n*=29)	Total (*n*=365)
Changing majors/ university (*n*=353)					
Yes	34 (22%)	24 (34%)	32 (36%)	5 (17%)	95 (28%)
No	120 (78%)	46 (66%)	56 (64%)	24 (83%)	246 (72%)
Ag Career (*n*=334)					
Yes	111(77%)	65 (92%)	82 (92%)	24 (86%)	284 (85%)
No	33 (23%)	6 (8%)	7 (8%)	4 (14%)	50 (15%)
Grad Degree (*n*=314)					
Yes	88 (61%)	29 (42%)	47 (60%)	10 (44%)	174 (55%)
No	37 (26%)	32 (46%)	28 (36%)	11 (48%)	108 (34%)
Undecided	19 (13%)	8 (12%)	3 (4%)	2 (8%)	32 (10%)

Regarding education after attaining a bachelors degree, over half of the respondents (55%, *n*=174) indicated they will pursue a post graduate degree. Thirty-four percent (*n*=108) said they would not pursue a post graduate degree, and 32 respondents (10%) were undecided at this time.

Conclusions

University freshman respondents majoring in agriculture throughout Kentucky were identified as a majority Caucasian, female, and possessed a farm background. Students took agricultural education at the high school level, and rated it as good. Students were also members of the FFA and some had involvement with 4-H. Those students who were not program graduates did not have access to an agricultural education program. Incoming freshman students majoring in agriculture have a variety of agricultural/youth program experiences prior to enrolling at the university. These experiences include involvement in both paid and non-paid agriculture activities. Students major in a variety of agriculture programs; the most frequent was animal science.

Various factors and persons influence a student's decision of university choice. Career opportunities are the most important factor to influence a student to attend a particular college, school, or department of agriculture. Some other factors contributing to the decision to attend a university program of agriculture included love of animals, reputation of faculty, scientific nature, financial aid, and environmental concern.

A parent/guardian is the most influential person in determining choice of college, school, or department of agriculture. Other persons identified as an influence in attending university programs of agriculture included the agricultural representative from the college, department or school of agriculture; friend of the student, high school agriculture teacher; university representative; high school counselor; brother or sister of student; other relative; other person; or other teacher in the high school.

Campus visits were the most helpful source for informing freshmen students majoring in agriculture about the college, school or department of agriculture. Other sources also ranked by university freshmen included contacts with faculty, brochures, website, interaction with current students, letters from staff and phone calls from university representatives.

Freshmen who declared agriculture as their major do not plan to change majors and/or universities in the future. Students also plan to pursue an agricultural related career after graduation. Regarding further education, students plan to pursue a graduate degree after receiving their undergraduate degree.

Recommendations

Campus visits and contact with faculty was important to the decisions of university freshmen. Faculty, administration and staff must continue to take time to meet with prospective students and encourage on-campus visits. Parents are also influential in

determining choice of university program of agriculture. All involved with university programs of agriculture must work at developing relationships with students and parents.

The role of the agricultural educator and the agricultural education program to the local college, school or department of agriculture is sometimes never appreciated or addressed. Teacher educators must work with Associate Deans for Instruction and Directors of Student Relations/Recruitment coordinators to best promote instruction in and about agriculture. In addition, agricultural educators must promote the importance of recruiting quality students for agricultural programs.

Further research should be conduced in this state to assess university students' attitudes regarding entrance standards, the recruitment process including public relations strategies, marketing agriculture as a major, and university entrance standards. Furthermore, the issue of recruitment issues for land grant and non-land grant universities should be investigated to analyze if differences exist.

Additional states should examine their university agriculture programs to evaluate if the recruitment process is meeting the needs and expectations of the students. Furthermore, a national or regional study could provide a broader perspective into the recruitment and student decision making process. Findings from these studies would help administration and faculty alike in the recruiting of quality agriculture students.

A similar study should be conducted to assess the university faculty attitudes of the recruitment process and issues regarding retention of agriculture students. This study could lend to a comparative analysis regarding perceptions of faculty and students in colleges, schools, and departments of agriculture.

Discussion/Implications

A slight majority of students entering agriculture in this state are female. In a state that is perceived by some as more traditional in nature, this is surprising! Traditionally, faculty members in university programs of agriculture are male. As changes with our student population occur, do learning styles and needs of our students change? As agriculturalists and educators we must be ready to embrace this change and be ready to assist our colleges, schools, and departments of agriculture prepare for the future.

As state and federal budgets get tightened and accountability for schools at all levels becomes more crucial, professionals in agriculture must be aware of the attitudes of the clients—our students. Faculty, staff, administration and even current agriculture students must market and promote agriculture through the aspects in reaching potential students.

University agricultural educators are vital to the success of state high school agricultural education programs and also play an important role in the recruitment of students within our colleges, schools, or departments of agriculture. Does contact with students through secondary agricultural education play a role in the recruiting process? Does

interaction with agricultural education teachers influence students' decision? What value does an university agricultural education program have on the recruitment of potential students in the university programs of agriculture?

Agricultural educators in both land grant and non-land grant universities must strive to recruit and enable potential agriculture majors to achieve success. This is crucial for the careers of our students and future success of our programs.

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The Role of 4-H and FFA Involvement and Gender on Student Success in an Introduction to Animal Science Course

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Abstract

Students enrolled in Introduction to Animal Science at a non-land grant state university participated in the study and completed identical subjective and objective assessments at the beginning and the end of the semester. Students rated their knowledge of 49 course outcomes and completed a 50-question multiple-choice exam that covered topics discussed in the course. The assessments were completed the first day of class and on final exam day. Demographic surveys were completed as part of the subjective evaluation to provide the information needed to determine how the students performed in the course based on involvement in youth activities and gender.

The statistical analysis was conducted using SAS (1999). A mixed linear model was used to analyze all data (PROC MIXED, SAS, 1999). Least square means and standard errors were calculated for the following: average beginning assessment (ABA), average ending assessment (AEA), average improvement (AI), initial test (ITS), last day test (LDTS), test improvement (TI), final test (FT) and final average (FA). Variable means were compared using the Least Significant Difference (LSD) Mean Separation test at a ($P<0.05$) significance level by the pdmix procedures of SAS (Saxton, 1998).

Student involvement in 4-H or FFA significantly ($P<0.05$) affected the average beginning assessment (ABA), average ending assessment (AEA), and initial test score (ITS). The students ranking themselves as very active in both youth organizations ranked their confidence of course topics highest at both the beginning and end of the semester and scored the highest on ITS. Final average (FA) was not significantly influenced by involvement in youth organizations. The ABA, AEA, ITS, and last day test score (LDTS) were significantly ($P<0.05$) higher for males than females, but FT scores were similar for males and females.

Introduction

Arguably, a major role of the university and its faculty and staff is to prepare students for their future careers and ultimately their economic goals. Ideally, programs of study in agriculture should be similar across universities for students to be competitive for employment in the global agricultural industry or in preparing for further education in graduate or professional school. The knowledge attained by the student should have the breadth and depth to address issues in various agricultural fields or pursuit of an agriculturally related graduate program. In order to determine if a college or university agricultural education program is successful, an effective method of outcomes assessment must be implemented.

A method of determining the success of an academic program is to develop a set of outcomes that are expected for students enrolled in an agricultural program. Outcomes must be clearly defined and a curriculum designed to provide students the opportunity to achieve those outcomes and their measurement must be clearly established. As a component of the outcomes assessment program in the Department of Agriculture at a non-land grant institution, assessment of course outcomes began with the freshman-level Introduction to Animal Science course that is required for all students majoring in any area of agriculture and for pre-veterinary students.

Evaluation of course outcomes may be either subjective, objective, or both. The subjective form of evaluation allows students to self-evaluate their knowledge of various topics at any point in the course. Subjective evaluation may be given at the beginning and the ending of the class. The objective form of evaluation is usually a traditional form of testing course topics. Objective evaluation sets the list of course outcomes into a multiple-choice question format for the student to answer. The questions are used as a pre- and post-test to compare students' progress during a semester-long course.

The knowledge attained by the students in high school classes and extracurricular activities should be reflected in student success in college courses. As a component of the outcomes assessment for the Introduction to Animal Science class, an instrument was developed to collect demographic and high school activity data that could have relevance to the learning activities of students in college level classes. These data were studied in relation to both subjective and objective evaluation of course outcomes.

Theoretical/Conceptual Framework

Various measures of academic ability and previous agricultural experiences may aid in planning academic interventions needed to ensure student success in agricultural classes. By implementing learning experiences to compensate for lack of knowledge or experience in agriculture, the retention rate of students may be increased. The measures used in past studies have included high school grades, standardized test scores (Brashears and Baker, 2003), background of the students, involvement in youth organizations (Ball et al., 2001), gender (Bridges et al., 2002), and preferred learning style of the students (Garton et al., 2000). In

the present study, youth organization involvement and gender were studied to determine their relationship to success in an Introduction to Animal Science class at Western Kentucky University.

Youth Organization Involvement --Involvement in youth organizations such as 4-H or FFA may be used by colleges and universities as a predictor of student performance and retention. 4-H and/or FFA involvement impacts numerous educational outcomes including student achievement, skill attainment, and student retention (Ball et al., 2001). The lack of experience in agriculture can be compensated for by involvement in 4-H or FFA for some students. Ball et al. (2001) reported those students who participated in one of the two agriculture youth organizations had a higher mean cumulative grade point average at the end of their freshman year when compared to those students who did not participate (3.1 vs. 2.6). Students who were very active in FFA demonstrated that they had more knowledge of animal science topics at the beginning of the semester than those students who were very active in 4-H and those who were not active in either of the youth organizations (Deppe, 2002). Ball et al., (2001) found that significantly more students who participated in 4-H or FFA returned for their sophomore year of study. The students who were not involved in agriculture youth organizations had an 83.8 percent retention compared to 94.3 percent retention of students who were involved.

Gender--Student populations in agricultural programs at colleges and universities have changed to include a larger percentage of women. A Texas A&M University study indicated that the enrollment changed from 51 percent women in 1986 to 59 percent women in 1996 (Cleere et al., 2002). With the increased percentage of women enrolled in agriculture comes some differences in the success of males and females and in learning styles related to gender. Bridges and Casavant (2002) showed that women tend to perform better on essay type exams while men tend to excel on multiple-choice exams. The learning rate of men and women tends to be similar (Bridges and Casavant, 2002). However, males tend to perform better on the SAT™ and the ACT™ . Bridgemon and Wendler (1991) found that men's scores on the mathematics portion of the SAT™ were significantly higher ($p<.05$) when compared to the scores for women. The study also showed that women had a significantly higher ($p<.05$) grade point average in high school than the male students. Gender score differences on the mathematics portion of the SAT™ may be explained by the test being taken only by those individuals planning to attend college with a larger percent of those individuals being females, and the content of the SAT™ questions may result in score differences found between men and women (Bridgemon and Wendler 1991).

Purpose and Objectives

The purpose of this study was to evaluate and assess student performance in an introductory animal science class at Western Kentucky University. Objectives of the study were to determine if gender and experiences and background in agriculture prior to college influenced student learning in an Introduction to Animal Science class. The ultimate

objective was to determine if special learning opportunities are needed for those students who have little or no previous background or experiences in agriculture.

Procedures

The data for this study were collected during eight semesters and twelve sections of the Introduction to Animal Science course from 1999 to 2003. A total of 649 students completed both the subjective and objective evaluations at the beginning and end of each semester. Data from students who completed only the beginning or the ending evaluations were not included in the study.

The students completed beginning evaluations at the first class meeting each semester. The evaluation consisted of three parts: a subjective course outcomes assessment, a demographic questionnaire, and an objective multiple-choice test. The course outcomes evaluation consisted of 49 course outcome statements and allowed the student to assess his/her prior knowledge of topics. Students rated their knowledge of each statement with a number ranging from 1 to 100 with 1 being the least prior knowledge and 100 being very knowledgeable about the subject. A demographic survey addressed data about student background, the number of college hours completed by the student, his/her prediction on the degree of difficulty of the course, the expected grade from the course and his/her agricultural area of interest. The final portion of the initial evaluation was a 50-question multiple-choice examination that addressed topics on the list of course outcomes.

The final evaluation consisted of the same three parts and was completed on the day of the final exam. The final evaluation was completed in the same manner as at the beginning of the course. The study also included the evaluation of grades received in the course. The score each student received on a 100-question final examination (the first fifty questions were the same as the pretest given the first day of class) was recorded. The final average (FA) recorded for each student was calculated by the following: 30 percent on class quiz average, 20 percent on each of two hour examinations (40 percent total), and 30 percent on the final examination.

The statistical analysis was conducted using SAS (1999). A mixed linear model was used to analyze all data (PROC MIXED, SAS, 1999). Least square means and standard errors were calculated for the following: average beginning assessment (ABA), average ending assessment (AEA), average improvement (AI), average percent improvement (API), initial test (ITS), test improvement (TI), percent test improvement (PTI), last day test (LDTS), final test (FT), final average (FA), lab grade (LG). Variable means were compared using the Least Significant Difference (LSD) Mean Separation test at a ($P<0.05$) significance level by the pdmix procedures of SAS (Saxton, 1998).

Findings

The effects of involvement in the 4-H and FFA youth organizations on subjective assessment scores are shown in Table 1. Students who were very active members in both 4-H and FFA rated their knowledge highest ($P<.05$) at both the beginning of the semester (47.0 versus overall mean of 30.1) and the ending of the semester (74.3 versus overall mean of 67.8) as indicated on the subjective assessments (ABA and AEA). Students who were FFA members but did not judge themselves as active and the students who were not a member of either organization compared to the other students rated their opinion of knowledge on course topics the lowest at the beginning of the semester with scores of 27.0 and 28.1, respectively. The opinions of the students who were involved in both 4-H and FFA but were not active had more variation in their scores than the other students at the beginning of the semester (SE = 7.58). Students who were FFA members but were not involved had a significantly ($P<0.05$) lower opinion of their knowledge on the AEA (59.0) when compared to other students included in the study. Despite the differences on the subjective assessments based on student involvement, there were no significant perceived knowledge improvement (AI) differences based on the level of involvement in the youth organizations. Numerically, however, the students deemed very active members in both 4-H and FFA had the lowest amount of improvement on the AEA compared to the score received on the ABA.

Table 1. Least squares means (± Standard Error) for Average Beginning Assessment, Average Ending Assessment, and Average Improvement for students categorized by their high school involvement in 4-H or FFA before enrolling in Animal Science 140 at Western Kentucky University

Activities	N	ABA[1]		AEA[2]		AI[3]	
		LSM	±SE	LSM	±SE	LSM	±SE
Not a member	242	28.10[c]	4.45	66.98[b]	3.72	39.87	5.71
4-H Member-Not Active	31	29.18[bc]	6.30	69.66[ab]	4.76	41.58	7.47
4-H Member-Very Active	28	32.28[bc]	6.71	69.48[abc]	5.59	35.22	8.86
FFA Member-Not Active	58	26.97[c]	5.41	58.95[c]	4.37	34.97	6.78

Activities	N	ABA[1]		AEA[2]		AI[3]	
		LSM	±SE	LSM	±SE	LSM	±SE
FFA Member-Very Active	147	36.31[b]	4.95	68.12[b]	4.06	34.81	6.23
4-H and FFA Member-Not Active	19	33.44[abc]	7.58	68.38[abc]	5.97	36.38	9.50
4-H and FFA Member-Very Active	82	47.01[a]	5.43	74.27[a]	4.35	28.48	6.76

Means within a column with different superscripts are different (P<.05)
[1]Average Beginning Assessment = ABA [2]Average Ending Assessment =AEA
[3]Average Improvement = AI

Table 2 shows the effect that 4-H or FFA involvement had on the objective test scores. The students who were very involved in 4-H and FFA scored significantly higher (P<0.05) on the ITS than all groups except the non-active members of both organizations (39.9 versus group mean of 35.9). The students who were either non-members of either organization or were FFA members but were not active performed the lowest on the initial objective test with scores of Table 2. Least squares means (± Standard Error) for Initial Day Test Score, Last Day Test Score, Test Improvement, Final Test Score, and Final Average for students categorized by their high school involvement in 4-H or FFA before enrolling in Animal Science 140 at Western Kentucky University

Activities	N	ITS[1]		LDTS[2]		TI[3]		FTS[4]		FA[5]	
		LSM	±SE	LSM	±SE	LSM	±SE	LSM	±SE	LSM	±SE
Not a member	242	33.09[c]	2.08	63.55	2.19	29.53	3.70	61.27	2.26	69.44	2.62
4-H Member-Not Active	31	33.85[bc]	2.88	64.76	3.19	28.12	4.72	63.58	3.03	71.86	3.47
4-H Member-Very Active	28	33.55[bc]	3.07	60.54	3.93	28.69	5.23	60.47	3.45	66.63	3.86
FFA Member-Not Active	58	32.77[c]	2.47	63.19	2.70	28.88	4.20	60.95	2.69	71.82	3.12
FFA Member-Very Active	147	36.60[b]	2.30	62.17	2.38	23.79	4.07	61.27	2.47	71.85	2.87
4-H and FFA Member-Not Active	19	34.92[abc]	3.38	60.32	4.19	24.46	5.59	61.42	2.68	68.71	4.33
4-H and FFA Member-Very Active	82	39.90[a]	2.50	66.14	2.54	24.17	4.22	62.48	2.68	73.19	3.08

Means within a column with different superscripts are different (P<.05)
[1] Initial Day Test Score= ITS
[2] Last Day Test Score= LDTS
[3] Test Improvement= TI
[4] Final Test Score= FTS
[5] Final Average= FA

33.1 and 32.8, respectively. Despite the differences on the ITS, the students did not perform significantly different on the last day test, the final test or the final average (P>0.05).

The effect of student's gender on assessment scores is shown in Table 3 and 4. Males rated their knowledge of course topics higher when compared to females at the beginning (36.4 vs. 31.0) (P<0.05) and the ending (71.8 vs. 66.4) (P< 0.05) of the course. However, the average

improvement on the subjective assessments was not significantly (P>0.05) different between males and females. Males scored significantly (P<0.05) higher than females on the ITS and LDTS. However, male and female students improved at the same rate. Despite the differences on Table 3. Least squares means (± Standard Error) for Average Beginning Assessment, Average Ending Assessment, and Average Improvement for students categorized by gender and enrolled in Animal Science 140 at Western Kentucky University

Gender	N	ABA[1]		AEA[2]		AI[3]	
		LSM	±SE	LSM	±SE	LSM	±SE
Male	337	36.44[a]	4.61	71.77[a]	3.77	36.94	5.78
Female	293	31.03[b]	4.86	66.41[b]	3.91	36.36	6.01

Means within a column with different superscripts are different (P<.05)
[1]Average Beginning Assessment = ABA [2]Average Ending Assessment = AEA
[3] Average Improvement= AI

the ITS and LDTS, scores on the FTS and FA were not significantly different (P>0.05) between males and females.

Table 4. Least squares means (± Standard Error) for Initial Day Test Score, Last Day Test Score, Test Improvement, Final Test Score, and Final Average for students categorized by gender and enrolled in Animal Science 140 at Western Kentucky University

Gender	N	ITS[1]		LDTS[2]		TI[3]		FTS[4]		FA[5]	
		LSM	±SE	LSM	±SE	LSM	±SE	LSM	±SE	LSM	±SE
Male	337	37.28[a]	2.15	63.92[a]	2.09	25.61	3.76	61.88	2.29	70.92	2.65
Female	293	34.08[b]	2.25	60.80[b]	2.29	25.38	3.94	59.57	2.40	69.04	2.79

Means within a column with different superscripts are different (P<.05)
[1] Initial Day Test Score= ITS
[2] Last Day Test Score= LDTS
[3] Test Improvement= TI
[4] Final Test Score= FTS
[5] Final Average= FA

Conclusions

The results of this study demonstrate that involvement in youth activities and gender influenced both subjective and objective evaluation scores. 4-H and FFA provide opportunities for young people to learn about the agricultural industry. Involvement of the students in 4-H and FFA helps determine the students' perception of their knowledge of topics to be discussed in the Introduction to Animal Science course. The students ranked their knowledge differently relative to their involvement in activities as a high school student; however, the students' knowledge ranking improved at the same rate. Prior agricultural experience gained through 4-H and FFA activity may have allowed students to score higher on the initial day test score. These results coincide with the knowledge that prior experience with a subject addressed in a course may enhance the ability of students to learn

information presented (Osman and Hannafin, 1994). Despite the fact that the involvement did affect their opinion of how much they knew, the participation in 4-H and/or FFA did not translate into higher scores on the objective tests at the end of the semester. The results of the present study do not agree with those previously reported where students involved in the youth organizations had higher grade point averages when compared to those students not involved in the organizations (Ball et al., 2001). The explanation for this difference in results could be due to the fact that students from the present study who had prior agricultural experience thought they possessed more knowledge on subjects presented throughout the course, and hence, they did not study as much or as regularly as students without prior experience or involvement in the youth organizations. This outcome could be desirable when considering that instructors want students to be able to succeed in the course regardless of their level of previous experience prior to enrollment in the course.

Gender plays a role in subjective and objective assessment performance with scores on multiple choice exam differing. The present findings closely follow those previously reported by Bridges and Casavant (2002) who showed that males outperformed females on multiple-choice exams. In the present study, males not only scored higher on the objective tests but also subjectively self-assessed their knowledge higher. It appears that males thought they had more understanding of the course subject matter than females. A plausible explanation for these results could be that males may have had more previous experience with agriculture and related topics than the females. Despite the gender assessment score differences, women and men had similar rates of improvement on the subjective self-assessment administered at the beginning and at the end of the semester. The study demonstrated similar learning rates among males and females. The results of the present study are in agreement with those previously reported (Bridges and Casavant, 2002) indicating that males and females have similar rates of course knowledge improvement. Student gender was not a significant source of variation for FTS or the FA received in the course. Male and female FA score differences may have resulted from differences in performance on other testing instruments (either quizzes or hourly exams) administered throughout the semester. The quizzes and hour exams are fill-in-the blank, short answer or essay type exams on which the females must have excelled the males in performance. Bridges and Casavant (2002) found that females had superior performance on these type exams. Furthermore, males may not study as regularly due to their perceived course subject matter knowledge; whereas, females spend more time studying the course topics.

Implications and Recommendations

The implications and recommendations reflect the findings and important conclusions that resulted from the study. The recommendations are intended to provide some basis for important considerations among high school and college educators as they attempt to provide learning opportunities for students with varying educational and agricultural experiences:

- Involvement of students in 4-H and FFA activities appears to create a strong degree of self-confidence in their academic ability relative to animal science.
- Active involvement in the youth organizations did not relate to an improvement in the rate of increase in perceived knowledge during the semester. However, those students who classified themselves as very active members of both organizations rated their knowledge highest of all involvement groups at the end of the semester.
- Based upon the initial objective test scores, active involvement in the youth organizations gave those students a knowledge advantage.
- The extra self-confidence and knowledge advantage of those students active in the youth organizations did not translate into better performance on the objective measures of knowledge given at the end of the semester.
- Students with little or no background in agriculture or involvement in the agricultural youth organizations can perform just as well as students with a favorable background if the course is designed to teach students as if none has any prior knowledge or experience. In order to allow inexperienced students to gain both knowledge and confidence, it may be necessary to utilize the animal units at the university farms to offer inexperienced students the opportunity to interact with farm animals in a production setting.
- Educators at the high school level should place much greater emphasis on the idea of "lifelong learning" as a means of encouraging students to develop a more open-minded inquisitive attitude. Having a high degree of self-confidence can be very positive, but this should not substitute for excellent study habits and a zeal for learning new information.
- Males had more confidence in their ability at both the beginning and the end of the semester and actually outperformed females on the initial test and last day test score.
- Females appear to have better study habits and work harder on course assignments to allow them to have overall performance similar to male students.
- Professors should provide confidence building animal experiences for students who are deficient in animal experience or those who simply wish to be involved in more animal activities at the university farms.
- Faculty of introductory classes in agriculture should utilize outcomes based educational models to maintain relevancy in course content and assessment.

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Perceptions of Secondary Principals in Texas Concerning Leadership Skills Attained Through Membership and Participation in the FFA

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Abstract

The primary purpose of this study was to determine Texas secondary principals' perceptions of leadership skills attained through membership and participation in the FFA program. The target population consisted of Texas secondary principals located at schools with an agricultural science program and chartered FFA chapter. A stratified sample of 288 principals was selected. A questionnaire was developed by the researcher concerning leadership skills and the FFA program. After pilot testing of the questionnaire, it was mailed to the participants of the study to complete.

Overall, secondary principals in Texas agreed that membership and participation in the FFA program offers students the opportunity to develop leadership skills. Principals surveyed also agreed that participation in the FFA program helps students to generate goals, establish priorities, develop responsibility, enhance social skills, improve problem solving abilities, listen to others and develop honesty and integrity.

The conclusions drawn from this study have opened the door for further research. Now that Texas secondary principals' perceptions of the attainment of leadership skills by students through membership and participation in the FFA program have been gathered and analyzed, their perceptions regarding other important issues such as curriculum, course offerings and graduation requirements should be collected and analyzed. The results from this study and future studies can be used to build and create relationships between agricultural science teachers and secondary principals allowing them to work together more efficiently to the benefit of the student.

Introduction/Theoretical Framework

The mission of the National FFA Organization 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 (National FFA Organization, 2002). The FFA consists of programs and activities that allow members to develop communication skills, conduct and participate in meetings, manage financial matters, strengthen problem-solving abilities and assume civic responsibility (Vocational Agricultural Teachers Association of Texas, 2002). Activities of the FFA chapter are an integral part of the Agricultural Science and Technology education program (Texas Education Agency, 2002).

Currently, there are 90,000 students enrolled in Agricultural Science and Technology courses in the state of Texas (Vocational Agricultural Teachers Association of Texas, 2002). Enrollment in these courses and participation in the FFA allows students to develop skills that are highly valued by employers such as leadership, teamwork, personal responsibility, problem solving, management, and analysis (Vocational Agricultural Teachers Association of Texas, 2002). However, increased high school graduation requirements have put pressure on agriculture programs by limiting the opportunities for students to enroll in elective courses (Thompson, 2001).

The National Research Council concluded that increased requirements for high school graduation would reduce the time available for electives and extracurricular activities (National Research Council, 1988). A study in Idaho found that 65% of state supervisors and 88% of secondary agriculture teachers agreed that many students were unable to enroll in agricultural education because of high school graduation requirements (Connors, 1998). Teachers in Arkansas felt that offering a science credit for agricultural courses would increase enrollment, benefit students, and enhance the program image (Johnson, 1995).

Currently in the state of Texas, there are 40 different classes offered through Agricultural Science and Technology Education. Certified teachers, administrators, students, and advisory committees determine the courses that are offered to the students (Vocational Agricultural Teachers Association of Texas, 2002). School principals are key decision-makers in the curriculum at their high school and influential in the continuation of the agricultural science program. Although they do not have full control over curriculum, their influence has great impact and their perceptions of agricultural education and technology courses determine its success (Johnson & Newman, 1993). Therefore, the perceptions of secondary principals in Texas concerning leadership skills attained through membership and participation in the FFA program are very important to the success of the FFA program.

Literature indicates that secondary principals are overall supportive of the agricultural education program. There have been numerous studies concerning perceptions of secondary principals concerning different aspects of agricultural education. However, there has never been a study conducted regarding the perceptions of secondary principals in Texas

concerning the leadership skills attained by students through membership and participation in the FFA program.

"Leadership is the ability to influence the activities of an individual or group toward the achievement of a goal." (Addison, 1985, p. 1) Examples of leadership skills are organization and delegation, problem solving, shared leadership, communication, futuristic thinking, decision-making, conflict resolution, goal setting, group dynamics, divergent thinking and time management.

Development of leadership skills in youth has long been a goal of many organizations and clubs including FFA and 4-H. Public speaking, holding an office and participating in meetings are all ways that youth develop leadership skills (Dormody & Seevers, 1994).

Dormody and Seevers (1994) surveyed 370 students from Arizona, Colorado and New Mexico that were members of the FFA. The purpose of the survey was to determine if leadership life skills development of the FFA member was affected by participation in leadership activities. Independent variables in the study included participation in FFA leadership activities, achievement expectancy, self-esteem, years in FFA, age, ethnicity, gender, and place of residence. The dependent variable was the development of leadership life skills. The conclusions from this survey indicated that there was a positive relationship between youth leadership life skills development and achievement expectancy (i.e. what the FFA members expected of themselves and of others during FFA activities and projects). Females also had higher youth leadership life skills development than males. However, there was no correlation between leadership life skill development and self-esteem, years in FFA, ethnicity, or place of residence.

Wingenbach and Kahler (1997) surveyed 371 FFA members from Iowa during the 1994-1995 school year. The purpose of the study was to determine if there was a significant relationship between the member's self-perceived youth leadership and life skills development and their participation in youth leadership activities. The researchers found that there was a positive relationship between FFA leadership activities such as chapter meetings and SAE projects and the member's scores on the survey. The researchers indicate that greater cooperation between agricultural educators, representatives of the industry, and leaders of other youth organizations is needed to help build leadership and life skill development in all youth.

Purpose and Objectives

The major purpose of this study was to determine the perceptions of Texas secondary principals concerning leadership skills attained by students through membership and participation in the FFA program. Specifically, the study addressed the following research questions:

1. What are the demographic characteristics of Texas principals at secondary schools that have an agricultural science program and chartered FFA chapter?

2. What are the perceptions of secondary principals in Texas concerning leadership skills attained by students through membership and participation in the FFA program?

3. Is there a relationship between demographic characteristics of secondary principals in Texas and their perceptions of leadership skills attained by students through membership and participation in the FFA program?

Procedures

A descriptive-correlational design was used in this study. It was designed to assess the perceptions of secondary principals in Texas concerning leadership skills attained through membership and participation in the FFA program. A mail questionnaire was the method of data collection.

The target population of this study was secondary principals in the state of Texas during the 2002-2003 school year at schools that had an agricultural science program and chartered FFA chapter. In 2002, there were 1018 schools with agricultural science programs and chartered FFA chapters (Instructional Materials Service, 2002). It was determined to take a random sample of the target population due to the fact that the target population was so large.

The sample consisted of 288 secondary principals in Texas at high schools that had an agricultural science program and a chartered FFA chapter. The sample was stratified among the 10 FFA areas in the state. Secondary principals were randomly chosen in each area. The number of secondary principals chosen from each area depended on how many schools that area had in comparison to the overall number of schools in Texas with agricultural science programs and chartered FFA chapters.

The data collection instrument used was a researcher developed questionnaire. The questionnaire was developed by using previous surveys used by researchers to analyze perceptions of high school administrators or superintendents regarding agricultural education teachers (Hinkson, 1999), the agricultural education program (Pavelock, 2000), and vocational education (Marrs, 1983). A questionnaire used by Wingenbach and Kahler (1997) in Iowa that measured self-perceived leadership and life skills in FFA members was also used to develop the questionnaire for this study.

One section of the questionnaire was titled "Leadership Skills and the FFA Program". There were 20 statements that respondents agreed or disagreed with using a Likert-type scale of 4=*Strongly Agree*, 3=*Agree*, 2=*Disagree*, 1=*Strongly Disagree* and 0=*Don't Know/No Opinion*. Another section was titled "Demographic Information" and collected demographic variables such as: school location, classification of school, years as a secondary principal, years as a classroom teacher, primary teaching area, teaching experience in career and technology education, teaching experience in agricultural science, enrollment in agricultural

education in high school or college, children's enrollment in agricultural education in high school or college, membership or volunteering for FFA or 4-H programs, children's membership or volunteering for FFA or 4-H programs, attendance of particular FFA activities, recognition by the local FFA chapter, work experience in agriculture, size of hometown, primary source of income for community, highest degree held, major area of study, age, and gender.

The instrument was reviewed by the faculty in the Department of Agricultural Education and Communications at Texas Tech University for face and content validity. After making necessary changes to the instrument, a pilot test involving 30 secondary principals from the target population that were not selected in the stratified random sample was conducted. The pilot test required the secondary principals chosen to complete the actual questionnaire. The participants were also asked for any comments or suggestions to help make the questionnaire better or cleaner. Pilot test data was analyzed for internal consistency using Cronbach's alpha. The leadership skills section of the questionnaire had reliability of .85. Slight modifications were made to the questionnaire before being mailed to the stratified random sample.

The questionnaire was coded (for nonresponse purposes) and mailed to the stratified random sample with a cover letter and self-addressed stamped envelope on April 2, 2003. A thank you/reminder postcard was sent on April 11, 2003, to all participants of the study. A second questionnaire, new cover letter and self-addressed stamped envelope were sent to nonrespondents on April 30, 2003. The cut off date for responses was May 30, 2003. There were 213 questionnaires returned for an overall response rate of 74%.

Responses to the questionnaire were coded and entered into a Microsoft Excel spreadsheet. SPSS 11.0 for Windows was used for data analysis. Descriptive statistics were used to determine frequencies and percentages of responses to questions and statements on the questionnaire pertaining to the respondents' characteristics and perceptions concerning leadership skills attained though membership and participation in the FFA program. Correlation calculations were performed to determine if any significant relationships existed between chosen respondent characteristics and perceptions of secondary principals regarding leadership skills attained through membership and participation in the FFA program.

Findings

The target population in this study was secondary principals in Texas at schools with an agricultural science program and chartered FFA chapter. Responses of participants regarding research question 1, "What are the demographic characteristics of Texas principals at secondary schools that have an agricultural science program and chartered FFA chapter?" are discussed in the following paragraphs.

A majority (85.9%) of secondary principals that responded were male. Over three-fourths of respondents were within the ages of 40 to 59 (82.5%). The largest numbers of respondents (34.6%) were raised in rural areas. Education was the area that most

respondents majored in (70.0%). A majority (98.6%) of respondents received master's degrees or higher.

Over two-thirds (69.8%) of respondents had been a secondary principal for nine years or less. The largest percentage (32.5%) of respondents had been classroom teachers for ten to fourteen years. A majority (69.8%) of respondents indicated that their primary teaching area had been academics. The largest number of respondents indicated that they did not have any teaching experience in career and technology education (80.7%) or agricultural science (91.0%). Sixty percent (60.1%) of the respondents indicated that they had work experience in agriculture.

Over half (51.4%) of respondents were at schools that were located in small towns. A majority (51.4%) of the respondents' schools were classified as 1A (29.2%) or 2A (22.2%). Half (50.0%) of the respondents identified agriculture services as the primary source of income for the school community.

A minority (38.2%) of respondents were enrolled in agricultural science/vocational programs in high school and/or college. Almost one-third (30.2%) of respondents were members of FFA and had volunteered for FFA (33.0%). In regards to 4-H, 19.3% of respondents were members and 17.9% had volunteered for 4-H.

A minority (36.8%) of respondents indicated that they have or have had children enrolled in high school agricultural science/vocational agriculture course(s). One-third (30.2%) of respondents had children that were members of FFA and 8.5% had children that were volunteers of FFA. One-fifth (21.7%) of respondents had children that were members of 4-H and 4.7% had volunteered for 4-H.

Of the secondary principals that responded to this study, 46.9% had received recognition from their local FFA chapter. Eighty-five percent of respondents had attended a chapter FFA banquet. Respondents had also attended the following: FFA district banquets (37.1%), FFA area conventions (17.8%), the FFA state convention (11.7%), local livestock shows (89.2%), county livestock shows (85.9%), major livestock shows (63.8%), FFA judging contests (38.0%) and FFA leadership contests (27.2%).

In order to answer research question 2 "What are the perceptions of secondary principals in Texas concerning leadership skills attained by students through membership and participation in the FFA program?" respondents were asked to indicate their level of agreement with statements pertaining to leadership skills and the FFA. The participants' responses are illustrated in Table 1.

Secondary principals agreed very highly (M=3.96, SD=.205) leadership characteristics are of importance. They also agreed (M=3.71, SD=.473) leadership qualities are developed over time. Respondents also agreed (M=2.92, SD=.790) every student has leadership potential. Respondents disagreed (M=2.36, SD=.770) individuals are born leaders.

Respondents agreed (*M*=3.62, *SD*=.553) an officer position in the FFA chapter promotes leadership and the FFA program offers students an opportunity to develop leadership skills (*M*=3.70, *SD*=.519). Respondents also agreed that participation in the FFA helps students to: generate goals (*M*=3.50, *SD*=.606), establish priorities (*M*=3.48, *SD*=.614), develop responsibility (*M*=3.64, *SD*=.539), enhance social skills (*M*=3.51, *SD*=.623), improve problem-solving abilities (*M*=3.45, *SD*=.666), listen to others effectively (*M*=3.39, *SD*=.702), and develop honesty and integrity (*M*=3.44, *SD*=.714).

Table 1.
Respondents' agreement with statements regarding leadership skills and the FFA program

Statement	No.	Mean*	**SD**
I believe:			
Leadership characteristics are of importance.	206	3.96	.205
Leadership qualities are developed over time.	207	3.71	.473
Individuals are "born leaders".	205	2.36	.770
Every student has leadership potential.	202	2.92	.790
An officer position within the FFA Chapter promotes leadership.	206	3.62	.553
The FFA program offers students an opportunity to develop leadership skills.	205	3.70	.519
Participation in the FFA program helps students to:			
generate goals.	207	3.50	.606
establish priorities.	207	3.48	.614
develop responsibility.	207	3.64	.539
enhance social skills.	206	3.51	.623
improve problem solving abilities.	206	3.45	.666
listen to others effectively.	206	3.39	.702
develop honesty and integrity.	207	3.44	.714
I am familiar with:			
FFA Career Development Events (judging and leadership contests).	207	3.27	.712
The roles and duties of the FFA chapter officers.	206	3.15	.845
The opening and closing ceremonies of an FFA meeting.	206	3.13	.966
The degrees of membership in the FFA.	206	2.82	1.034
Area FFA Leadership Camps.	206	2.51	1.172
Made for Excellence Conference (MFE).	206	1.95	1.225
Washington Leadership Conference (WLC).	206	2.08	1.256

* Scale: 0 through 4 where 0=*Don't Know/No Opinion*, 1=*Strongly Disagree*, 2=*Disagree*, 3=*Agree*, 4=*Strongly Agree*

Respondents agreed they were familiar with FFA career development events (*M*=3.27, *SD*=.712) and the roles and duties of the FFA chapter officers (*M*=3.15, *SD*=.845). They were also familiar with the opening and closing ceremonies of an FFA meeting (*M*=3.13, *SD*=.966). They were familiar with the degrees of membership in the FFA (*M*=2.82, *SD*=1.034) and area leadership camps (*M*=2.51, *SD*=1.172). Respondents were least familiar with the Made for Excellence Conference (MFE) (*M*=1.95, *SD*=1.225) and the Washington Leadership Conference (WLC) (*M*=2.08, *SD*=1.256).

Research question 3, "Is there a relationship between demographic characteristics of secondary principals in Texas and their perceptions of leadership skills attained by students through membership and participation in the FFA program?" was addressed by conducting correlation analyses between chosen independent demographic variables and constructs of the dependent variables, the dependent variables being perceptions of secondary principals concerning statements regarding leadership skills.

The only relationships that were found to be significant in this study dealt with demographic variables and familiarity with leadership development events and career development events. A secondary principal that had experience teaching agricultural science or career and technology education was found to be more familiar with leadership development events and career development events. Also, respondents that had been members of FFA or volunteers of FFA were more familiar with leadership development events and career development events. Respondents that had been enrolled in an agricultural science/vocational program in high school and/or college were also more familiar with leadership development events and career development events. Respondents that had majored in agriculture were also found to be more familiar with leadership career development events and career development events. Respondents that had children that were FFA members were also more familiar with leadership and career development events. Respondents whose primary teaching area was career and technology education were found to be more familiar with leadership development events and career development events, whereas respondents whose primary teaching area was fine arts were least familiar.

Conclusions

The following conclusions are restricted to the population surveyed. These conclusions are based on the interpretation of data presented in the study. A majority (85.9%) of secondary principals are male and are in the age range of 40 to 49 years (44.3%). One-third (34.6%) of principals were raised in rural areas. The major area of study for secondary principals is education (70.0%). A majority (98.6%) of secondary principals have received a master's degree or higher. Over half (51.4%) of secondary principals are at schools that are located in small towns and classified as 1A (29.2%) or 2A (22.2%). The primary source of income for half (50.0%) of school communities is agriculture services.

Less than one-third (30.2%) of secondary principals have been in their current position for more than 10 years. The remaining 69.8% have been in this position for nine years or less. More than 60% of secondary principals taught in the classroom for 14 years or

less and the primary teaching areas for most secondary principals were academic areas such as social studies, English, and science. Almost one-fifth (19.3%) of secondary principals have experience in teaching career and technology education whereas only 9% of secondary principals have experience teaching agricultural science. Sixty percent of secondary principals have work experience in agriculture.

Over one-third (38.2%) of secondary principals were enrolled in an agricultural science/vocational program in high school and/or college. Thirty percent of secondary principals were members of FFA and one-third (33.0%) volunteer or have volunteered for FFA. Almost one-fifth (19.3%) of secondary principals were members in 4-H and 17.9% volunteer or have volunteered for 4-H. Over one-third (36.8%) of secondary principals have children that are or have been enrolled in high school agricultural science/vocational agriculture course(s). Thirty percent of secondary principals have children that are or have been members of FFA and only 8.5% have children that are or have been volunteers of the FFA. More than a fifth (21.7%) of secondary principals have children that are or have been members of 4-H and only 4.7% have children that are or have been volunteers of the FFA. Secondary principals have been involved with the FFA chapter by attending chapter banquets, district banquets, area conventions, state conventions, local livestock shows, county livestock shows, major livestock shows, FFA judging contests, and FFA leadership contests. Almost half (46.9%) of secondary principals have been recognized by their local FFA chapters.

Secondary principals agree that the FFA program allows students an opportunity to develop leadership skills. Secondary principals perceptions of leadership skills attained through membership and participation in the FFA program were not affected by demographic variables such as age, gender, or school classification. However, experience in teaching agricultural science and career and technology education helped to familiarize secondary principals with leadership development events and career development events. Also, secondary principals whose major area of study was agriculture are more familiar with leadership development events and career development events.

Overall, secondary principals that were FFA members or enrolled in agricultural science/vocational program in high school and/or college are more familiar with leadership development events and career development events. Secondary principals that volunteer for FFA or have children that are FFA members are also more familiar with leadership development events and career development events.

Recommendations

The following recommendations have been made by the researcher as a result of this study:

1. The results of this study should be made available to agricultural science teachers in the state of Texas. The annual agricultural science teachers' conference, the Vocational Agricultural Teachers Association of Texas newsletter, The Ag Education Magazine and other publications targeting

agricultural science teachers in Texas should include the results of this study in future programs or publications. Making this information available to agricultural science teachers will help to inform them of the perceptions of secondary principals in Texas concerning leadership skills attained by students through membership and participation in the FFA program.

2. The results of this study should be made available to secondary principals in the state of Texas. The perceptions that were found in this study were very positive and would perhaps create interest in the agricultural science program and FFA program among secondary principals that do not have agricultural science programs and chartered FFA chapters at their schools. This study distinguishes the fact that secondary principals agree that the FFA program offers students a chance to develop leadership skills. Perhaps if this study was brought to the attention of secondary principals, their perceptions on issues such as curriculum, course offerings and graduation requirements would be influenced.

3. The findings of this study should be presented to students studying to be future agricultural science teachers. The results of this study will help prepare future agricultural science teachers by helping them to realize the perceptions of secondary principals concerning leadership skills attained by students through membership and participation in the FFA program. Realization of these perceptions could help future agricultural science teachers develop and establish agricultural science programs and FFA chapters that do in fact provide students with the opportunity to develop leadership skills.

4. The findings of this study also revealed that less than one-half of secondary principals have been recognized by their local FFA chapter. The results of this study show that secondary principals agree that membership and participation in the FFA program gives students an opportunity to develop leadership skills, therefore they are generally supportive of the FFA program and should receive recognition from the local FFA chapter.

5. The results of this study also indicated that secondary principals were not especially familiar with leadership development events and career development events. This could be remedied by more communication between the agricultural science teacher and the secondary principal. Making the principal more aware of activities occurring within the local FFA chapter and inviting them to be a part of the activities might help to familiarize them with these events and increase support of the program.

6. Now that Texas secondary principals' perceptions of the attainment of leadership and life skills by students through membership and participation in the FFA have been gathered and analyzed, their perceptions regarding curriculum, course offerings and graduation requirements need to be collected

and analyzed. The two studies can be compared to see if their perceptions of the FFA program are reflected in their perceptions regarding curriculum, course offerings and graduation requirements.

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Leadership Development Factors Leading to the Success of Former Florida State FFA Officers

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Abstract

The purpose of this study was to determine the factors that influenced the leadership development of former State FFA officers in Florida. The objectives were to (1) Determine the demographic information of State FFA officers from the past 25 years, and to (2) Identify the self-perceived factors contributing the most and least to leadership development. A sample of former state officers from the past 25 years (N=94) were mailed a researcher-developed survey to measure the constructs of *Family, Agricultural Education Program, FFA, School, Self,* and *Community*. Most of the subjects were from rural/farm areas, continued their education past high school, were currently involved in leadership activities, and still supported the FFA. The agricultural education program and the FFA were the most influential constructs for leadership development. Leadership conferences, FFA contests, goal-setting, and the agricultural teacher were the most influential individual items contributing to leadership development. Recommendations include formal instruction in leadership, continued non-formal leadership education through the FFA, and more urbanization of agricultural education and the FFA.

Introduction

How do we prepare secondary high school students with the leadership skills and personal attributes that business and industry desires for their employees? Some would argue that agricultural education has always prepared leaders (Brannon, Holley, & Key, 1989). Others have found (Ricketts, 1982; Townsend & Carter, 1983; Dormody & Seevers, 1994; Wingenbach & Kahler, 1997) that when the "total program" (class/lab, FFA, SAE) of agricultural education is considered, much of the leadership development that occurs within secondary agriculture is a result of their involvement with the FFA, one component of the "total program" of agricultural education. Townsend and Carter (1983) found FFA activity participation had a positive correlation with the leadership of 12th grade agricultural education students in Iowa (pp. 20-25). Similarly, Ricketts (1982) gathered data from 12th grade male students in Tennessee and found that agricultural education students and FFA members from both superior and non-superior chapters possessed significantly more leadership and personal development abilities than students not associated with agricultural education. Additionally, Wingenbach and Kahler (1997) pointed out, "Agricultural students at the secondary level could increase their leadership skills in communications, decision making, getting along with others, learning management of self, understanding self, and working with groups by participating in a combination of youth leadership organizations in school and/or community activities" (p. 19). Lastly, in an attempt to predict Youth Leadership Life Skill Development, Dormody and Seevers (1994) found a weak, but positive relationship between participation in the FFA and students' Youth Leadership Life Skills Development.

Who are leaders? Leaders are those challenge people, inspire shared vision, enable others to act, set a good example, and encourage others to succeed (Kouzes & Posner, 2003). "Leaders are people who think for themselves, communicate their thoughts and feelings, and help others understand and act on their own beliefs; they influence others in an ethical and socially responsible way" (vanLinden & Fertman, 1998, p. 17). Regardless of the definition used, all students have the potential to be leaders, (Bennis & Nanus, 1985; vanLinden & Fertmen, 1998) yet only a small percentage compared to the actual number of students enrolled in agricultural education seem to capitalize on that leadership potential.

Some agricultural education students are seemingly exceptional leaders, while other youth fail to acquire leadership skills when subjected to the same classroom and FFA opportunities. Some agricultural educators agree that the FFA teaches leadership to all students. However, the aforesaid gap between who does and who does not become a leader conflicts with the notion that all agricultural education students all fully developing that leadership potential. Based upon the reasonable assumption that a population of former State FFA officers were exceptional leaders, this study sought to identify the factors contributing to leadership development. Findings may influence the design and quality of leadership programming and curricula in agricultural education.

Theoretical Framework

The theoretical framework for this study is based on vanLinden and Fertman's (1998) conceptualization of youth leadership. They described three stages of youth leadership development, which were *awareness, interaction,* and *mastery* that fit into five dimensions: (a) *leadership information*, (b) *leadership attitude*, (c) *communication*, (d) *decision making*, and (e) *stress management*. This model of youth leadership (1) advocates that all adolescents have the potential for leadership, and (2) describes how adults can make a positive impact on adolescents' lives at home, school, the community, and at work.

Building on the framework of vanLinden and Fertman (1998), Ricketts and Rudd (2002) developed a model of youth leadership development. Because so many (Carter & Spotanski, 1989; Cummins, 1995; Tabke, 1999; Taylor, 1998; Thorp, Cummins, & Townsend, 1997) have found that sustained, formal leadership education is such an effective way to teach leadership, Ricketts and Rudd suggested that a formal youth leadership curriculum could further enhance leadership development by supplementing the leadership learning provided by youth leadership organizations such as the FFA. This model was considered in this study because of its belief that leadership can, in fact be taught. If this is true, then the Agricultural Education program should be one of the major factors contributing to the self-reported leadership development of the former State FFA officers.

In a study attempting to describe the leadership prominence of females in the FFA, Ricketts, Osborne, and Rudd (in press) introduced a conceptual model of local FFA leadership development. The conceptual model they presented not only depicted leadership learning as a result of the FFA and formal educational settings, but also as a result of the influence of the family, teachers, agricultural education programs, schools, and community interactions. Individual *self* variables, such as gender, self-esteem, motivation, and even GPA were also included by the researchers as possible factors influencing the development of leadership. To gain a better understanding of what needs to be included in leadership learning materials, this study seeks an answer to the following question: What factors actually contribute to the leadership development of former State FFA officers in Florida?

Purpose and Objectives

The purpose of this study was to determine the factors that influenced the leadership development of former Florida State FFA officers. To achieve this purpose the following objectives were established:

1. Determine relevant demographic information of Florida State FFA officers from the past 25 years.

2. Identify the factors contributing the most and least to former Florida State FFA officers' leadership development.

Methods / Procedures

A sample of former State FFA officers from Florida, from the last 25 years, was mailed a researcher-developed instrument using the procedures outlined by Dillman (2000). The population frame (N=94) was obtained from the State Department of Education. The population frame did not include all former State FFA officers, as the location of some of the former officers was not known. The design of the study was both descriptive and *ex post facto,* since the factors that were being identified were pre-existing (Ary, Jacobs, & Razavieh, 1996). The design was employed to describe the present demographics of the former State FFA officers and to identify the factors that were perceived to be important in the development of leadership during their high school years.

Demographic data were collected with a researcher-developed instrument. Gender, age, year of state officer appointment, size of community, current occupation, highest education level, and current leadership activities were the variables analyzed with the demographic instrument.

Researchers also developed the data-gathering instrument, seeking to identify the self-perceived factors contributing to the leadership development of the former State FFA officers. The instrument was based on the conceptual model of local FFA leadership development (Ricketts, Osborne, & Rudd, in press). In order to determine the self-perceived factors that influenced the leadership development of the former Florida State FFA officers, a seven-point, Likert-type scale (1 = Not Influential, 7 = Very Influential) was used. The instrument included 53 items comprising six constructs of influence. The Family construct was consisted of 7 items, as was the Agricultural Education Program and the FFA constructs. The School construct was consisted of 8 items, the Community construct a weak 3 items, and the Self construct contained 21 items.

A panel of experts determined the face and content validity of the instrument. Subsequently, the Agriscience Teacher variable was combined with the Agricultural Education Program variable. Instrument reliability was assessed using a measure of internal consistency and was calculated on each of the influence constructs of the questionnaire. Item analysis for each of the construct scales and the entire instrument were also conducted. The total Cronbach's alpha for the entire instrument was 0.88. The construct subscale reliabilities ranged from 0.73 to 0.91.

Questionnaire packets were mailed to participants with a follow-up postcard mailed approximately three weeks later. A replacement questionnaire was mailed to non-respondents approximately five weeks after the first mailing, followed by a reminder postcard, which was mailed approximately seven weeks after the first mailing. A total of 52 respondents completed the questionnaire for a response rate of 55.3%. Non-response error was addressed by comparing early to late respondents (Miller & Smith, 1983) using t-test procedures. No statistical difference was found between early and late respondents for any of the constructs.

Data were analyzed using descriptive statistics, analysis of variance, and t-test procedures using SPSS. Cohen's *d* and omega squared (ω^2) were used to identify main effects, followed by post hoc analyses using Bonferroni multiple comparisons to pinpoint specific differences.

Results / Findings

Objective 1. Demographics of State FFA officers for the last 25 years

Former State FFA officers from 1975 to 2000 responded to the questionnaire. Sixty-three percent of the respondents were State FFA officers between 1990 and 2000. Males represented 61.5% of the sample and females represented 38.5%. The average age of the participants was 29. Forty-five percent of the sample reported that they held jobs in the field of agriculture. Nearly 37% of the former State FFA officers were involved in some type of management position or entrepreneurship. Ten percent were in education, 20.4% were still classified as students, and almost 7% were in the Law profession. The majority (48.1%) of students were from rural (pop. < 2500), farm areas. Another 11.5% were from rural, non-farm areas, while suburban (pop. 2500-24,999), medium urban (pop. 25,000-100,000), and large urban (pop. over 100,000) were represented by 15.4%, 17.3%, and 7.7%, respectively. Over 65% of the subjects reported they were currently involved in some form of leadership activity and over 85% still support the FFA. Additionally, 90.4% of the former State FFA officers completed or are completing some form of post-secondary education.

Objective 2. Factors contributing the most and the least to leadership development

Descriptive results of each of the constructs revealed that former State FFA officers reported that the agriculture program and the FFA contributed the most to their leadership development, followed by the Community, the Self variables, the Family, and lastly, the School (Table 1).

For a more specific description of the factors that former State FFA officers perceived as contributing to their leadership development, descriptive statistics on individual items were also examined. Table 2 details the individual items that contributed to their leadership in descending level of importance. Notice the item "Leadership conferences I attended in the FFA" was ranked as the most important variable contributing to leadership development. Setting goals, encouragement from the teacher, and participation in FFA contests complete the top four ranked items.

Table 1.
Summated Means for the Variables Influencing Leadership Development.

	N	**M**	**SD**
Agricultural Education Program	52	40.61	7.17
FFA	52	40.18	5.61
Community	52	34.95	3.84
Self	52	34.67	13.86
Family	52	32.90	8.19
School	52	31.63	7.83

Table 2.
Individual Items Contributing to Leadership Development.

Items	*n*	**M**	**SD**
Leadership conferences I attended in the FFA	51	6.51	0.81
The high goals that I set for myself	51	6.26	0.89
Encouragement from my teacher	51	6.20	1.30
My positive participation in FFA contests	52	6.00	0.91
The high quality of my agriculture teacher	52	5.98	1.20
The support of my family	52	5.98	1.46
My personal desire to lead	52	5.94	1.09
The career plans that I set for myself	51	5.90	1.33
High teacher expectations	52	5.85	1.23
My own positive self-concept	51	5.82	1.18
Encouragement from my family	37	5.81	1.66
The high quality of my communication skills	51	5.80	1.13
My personality	52	5.79	0.98
The quality of my high school agricultural education program.	52	5.77	1.13
My personal need for achievement	42	5.62	1.29
My individual desire to be in charge	52	5.54	1.45
My knowledge of the FFA	52	5.48	1.23
Peers or friends in the FFA	52	5.42	1.27
My own knowledge about leadership	51	5.41	1.22
Other friends who were leaders	52	5.27	1.47
My leadership in out of school activities	52	5.23	1.48
The high quality of my FFA chapter	52	5.17	1.45
High family expectations	52	5.08	1.71
Length of time in the FFA	52	5.06	1.78
The high quality of my Agricultural Education program	52	5.02	1.54
The awards that were available through the FFA	52	5.00	1.34
My family's positive views towards leadership	52	4.92	1.55
Family role models	52	4.89	1.56

Items	*n*	**M**	**SD**
My academic success	52	4.87	1.27
Participation in other school activities	52	4.85	1.38
My high need for affiliation or to be around others	52	4.77	1.49
Leadership taught outside of the ag class/FFA setting	51	4.65	1.76
The community support of our Ag program	52	4.64	1.76
Community support of our FFA chapter	52	4.64	1.66
High school administrator support	52	4.58	1.95
The positive attitude my high school had towards leadership.	51	4.53	1.52
Simply being an FFA member	52	4.53	1.59
Positive experiences in other school activities	52	4.50	1.55
My positive involvement in the church or synagogue	51	4.49	2.14
The high quality of other teachers besides my ag teacher	52	4.46	1.67
Peers or friends in my school	52	4.33	1.64
My need for recognition	51	4.20	1.77
The high quality of other school organizations besides FFA	52	3.75	1.51
My family's involvement with the school	52	3.62	1.83
Leadership conferences I attended in other school activities	51	3.59	1.85
My high school part-time job	52	3.06	1.93
A positive experience in athletics	52	2.75	1.85
My positive involvement in 4-H activities	50	2.62	2.21
How far I lived from school	52	2.39	1.75
A positive experience in band	50	1.34	0.82

To provide additional probable explanations for the leadership development of all of the Florida FFA officers over the years, ANOVA procedures were used to further examine relationships between the factors, controlling for the demographic variables: age, type of job, level of FFA support, level of current leadership activity, rural/urban and farm/non-farm area, and level of education. T-tests were used to identify relationships for gender and whether or not the former officers selected a career in agriculture. With the alpha level set at 0.05 there was no significant difference between the factors when controlling for age, gender, type of job, current level of FFA support, and level of current leadership activity.

When controlling for *area,* the ANOVA procedures revealed significant main effects between groups for the family ($F = 3.54$, $df = 4/45$, $p < 0.05$, $\omega^2 = 0.17$), self ($F = 2.83$, $df = 4/45$, $p < 0.05$, $\omega^2 = 0.13$), and community ($F = 2.80$, $df = 4/45$, $p < 0.05$, $\omega^2 = 0.13$) factors. Each of the aforementioned effect sizes was either large or moderately large using Keppel's (1991) explanation of main effects. To assess pairwise differences within each factor, post hoc Bonferroni multiple comparisons using an alpha of 0.05 were conducted as a follow-up procedure. Former State FFA officers from rural/farm (pop. < 2,500) areas ($M = 5.53$, $SD = 0.79$) had stronger feelings than those from large urban (pop. > 100,000) areas ($M = 3.47$, $SD = 1.75$) that family influenced their leadership ability. Those from rural/farm areas ($M =$

5.075, *SD* = 0.59) had stronger feelings about the influence of the self variables than those from large urban areas (*M* = 3.96, *SD* = 0.96). Additionally, former State FFA officers from rural/farm areas (*M* = 5.15, *SD* = 0.96) believed the community was more influential on their leadership development than did former State FFA officers from large urban areas (*M* = 2.75, *SD* = 1.85).

Level of education had a significant and large main effect on the self construct, F = 4.29, *df* = 4/47, $p < 0.05$, $\omega^2 = 0.15$. Post hoc analyses indicated that those with a graduate degree (*M* = 5.44, *SD* = 0.58) stronger feelings that the self variables influenced their leadership development more than those who received a degree from a 4-year university (*M* = 4.64, *SD* = 0.59).

Lastly, those former State FFA officers who did not have a job related to agriculture (*M* = 5.23, *SD* = 0.95) reported that their agricultural education program had a significantly greater influence on their leadership development than those who did have a job related to agriculture (*M* = 5.94, *SD* = 0.66), $t(38) = 2.77$, $p < 0.05$, $d = 1.08$). The effect size of this finding is well into the large range (Cohen, 1977).

Conclusions and Implications

The subjects appeared to be a very homogenous group for a sample that spanned 25 years. They were predominately male and nearly half of them held careers related to agriculture. The types of careers they are currently involved in were very diverse ranging from entrepreneurs to lawyers to students. The majority of the participants were from rural/farm backgrounds and the smallest portion of participants was from large urban areas, which may be indicative of the lack of representation agricultural education and the FFA has in urbanized areas. Most of the subjects were currently involved in some type of leadership activity and an even greater number still support the FFA. Over 90% of former Florida State FFA officers have continued their education past the high school level.

The agricultural education program was the most influential self-reported construct for development of the subjects' leadership ability. This construct included such variables as the affect of the agricultural teachers, the quality of the Agriscience program, and the leadership development opportunities offered through the program. This extent of the influence could lead one to conclude that the agricultural education program is a venue for teaching leadership. This conclusion may support the development and implementation of formal leadership development curricula in Agricultural Education programs.

The FFA construct was the second most influential factor. Similar to the findings of many studies on the FFA (Brick, 1998; Ricketts, 1982; Townsend & Carter, 1983; Wingenbach, 1995), it was clear that the former State FFA officers had stronger feelings that the FFA had an influence on their leadership development. This construct included items pertaining to knowledge of the FFA, participation in career development events, and simply being a member. The individual item that most influenced the leadership development of former State FFA officers was the item, "Leadership conferences I attended in the FFA."

According to the former State FFA officers in this study, it seems that the non-formal leadership educational tool of the FFA is still a strong force in the leadership development of agricultural education students.

The community and self factors were somewhat influential, followed by the family variable, but the least influential construct was the school itself. The school construct measured the influence of the reputation of the FFA in the school, non-agricultural student peer influences, school climate, and the overall quality of non-FFA student organizations had on the former State FFA officers.

In addition to the FFA leadership conferences, personal goal setting, the teacher, participation in FFA contests, and family support represented the other most influential individual items. Conversely, a positive experience in band, distance from school, positive involvement in 4-H activities, athletics, and a part-time job represented the lowest rated individual items. The low ranking could be a result of no experience or involvement with each of these activities, due to no interest, or simply a lack of time.

Despite the age, type of job, level of FFA support, or level of leadership activity, the respondents were quite consistent in their responses across constructs. The major differences in responses were in regard to area, level of educational attainment, and whether the subjects were in a job related to agriculture. Rural/farm students not only represented the majority of the sample, they also indicated greater influence from family, their community, and an array of self variables than did students from large urban areas.

Interestingly, former State FFA officers that did not have jobs related to agriculture reported that the agricultural education program had a stronger influence than did individuals with careers in agriculture. This could be due to the effectiveness of agricultural education and the FFA in developing leadership in non-traditional students, but it could also indicate some failures associated with cultivating relationships with our own constituents in the agricultural industry. Finally, the subjects who had gone to graduate school felt more strongly than those who had not, that the *self* variables influenced their leadership development.

Recommendations

1. Because the agricultural education program and the FFA were so influential on the leadership development of former State FFA officers, teachers of agriculture should attempt to affect all students in their classes by formally teaching leadership through appropriately developed leadership development curriculum, and non-formally by continuing to encourage each of their students to participate in the National FFA Organization.

2. Since there was such a proliferation of former State FFA officers in the sample who were from rural/farm backgrounds and so few who were from urbanized areas, agricultural education and the FFA should continue efforts to position itself in urban

areas, for leadership development should be available to all if all are capable of achieving it (van Linden & Fertman, 1998). In the limited areas that agricultural education and the FFA have found urban America, the results have been very effective. The homogeneous nature of the sample is also indicative of need for agricultural education to diversify. Research should be conducted to find out why there are not more urban programs and to investigate how successful urban agricultural education programs were established.

3. Teachers of agriculture should work with and stay in close contact with members of the community and family members of adolescents when developing leadership in youth. Their heavy influence, as indicated in this study should also cause agricultural educators to encourage community leaders and parents to volunteer with the local agricultural education program to help develop leadership in students who do not have the opportunity to develop that leadership at home.

4. As a clinical study, this research is limited in its ability to be generalized to all former State FFA officers. The study should be replicated in other states or even nationally to increase its reliability and its level of generalizability.

5. This study attempted to measure the constructs affecting the emergence of leadership development. Further, more specific studies, which gain a deeper understanding of the constructs, especially the *self* variables should be conducted.

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Female Leadership in Urban Florida FFA Chapters

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Abstract

The purpose of this study was to determine the status of female FFA leadership in urban high schools and explain the apparent increase in the proportion of female leaders in local FFA chapters. Research methods included focused interviews with outstanding local chapter female FFA leaders and their FFA advisors and open-ended questionnaires mailed to parents of the female students in the study.

The results of the interviews were largely consistent across all six urban schools in the study. Girls are drawn to agriscience by their love animals and interest in biology-oriented careers. Once in the agriscience class, girls take advantage of leadership opportunities at a much higher rate than boys. Contributing factors seem to be the motivation and drive exhibited by females, the presence of female role models as teachers and former officers, and the female members' affinity for agriculture as a subject area.

Further study is needed to determine why males enroll in agriscience but view FFA leadership positions as less important when compared to perceptions of leadership opportunities held by females.

Introduction

The National FFA Organization is experiencing a noticeable change in student leadership at all levels of the organization. Thirty-six percent of the national membership and nearly 50% of state FFA officers are female (National FFA Organization, 2003). Females were first admitted into the national organization in 1969, and their participation as members and leaders has steadily increased. The first female National President, Jan Eberly, was elected in 1982, but it wasn't until 2002 that a female was selected as the American Star Farmer (National FFA Organization, 2002). Nationally, more women are becoming agriscience teachers, which may lead to more females entering agriscience classes and becoming involved in FFA (Bowen, 2001).

The National FFA Organization has seen a steady increase in membership, with 2003 membership the highest since 1989, when enrollments in agriscience education and in FFA were at an all-time low. In the ensuing years numerous campaigns designed to reshape the image of the FFA were undertaken in an attempt to make FFA more appealing to male and female students of any ethnic and cultural background. Shortly after that time, agriculture curricula began to change, moving from instruction predominantly focused on production agriculture to more hands-on, science oriented approaches (Hoover, 1991). As program image and curricular changes have occurred over time, female membership has also increased.

The apparent emergence of females as predominant leaders in the Florida FFA Association prompted a study of students from six rural schools in Florida (Ricketts, Osborne, & Rudd, 2002). The purpose of the current study was to further examine female leadership in local FFA chapters while focusing on urban schools. This study sought to determine the need for power, affiliation, and achievement of outstanding female FFA leaders in urban Florida high schools.

Theoretical Framework

The dominant theory base for the study was McClelland's motivational needs theory, which identified achievement, power, and affiliation as the motivational needs that influence the behavior of individuals (McClelland, 1961). Other variables that theoretically may explain the emergence of females as local FFA chapter leaders were identified through a review of the literature. Hesselbein (1990) described the necessary attributes of leadership as 1) a belief in oneself, 2) a passion for the job and 3) a love of people, but with a capacity for aloneness so that he or she is comfortable being out front. This researcher used a diary study of female managers to determine leadership differences between women and men. She concluded that women lead differently than men and that they use a collaborating style of leadership. Characteristics of the female leaders in her study were vision, communication, analytic listening, flexibility, and the ability to motivate others. Her later research on female leadership discussed a web-like approach to organization used by females as compared to a hierarchical approach used by males (Helgesen, 1995). Wu (2003) also argued that various leadership characteristics may be more prevalent in one gender than the other.

In their Leadership Practices Inventory (Kouzes & Posner, 1997) the authors described five practices for exemplary leadership: challenging the process, inspiring a shared vision, enabling others to act, modeling the way and encouraging the heart. Leaders who successfully use these five practices are thought to be great leaders.

Balschweid and Talbert (2000) of Purdue University conducted a qualitative research project using randomly selected FFA members at three national FFA events. The results of the study indicated that FFA members are also involved in other activities at school and at home, and a majority of the members surveyed joined FFA to gain leadership skills and prepare for a career.

In a study conducted with urban students, female respondents had higher academic achievement than males and scored significantly higher on internal assets ratings, such as communication, cooperation, empathy, problem solving, and goals and aspirations (Wasonga, 2002). In a self-esteem study of junior and high school students, males scored higher on a self-esteem measurement (Dawkins, 2003). Thorp, Cummins, and Townsend (1998) found that women enrolled in collegiate agricultural education courses had higher leadership scores if they had been involved in FFA in high school.

Several studies have focused on why students choose to enroll in agriscience or science classes. A greater hands-on science focus, female preference for biology over physics, and female preference for hands-on activities have been found to influence student enrollment patterns (Johnson, Wardlow, & Franklin, 1998). A question that was not fully answered in this study was whether females with higher abilities in science were being attracted to agriscience classes more than males of the same abilities. In a study involving females who were enrolled in an engineering camp, half of the campers were interested in biology-based careers, such as veterinarians and doctors, and students liked science because of the hands-on activities provided (James, 2002). Rohs and Anderson (2001) found that females have a higher need for affiliation and power than males, and all seventh and eighth grade students in the study were found to have a high need for achievement.

The conceptual model for leadership in local FFA chapters developed by Ricketts, Osborne & Rudd (2003) provided the organizational framework for the study. A modified version of this model is presented below.

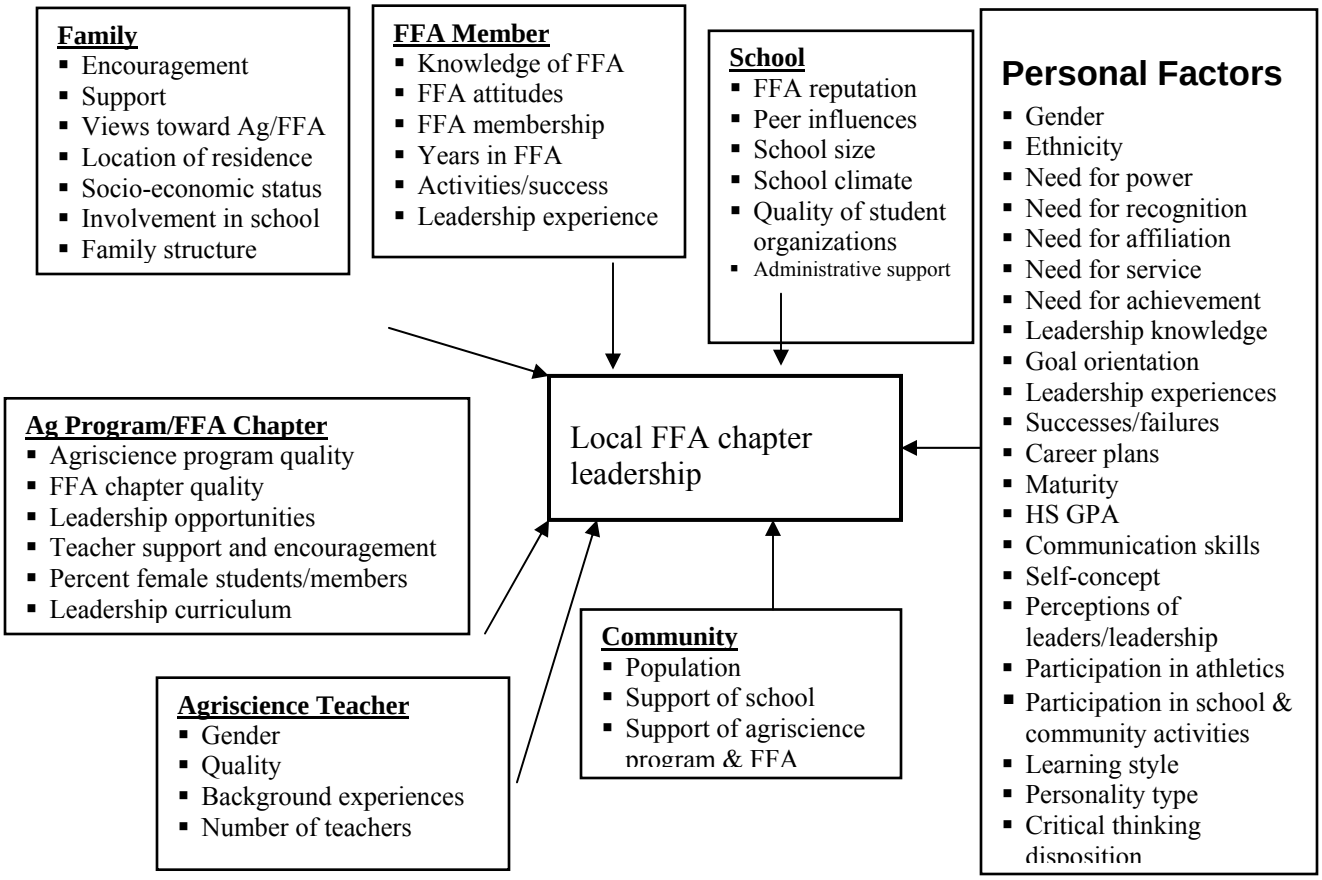

Figure 1. Conceptual Model for the Study of Leadership in Local FFA Chapters (Adapted from Ricketts, Osborne, & Rudd, 2003)

Purpose/Objectives

The purpose of the study was to determine the patterns and factors affecting gender prominence in local FFA chapter leadership in urban high schools in Florida. Specific objectives were to:

1. Describe the leadership status of females in urban FFA chapters in Florida and
2. Explain female leadership prominence or lack thereof as perceived by outstanding female leaders, their parents, and their FFA advisors.

Methodology

Qualitative methods were used to gather data for the study. Personal attributes and attitudes of outstanding local FFA chapter female leaders were examined using focused

interviews with the students and their FFA advisors. An instrument containing open-ended questions was given to parents of the selected female local FFA chapter leaders.

This study was intentionally designed to mirror and complement an earlier study completed in rural FFA chapters in Florida (Ricketts et al., 2003). The population for the study included high school students enrolled in urban agriscience programs in Florida, along with their parents and agriscience teachers. The agriscience teachers in each of the six purposively selected schools were asked to identify the two to three most outstanding female leaders in their respective local FFA chapters. Three schools with female FFA advisors and three schools with male FFA advisors were selected using the following criteria:

1. Urban schools with most students residing in city or suburban neighborhoods.
2. Schools with FFA chapters in good standing with the Florida FFA Association.
3. Schools that drew from regular attendance zones and were not magnet schools within the district.

Seventeen students were identified in the six schools as outstanding leaders by their agriscience teachers and FFA advisors and subsequently participated in the study. The female FFA leaders at each school were interviewed as a group but separately from their FFA advisors. Interviews were recorded on audiotape and transcribed. The three male and three female FFA advisors were interviewed on the same day as the students. These interviews were also recorded and later transcribed. Parents of the 17 FFA members were sent questionnaires in the mail with stamped, return-addressed envelopes. Nine parent questionnaires were completed and returned.

The research design employed investigator triangulation, which is described by Berg (1989) as having multiple observers of the same object. The same questions about the female leaders (regarding need for power, affiliation and achievement) were asked of the females themselves, to their parents, and to their FFA advisors. The focused interview questions aided in keeping the students on task, while being open-ended enough to encourage them to speak freely and thoroughly on the topics of the interview. The parent instrument also contained six open-ended questions about the leadership experiences sought by their daughters in the local FFA chapter. Interviews with the FFA advisors helped determine the status of leadership in their FFA chapter and whether females were the prominent gender in local leadership. Two sets of questions were prepared, one for situations where females were the prominent leaders and one for those instances where males were the prominent leaders. The appropriate set of questions was used, depending upon which gender the respondents viewed as prominent leaders in their local FFA chapters.

Analysis of Data

After conducting the interviews with the students and their advisors and recording the dialog exactly as spoken, the responses were summarized using content analysis coding, which focuses on concepts rather than specific words (Berg, 1989). Qualitative data were analyzed by deriving codes based upon transcribed interviews and notes from the three data

sources, combining codes into themes, and determining the frequency of each emergent theme. Themes confirmed or disconfirmed (Miles & Huberman, 1984) based upon the frequency of occurrence in each study group (i.e., teachers, parents, and students).

Results

Objective 1: Leadership Status

The first objective of this study was to describe the leadership status of females in urban FFA chapters in Florida. Of the six high schools where females were interviewed, five indicated that females were overwhelmingly prominent in local FFA chapter leadership. Respondents at one school indicated that males and females were about equal in leadership participation. Further questioning at that school revealed that males held the primary leadership positions in the FFA chapter, but the females who held other offices, such as secretary and treasurer, actually provided more organizational leadership in the chapter. All six FFA chapters in the study had officer teams comprised of a majority of females. All of the schools but one had female FFA presidents. When the FFA advisors were interviewed, the three male and three female teachers unanimously responded that females took a more active role in leadership than males.

When asked if certain FFA activities appeal more to females than males, most females felt that they could compete in all career development events equally with males. The only activity that appeared to be male dominated was the tractor operation competitive event, but in all of the interviews females expressed a desire to learn to compete in that event in the future.

When the female students were asked if there is a difference between male and female students that enables them to be more involved in leadership, there were a variety of responses:

> "I think girls are more determined."
>
> "It could be that girls like animals more. Girls are into taking care of animals the hands-on experience."
>
> "I think we are louder, and will take charge faster than guys will."

Although all of the schools were located in urban areas, livestock SAE projects were mentioned prominently by the students in terms of involvement and often in describing commitment and leadership of individual students. When the teachers were interviewed, the three male and three female teachers unanimously responded that females took a more active role in leadership than males. The teachers who were interviewed had a more traditional view of leadership qualities; such as students who possessed organization skills, could run FFA meetings, encourage other officers and members, and serve as officers of FFA and other

organizations at the school. When asked the same question about a difference between male and female students the advisors responded as follows:

> "Girls don't care what they are called, they like to belong. Girls are more compassionate."
>
> "We talk to the science classes at the middle schools about our ag program here. We don't hit on girls or guys. The girls just seem to take on a more active role and I don't know why."
>
> "Women, it seems, are inherently better organized, better time managers, even when there are males in the leadership roles the female officers seem to be the ones to keep them on task."
>
> "The girls will always volunteer. The guys will do it if I specifically call a name and ask them. They will do it but they won't volunteer like the girls will."
>
> "I think the maturity level has something to do with it."

Both students and advisors agreed that changes in the FFA have not really made it more attractive to females, other than when females were first allowed to become members in 1969. Both groups also indicated that the qualities advisors look for in students who are participating in FFA events include commitment to the task and prior experience in the subject.

In asking what could be done to get more leadership from the males enrolled in agriscience programs, the female students said that males needed greater encouragement and exposure to the benefits of active participation in FFA. The FFA advisors agreed with the students but added that males need more male role models as teachers and FFA officers.

Regarding class enrollments, most of the schools had at least 50 percent female enrollment in agriscience class, and FFA enrollment ranged from 50 to 80 percent female. When asked why more females were taking a leadership role, the females responded that they were interested in the activities, and the males were more worried about their reputation with their peers. The females also stated that males don't enjoy getting dirty and working hard. According to their parents, females primarily enroll in agriscience because of their interest in animals. As the females talked during the interviews, it became clear that nearly all of them were interested in careers in veterinary medicine, the horse industry, or teaching agriscience.

When the teachers were asked why females were taking more active leadership roles in FFA, they responded that males are always busy with sports in the fall when FFA really gets started. They also believed that females follow the example set by their female teachers, are better organizers, and love working with animals. Overall, FFA advisors described their

female FFA leaders as stronger academically and more goal oriented with higher aspirations than males. Advisors also felt that females were better at organizing and following through on tasks and assignments. The females interviewed did not think they had advantages over males, and in fact, indicated that males could hold leadership roles but they did not desire them.

Regarding extracurricular activities, most of the females participated in other clubs and sports but felt that FFA took more time and deserved more of their effort than any other activity. Most of female leaders indicated that males held the highest offices in the school, such as class president and student council president.

Table 1.
Frequency of Emergent Themes

THEME	FEMALE TEACHER	MALE TEACHER	FEMALE STUDENT	PARENTS	TOTALS	RANK
Gender Issues	17	13	42	0	72	1
Curriculum/ FFA	13	19	35	3	70	2
Leadership	5	9	33	12	59	3
Extra Curricular Activities	7	5	28	17	57	4
Hard Work/ Commitment	3	9	27	5	44	5
Achievement	6	8	19	10	43	6
Affiliation	3	6	24	8	41	7
Power	3	5	22	8	38	8
Careers/ Goals	1	5	17	14	37	9
Family	4	1	11	0	16	10
Teacher	3	0	8	2	13	11
Self-Improvement	0	0	11	0	11	12

The most common theme that emerged from the discussions with teachers and students was the differences between the male and female students. The female students and teachers mentioned activities that attracted one gender over another, and frequently commented on the gender imbalance in their FFA chapter membership and in participation in FFA activities. The next dominant frequency was the discussion of the attraction of certain genders to types of curriculum (such as animal science and agricultural mechanics) and FFA tasks. All interviews revealed that females are strongly attracted to curriculum and activities that are animal related.

All of the parents felt that their daughters were strong leaders, and the female students often mentioned leadership ability when referring to the females in their FFA chapter. Being a "hard worker" and committed to spending the time necessary to complete a project was a strong theme in all of the interviews and these traits were most often attributed to the females of the FFA chapter. This is a typical comment from a male advisor of his female FFA officers:

"It seems that past few years it has been the females who have taken a more active role in the FFA chapter. And even if it is not a female president, it is the strong female members on the team that are willing to get things done, get on the phone and line things up."

Some of the remaining items on the frequency chart provided the reasoning for being involved in FFA; such as a means for achieving their career goals, and the students mentioned eleven times that they thought they would improve in areas of confidence, speaking and leadership if they were active in FFA.

Objective 2: Leadership Prominence

The second objective of this study was to explain leadership prominence by gender as perceived by outstanding female FFA leaders, their parents, and their FFA advisors. The need for power, affiliation, and achievement in female FFA chapter leaders as perceived by each respondent group is shown in Table 2. The word "power" seemed to have a different meaning for some of the participants in the study. One student responded that she didn't need power but was goal oriented. Overall, a large majority of the female FFA leaders and their parents felt that the female FFA leaders have a greater need for power than males. However, only one-third of the advisors interviewed held the same opinion.

Table 2.
Need for Power, Affiliation, and Achievement as Perceived by Female FFA Leaders and Their Parents and FFA Advisors

	Is the need higher for females than males?		
	Student Responses	Parent Responses	FFA Advisor Responses
Power	80% Yes	100% Yes	33% Yes
Affiliation	15% Yes	100% Yes	100% Yes
Achievement	100% Yes	100% Yes	50% Yes

All responding parents and advisors indicated that the female FFA leaders had a greater need for affiliation than males. However, the females viewed themselves as more independent than males. One of the females interviewed stated that "males run in packs, they dress alike and talk alike – females are more independent." Another recurring statement

from the female FFA leaders was that males were more concerned than females about standing out in a crowd or being different than their peers.

All of the female FFA leaders and their parents felt that females have a greater need for achievement than males, while only 50 percent of the FFA advisors agreed with that statement. The female students mentioned that their parents expected more from them than their male siblings, that they had to "prove themselves," and that they did not want to be "dependent on a man" in the future.

Conclusions

Since purposive samples were used for data collection in this study, results and conclusions are limited to the data sample. In these urban schools females are more prominent than males in leading local FFA chapters. All of the FFA chapters included in the study had experienced a shift toward female leadership, mostly in the past four to ten years.

An interest in animals and science and a desire to improve, earn scholarships, and go to college motivate females to enroll in agriscience education. Female students enjoy the teamwork inherent in many FFA activities. Most female FFA leaders indicate that they encourage males to accept more active leadership roles in their local FFA chapters.

Parents of female leaders in local FFA chapters in the urban schools studied believe that their daughters have a higher need for power, affiliation, and achievement than males. Female FFA leaders in these urban schools believe that their own needs for power and achievement are greater than for males, but perceive their need for affiliation as similar to males. FFA Advisors believe that female FFA leaders have a higher need for affiliation and achievement than males, but see the need for power as similar for males and females. Outstanding female leaders in local FFA chapters have parents who support them with time, money, transportation, and resources. Parents of outstanding FFA female leaders perceive their daughters as goal oriented and driven to succeed.

Once they are in enrolled in agriscience classes, females use FFA as a means for achieving their goals for college and career preparation. Female students believe that female agriscience teachers are capable of working in all aspects of agriculture.

If the trend found in these cases continues, more female students will be come active in their FFA chapters and more of them will seek careers in agriculture, including becoming Agriscience teachers. As curriculum evolves and agriculture education moves toward more biology and hands-on laboratory activities, more girls will be attracted to Agriscience class and be exposed to the opportunities available to them through FFA. Whether they are looking for achievement, power, and affiliation or want to advance toward a career working with animals; it is evident that females are becoming comfortable in leadership positions in the FFA chapters.

Recommendations

Based on the results of the study, the following recommendations were forwarded:

1. Female FFA members should continue to be encouraged and supported as they seek and carry out leadership responsibilities in local FFA chapters. At the same time, the benefits of FFA involvement should be highlighted for both males and females.

2. Teachers should work to become more aware of the trends in local FFA chapter leadership by gender and the factors contributing to this phenomenon. While continuing to support female leadership, teachers need to develop more effective ways to boost the participation of males in local chapter leadership to achieve a better gender balance.

3. Further study is recommended in the following areas:
   a) Do parents of female FFA members provide greater support and encouragement to their daughters than parents provide to their sons? To what extent do parents influence their son or daughter's achievement expectations and goals, and is this influence differentially exerted, in both degree and type, to sons and daughters?
   b) In urban schools in which female and male FFA members equally share leadership of the local FFA chapter, what factors contribute to that shared leadership? What is the influence of community, school, and teacher interactions and conditions in the emergence of local FFA chapter leaders?
   c) Will an agriscience curriculum that is more balanced between biological and physical science applications in agriculture attract more equal numbers of male and female students and lead to more shared leadership of the local FFA chapter by males and females?
   d) Do female FFA members find leadership activities more enjoyable than males? Do they find public speaking, committee leadership, event planning, parliamentary procedure, chairing a meeting, working in teams, and similar activities more enjoyable than males? If so, why?
   e) How do female FFA leaders differ from other female leaders in the school in terms of their desire/need for achievement, power, affiliation, and other factors?
   f) Do agriscience teachers and perhaps other adults hold different expressed or hidden expectations for male and female students that lead to the emergence of females as leaders in FFA?
   g) What aspects of agriscience class and FFA meet the needs of male students? Why do males get involved in FFA? Why do many male high school agriscience students and FFA members choose to forego FFA leadership opportunities? How do they feel about the rise in female leadership? How could males be convinced to take on more leadership roles?

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Criteria Public School Administrators Consider When Hiring First-Year Agricultural Education Teachers

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Abstract

The purpose of this study is to describe factors that public school administrators consider when hiring agricultural education teachers. Participants in the study were 24 administrators that hired first year agricultural education teachers in the 2002-03 academic year. The collection of data was conducted by phone interviews. The researcher sought 100 % response rate by calling and setting up appointments with the administrators to accompany their tight schedules. Descriptive statistics were used in interpreting the data. Results of Likert-type questions were reported with a mean and standard deviation. Open-ended questions were coded and frequencies were analyzed.

Administrators placed the most emphasis on the knowledge of agriculture as measured by a subject matter competency test. Administrators seek well-rounded agricultural instructors who are confident in all areas of the agricultural education setting. They view student project involvement and the supervision of those projects as the most important. Administrators desire candidates who can manage the classroom and who develop rapport with the community. Administrators seek candidates who can orally present their knowledge of agriculture in an enthusiastic manner. Administrators place most value in cooperating teachers' recommendations. Administrators prefer candidates who are fully certified as compared to alternatively certified.

Introduction

Historically, vocational educational teachers have been hired using criteria much different than that of the common school teachers. Vocational teachers were expected to be expert in two areas: the art of teaching and the trade to be taught (Schaefer, 2001). If only one of these were available, preference was given to employing vocational teachers who were deemed competent in their trade. Prosser believed that if vocational teachers had to meet the same requirements as general education teachers the field would sacrifice technical proficiency. Prosser thought colleges and universities were ill equipped to prepare trade teachers and professional teacher education was impractical for most vocational educators. He asserted that vocational teachers should have practical experiences in their trade before teaching the youth of this nation. Thus, occupational experience replaced higher levels of education and provided vocational education teachers with subject matter expertise (Prosser & Quigley, 1949).

Agriculture and home economics teachers were the exception to this model. Agriculture and home economics teachers usually completed baccalaureate degrees in subject matter colleges and completed general education requirements expected of their colleges. Teacher education coursework was kept to a minimum. Boys were to have lived and worked on a farm and graduate from a secondary vocational agriculture program. Girls likewise were educated to become high school home economics teachers but only if they had successfully completed homemaking projects under the direction of their mother and high school homemaking teacher.

Historically vocational education has insisted on educators with experience in the field, however that is changing. Bruening (2001) found that only 10% of teacher education programs in vocational education require work experience for program entry and only 25% require work experience for program completion. Increasingly, vocational education is placing greater emphasis on a teacher's ability to integrate academic and career education rather than work experience.

Clearly, the education community is unsure of the qualifications necessary to teach in the public schools. In an exploratory study of employment interview practices, Coady (1990) found that little attention has been paid to recruiting teachers in secondary education. He asserted that faculty are central to the academic mission, which means that failure to hire good faculty can harm the school for decades. He believed that the teacher selection process is one of the most important tasks that face educational administrators. In studying the teacher selection process, Boulton (1979) found the selected interviewees for teaching positions were chosen based on cooperating teacher recommendations, college supervisor recommendations and the candidate's subject area concentration.

Mortaloni (1984) studied public school administrators regarding several areas associated with teacher preparation programs and found that factors considered most

important in recruitment of teachers were the letters of reference by the cooperating teacher, college supervisor, and building principal for the candidate's cooperating center, and the candidate's grade in student teaching. Braun (1990) found that teacher candidates were often selected based upon recommendations made by inexperienced and often unskilled interviewers. In some cases, one person hired teachers on the basis of one interview. Whether an interview was meaningful depended on the skill of the interviewer as well as the personality of the teacher candidate. Also, interviewers were often administrators who may not be familiar with classroom realities. This resulted in decisions based upon personal judgment rather than significant objective criteria. Braun noted that, "candidates who are articulate, glib, and confident in dealing with adults may appear more capable than less gregarious candidates who may be more effective teachers in the classroom" (Braun, 1990, p. 46).

Seiferth (1979) studied bias by the interviewer on his or her interviewing decisions. Preferential treatment was given to married candidates; candidate's just beginning their careers, candidate's with co-curricular expertise, and well-groomed, physically attractive candidates. The interviewing process was not standardized, making comparisons among several candidates difficult and more subjective. Seiferth found that the average interview lasted less than one hour with the interviewer talking 80% of the time. Often, the interviews were unstructured, featuring yes or no questions, leading questions, and irrelevant questions (Seiferth, 1979). As one researcher stated, "Often the administrator hires the applicant who seems to reflect his or her own attitudes" (Vornberg & Liles, 1983, p. 10).

According to supply and demand projections, the United States will need to hire 2.2 million educators in the next decade who are not currently teaching in elementary and secondary schools. In addition to the number of teachers needed, concern exists about teacher preparation and the quality of today's teaching force (Feistritzer, 1999). A teacher shortage is a constant concern to school administrators across the country as competition for teachers increases. This current research was undertaken to determine if there is a common set of criteria public school hiring officials utilize in judging applicants for teaching positions. Such information could be valuable as new teachers seek positions in public schools.

Purpose and Objectives

The purpose of this study was to describe factors that public school administrators consider when hiring first-year agricultural education teachers.

The following objectives were formulated to successfully accomplish the purpose of this study.

1. Describe the importance administrators placed on candidate's academic achievement.
2. Describe the importance administrators placed on candidate's agriculture experience.
3. Describe the importance administrators placed on candidate's teaching practice.
4. Describe the importance administrators placed on candidate's interview.
5. Describe the importance administrators placed on candidate's references.
6. Describe the importance administrators placed on candidate's type of certification.

Procedures

The population for the study included the 24 public school administrators who hired a first-year agricultural education teacher for the 2002-2003 academic year in a southern state. The researcher contacted the five regional agricultural education program specialists to identify the school administrator most responsible for hiring agricultural education teachers.

Instrumentation

The development of the instrument began by reviewing literature on criteria considered when hiring vocational teachers (Dunton, 2001, Loehr, 1986). The questionnaire was pilot tested on three public school administrators and reviewed by a panel of experts. The panel of experts was utilized to determine specific wording of the questions, content, and the sequence. The researcher used the telephone interview to increase the study's response rate.

Validity and Reliability

The researcher conducted the data analysis to avoid the threat of scorer variability. The administrators also knew they were being interviewed causing the effect of reactivity (Leedy & Ormord, 2001). Researcher bias was taken into consideration. The researcher was aware of personal bias as a threat to reliability. Meetings were held with the panel of experts. The panel assisted in enhancing content, construct, and face validity of the instrument, as they were knowledgeable about the desired content and target audience. The panel of experts was the researcher's graduate committee members.

Data Collection

The researcher sought 100% response rate by calling and setting up appointments with administrators to accommodate their schedules. The researcher chose the telephone interview for increasing response rate, time efficiency, and feasibility. Leedy and Ormrod (2001) asserted that telephone interviews are less time consuming and less expensive (they involve only the cost of long-distance calls), than other data collection methods. The researcher recorded the data by filling out the questionnaire while asking the administrators questions over the telephone. Each questionnaire was coded by replacing the name of the school with a number and then entered into a computer protected by a password ensuring confidentiality. The data was collected during a two-week period in May, 2003. A scale was developed to interpret findings from the Likert-type scale.

Table 1.
Scale for Categorizing Findings

Score	Level of importance
1.00 – 1.50	Not important
1.51 – 2.50	Not very important
2.51 – 3.50	Somewhat important
3.51 – 4.50	Important
4.51 – 5.00	Very important

Findings

The first objective was to describe the importance administrators place on candidates' achievement. The objective was measured with five items on the questionnaire. Administrators placed the most emphasis (mean=3.96) on the candidate's knowledge of agriculture as measured by an agricultural competency test Subject Area Tests (OSAT). The General Education Test (OGET) was given the lowest rating (mean= 2.92). Table 2 gives the complete findings related to the first objective.

Table 2.
Importance Placed on the Candidate's Standardized Tests Scores and College Grade Point Average by School Administrators (N = 24)

Assessment	**M**	**SD**	**Level of importance**
Knowledge of agriculture (OSAT)	**3.96**	**1.04**	**Important**
Knowledge of teaching (OPTE)	**3.58**	**.88**	**Important**
College grade point average	**3.63**	**.49**	**Important**
Standardized tests in general	**3.00**	**.59**	**Somewhat Important**
Knowledge of general education (OGET)	**2.92**	**.65**	**Somewhat Important**

The second objective of this study was to describe the importance administrators place on a candidate's agriculture experience. The objective was measured by one open-ended question and by five closed-ended questions. The open-ended question asked, "Is there any specific area on which you place more emphasis? Explain." Every administrator responded that they wanted a well-rounded teacher who was competent in all areas in agriculture. One administrator said, "We want a well-rounded teacher who has a general

knowledge about all aspects of agriculture." Another administrator said, "We look for an agricultural education teacher who has a broad spectrum in agriculture, someone who is well balanced and doesn't place emphasis on any one thing." Table 3 gives a summary of responses to the open-ended question.

Table 3.
Open-ended Responses to Specific Areas on which Administrators Placed Emphasis (N = 24)

Specific emphasis		Responses
First response		
	Well rounded in agriculture content	**24**
Secondary response		
	Leadership activities	**4**
	Emphasis on classroom teaching	**4**
	Emphasis on FFA activities	**2**
	Emphasis on showing livestock	**1**
	Emphasis on horticulture	1

Administrators placed the most emphasis on student project involvement and supervision of student projects (i.e., SAEs) with a mean of 4.67 giving it a rating of "very important". Administrators placed the least amount of emphasis on experience in production agriculture with a mean of 3.46 giving it a rating of "somewhat important" when asked, "How important is experience in production agriculture?" Table 4 provides a summary of the directed-questions related to objective 2.

Table 4.
Importance Administrators Placed on Selected Areas in Agricultural Education (N = 24)

Subject	**M**	**SD**	**Level of importance**
Supervision of student projects	**4.67**	**.64**	**Very Important**
FFA activities and programs	**4.50**	**.59**	**Important**
Experience in showing livestock	3.87	.54	Important
Experience in production agriculture	**3.46**	**.59**	**Somewhat Important**

The third objective of this study was to describe the importance administrators place on teaching practice. The objective was measured by seven questions. Administrators rated

classroom management skills as the most important (mean=4.96). Community relations skills, educating diverse students, and working with other faculty was also rated "very important." Administrators put the least amount of emphasis on integrating other subject areas into the agricultural education curriculum. Findings related to objective 3 are shown in Table 5.

Table 5.

Importance Administrators Placed on General Teaching Practice (N = 24)

Teaching practice	M	SD	Level of importance
Classroom management skills	***4.96***	***.20***	***Very Important***
Community relations skills	4.92	.28	Very Important
Educate diverse students	4.63	.49	Very Important
Work with other faculty	4.58	.50	Very Important
Educate students (special needs)	4.38	.71	Important
Integrate technology	4.25	.74	Important
Integrate other subject areas	**4.13**	**.54**	**Important**

The fourth objective was to describe the importance placed on candidate's personal interview. The objective was measured by five questions. Administrators placed the most emphasis on oral communication skills (mean=5.00). Administrators placed the least amount of emphasis on the candidate's marital status (mean=1.25). Findings for objective 4 are shown in Table 6.

Table 6.

Importance of Specific Items Evaluated by Administrators During Interviews (N = 24)

Interview items	M	SD	Level of importance
Oral communication skills	***5.00***	***.00***	***Very Important***
Candidate's enthusiasm	4.58	.50	Very Important
Personal appearance	4.21	.66	Important
Distance between hometown/job	1.50	.61	Not Important
Marital status	**1.25**	**1.02**	**Not Important**

The fifth objective of the study was to describe the importance administrators placed on recommendations. The objective was measured by administrators rating and then ranking

five possible reference sources. Administrators placed the most emphasis on the cooperating teacher's recommendation (mean=4.54). Administrators rated the candidate's personal references as the least important (mean=3.46). Table 7 displays the findings for objective five.

Table 7.
Aministrators' Ratings of Selected References (N = 24)

References	M	SD	Level of importance
Cooperating teacher	4.54	.66	Very Important
State program specialist	4.38	.71	Important
Administrators personal references	**4.13**	**.68**	**Important**
Teacher education faculty	**4.08**	**.58**	**Important**
Candidate supplied references	**3.46**	**.83**	**Somewhat Important**

Administrators were asked to rank the reference: "1" = "most important" . . . "5" = "least important." Administrators ranked the cooperating teacher as number one (mean=1.83). Administrators ranked the references supplied by the candidate fifth (mean=4.29). Table 8 gives administrators' rankings of references.

Table 8.
Summary of References as Ranked by Administrators (N = 24)

References	**M**	**SD**
Cooperating teacher	1.83	.82
State program specialist	2.25	1.29
Administrators references	3.29	1.37
Teacher education faculty	3.33	1.09
Candidate supplied references	4.29	1.04

The sixth objective was to describe the importance placed on the candidate's type of certification by the administrators who were interviewed. The objective was measured by two open-ended questions.

When administrators were asked if they would consider hiring an alternatively certified teacher, twenty administrators responded "No." Fifteen of those twenty administrators responded that they wanted teachers who were trained to teach (meaning taking courses in teaching and going through student or practice teaching) and seven said

they would only hire an alternatively certified teacher as a last resort. One administrator said, "No, I want someone with classroom experience, we like teachers who are qualified to teach and who have taken classes in teaching." Another administrator responded, "No, I want the best candidate for their needs, like someone who went through practice teaching and classes over teaching." Table nine gives findings for the first open-ended question.

Table 9.
Administrators' Open-ended Responses When Asked about Hiring an Alternatively Certified (AC) Teacher (N = 24)

Response:		Responses
Yes		**4**
No		**20**
*If no, then why?		
	Wanted teachers who have been trained to teach	**15**
	Wanted classroom experience	**13**
	Alternatively certified teachers are less qualified	**4**
	Would hire alternatively certified Ag teachers as last resort	**7**

**Note:* The number of responses does not equal 24 (total population) because these are secondary responses after administrators answered no initially.

Conclusions

Conclusions related to objective 1: Importance administrators placed on candidate's academic achievement.

1. Administrators were most interested in the candidate's knowledge of agriculture and knowledge of teaching.
2. Administrators' interest in academic achievement in college was supported by the interest in the candidate's college grade point average.
3. Administrators viewed standardized tests as somewhat important, however, the researcher notes that several administrators were not aware that subject matter tests existed for agricultural education. The candidate's general education knowledge was not a significant concern for administrators as long as candidates were adequate in those areas.

Conclusions related to objective 2: Importance administrators placed on candidate's agriculture experience.

1. Administrators sought well-rounded agricultural instructors who were competent in all areas of the agricultural education setting.
2. Administrators viewed involvement with student projects and the supervision of those projects as the most important job-related duty of an agricultural education instructor.
3. Administrators viewed candidate's experience in FFA activities and programs as well as their showing livestock as important criteria to consider when hiring a first-year agricultural education teacher.
4. Production agriculture experience was not viewed as important as other areas but some administrators still considered it.

Conclusions related to objective 3: Importance administrators placed on teaching practice.

1. Administrators wanted candidates who could manage the classroom, and who could develop rapport with members of the community. Educating a diversified student population and the ability to work with other faculty were also considered desirable traits.
2. Administrators viewed educating students with special needs, integrating technology, and integrating other subject areas as important but did not place as much emphasis on those areas as compared to items discussed in bullet number one.

Conclusions related to objective 4: Importance placed on candidate's interview(s).

1. Administrators sought candidates who could orally present their knowledge of agriculture in an enthusiastic manner. Personal appearance was also desirable. This supports the Kelly and Kelly (1982) finding that enthusiasm for teaching was a common quality among outstanding teachers.
2. Distance between hometown and job location was not important in the hiring-decision nor was marital status. This supports Seiferth's (1979) finding that marital status was of no importance in the hiring of teachers.

Conclusions related to objective 5: Importance administrators placed on candidate's references.

1. Administrators valued cooperating teachers' recommendations the most. This supports research by Boulton (1989) and Mortaloni (1984) who found that selected interviewees for teaching positions were chosen based on cooperating teacher recommendations.
2. The state program specialists, administrators, and teacher education faculty references were rated equally.
3. The candidate's personal references were not viewed as credible contacts.

Conclusions related to objective 6: Importance placed on the candidate's type of certification.

1. Administrators preferred first-year agricultural education teachers who were fully certified. They valued pedagogical preparation that gave teachers a foundation to enter classrooms prepared academically and philosophically. Darling-Hammond (1990) supported this conclusion.

2. Administrators preferred not to hire alternatively certified teachers.

3. Administrators believed alternatively certified teachers are less qualified; less experienced, and lacked the pedagogical knowledge to be effective teachers. Hawley (1990) also contended that teachers who have expertise in subject matter, but lack training in pedagogical skills are less effective. Administrators viewed alternatively certified agricultural education teachers as a last resort when considering hiring. If a traditionally certified teacher were not available, then they would seek other options. This finding was to the contrary of Darling-Hammond (2000) who found, "students of teachers who possess full certification with a major in their field of instruction significantly out perform students of teachers who enter the classroom lacking full credentials" (p. 58).

Discussion/Implications

The study sought to better understand the criteria administrators consider when hiring first-year agricultural education instructors. It provided a better description of what administrators value in a prospective agricultural education teacher.

Since publication of the report "Understanding Agriculture: New Directions for Education" (National Research Council, 1988), a major swing away from teaching about production agriculture in secondary agricultural education has occurred across the nation. For example, universities who prepare agriculture teachers have changed their pre-service programs to meet perceived needs about what competencies entry-year agricultural education teachers should possess; however, it was unknown if school administrators agreed with many of these changes. This study found that administrators were also de-emphasizing a first-year agricultural education teacher's experience in production agriculture.

It is generally accepted that the student teaching experience is one of the most valuable components of a teacher preparation program. Although not knowing if administrators placed student teaching in agricultural education in high regard, this study revealed that administrators did hold high value for that experience. Even in schools systems that hired alternatively certified teachers, the administrators responsible for those hiring decisions admitted that their teacher did not have the classroom experience desired. It was

perceived that having no previous classroom experience made them farther behind their traditionally certified peers, therefore, affecting their students' learning.

Most administrators stressed that alternative certification is not appropriate for first-year agricultural education teachers. While administrators stated these concerns, five of the 24 first-year agricultural education teachers hired for the 2002-2003 academic year were alternatively certified. This information may be valuable for reforming the current requirements concerning alternative certification. Alternative certification has been a hot topic across the United States.

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An Evaluation Of Student Knowledge And Perceptions Toward Agriculture Before And After Attending A Governor's School For Agriculture

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Abstract

The purpose of this study was to 1) identify students' knowledge and perceptions of agriculture, 2) determine if participation in a four-week Governor's School for Agriculture Program had an effect on the students' knowledge and perceptions of agriculture through the use of a pre- and post-test; and 3) ascertain the differences in perceptions between students with and without prior agricultural experiences toward specific agricultural issues (biotechnology, animal rights/welfare, and the environment). Results indicate an increase in the students' knowledge of agriculture after completing the Virginia Governor's School for Agriculture. In addition to an increase agricultural literacy, students were more confident in their answers as indicated by a decrease in the number of "not sure" answers on the post-test. The largest change in student perceptions from the pre to post-test results pertained to current agricultural issues (biotechnology and animal rights/welfare). Results also indicate that a larger percentage of students with prior agricultural experiences disagreed or strongly disagreed that livestock should have the same rights as people, and agreed or strongly agreed that farmers are concerned about the humane treatment of animals, in comparison to those with no prior agricultural experience. Both groups of students shared similar concerns over the safety and labeling genetically modified foods.

Introduction

Today's population continues to become more urbanized and less educated about the many aspects of the agricultural industry. Many would agree with the need for a basic understanding of agriculture and its' importance to our country and citizens (Frick, Birkenholz, Gardner & Machtmes, 1995). According to Fishbein and Ajzen (1975), students' and parents' personal experiences, observations, knowledge, and values about agriculture affect their attitudes about agriculture, which in turn affect their beliefs. May (1969) concludes that people base their perceptions on past experience and knowledge; therefore, if a person has limited knowledge and experience about a topic, then he or she cannot accurately perceive it.

Several authors (Case, 1993; Coulter, 1985; Mallory & Sommer, 1986) have researched the lack of agricultural literacy and the relatively poor public image of agriculture. Horn and Vining's (1986) study found that fewer than 30% of a sample (n=2000) of Kansas students, primarily of European descent, could give correct answers to basic agriculture questions. Kansas is one of the top agriculture producing states in the U.S. If fewer than 30% of high school students in Kansas can give correct answers to agriculture related questions, certainly students in more urban areas may score even lower. We as agricultural educators clearly need to increase students' knowledge of agriculture.

High school students' knowledge and perceptions about agriculture can be influenced by a number of factors. Those factors may include the media, family, involvement in agricultural clubs (i.e. 4-H and FFA), etc. According to Whitaker and Dyer (2000), journalists have been trained in how to write but are ill equipped to fully understand their influence in the complex relationship between agricultural producers and consumers. Lichter, Lichter, and Rothman, (1991) noted more than two out of three reporters preferred liberal activist groups of environmental information over more conservative sources. The use of liberal activist groups may create a discrepancy between public understanding and reliable information. If parents are influenced by unreliable reports in the media they may not encourage their son or daughter to enroll in a high school agriculture class or pursue an agricultural degree in college.

Only 31% of Virginia's middle school, high school, and technical centers offer courses in agricultural education (Virginia Association of Agricultural Educators, 2002). In addition to agricultural education classes, students have the option of being a member of the National FFA Organization and/or 4-H. In Virginia there are approximately 9,000 FFA members (National FFA, 2003). This figure represents only 1.6% of the total student population in grades 7-12 in Virginia's public school system. Approximately 28,800 (13.9%) of Virginia 4-H members are between the ages of 14 and 19 (Virginia Cooperative Extension, 2003). As indicated by the aforementioned statistics, a small percentage of students have the option of enrolling in an agricultural education course or are involved in FFA and 4-H. One of the primary goals of the Virginia Governor's School for Agriculture (VGSA), which was established in 2001, is to expose and educate students regarding the

diverse field of agriculture, thus increasing their awareness of the importance of agriculture both locally and globally.

Faculty, staff, and administrators at Virginia Tech offer a four week residential program during the months of July and August. The College of Agriculture and Life Sciences (CALS) serves as the administrative unit and host College. CALS also works collaboratively with the colleges of Liberal Arts and Human Sciences, and the Virginia-Maryland College of Veterinary Medicine with the VGSA. The VGSA is designed to provide fieldwork, develop laboratory skills, and provide an intensive educational foundation for careers and further education in the area of agriculture. The School's mission is to provide hands-on, cutting-edge scientific and academic instruction to future leaders and scientists to develop their understanding of the scope, opportunities, challenges, and both academic and scientific rigor of the broad fields of agriculture and natural resources.

The VGSA is intended for a highly selective group of rising juniors and seniors in public, private, and home schools throughout the Commonwealth of Virginia. In order to apply for admission to VGSA, students must be identified as gifted in their local school. Home schooling students must apply through the local public school serving their geographic areas. Students apply for admission and are screened at the local level based on a limited number of nominations allocated to the school division. Students selected for nomination by their local schools are submitted to the Virginia Department of Education for a second round of evaluations.

Each student attending VGSA selects a "major". Majors include agricultural economics, animal science, food science and technology, veterinary medicine, and plant science. Students in a given major completed one specialized (in-major) course not open to other students. The specialized course was designed to provide more in-depth exposure to the disciplines related to that major. Students also take "core" courses in the agricultural sciences and "elective" courses in areas such as GIS/GPS, food safety, genetics, biotechnology, and leadership.

Purpose and Objectives

The purpose of this study was to identify high school students' knowledge and perceptions of agriculture before and after attending the Virginia Governor's School for Agriculture (VGSA). Specific objectives of this study were to:

1. Identify the demographic profile of the respondents;
2. Identify students' knowledge of agriculture before and after completing the VGSA;
3. Identify students' perceptions toward current agricultural issues (i.e. biotechnology, animal rights/welfare, the environment, etc.) before and after completing the VGSA; and
4. Identify differences in perceptions toward specific agricultural issues (biotechnology, animal rights/welfare and the environment) between students who were involved in a 4-H Program, completed a high school agriculture/horticulture class(s), and those whose families own or work on a farm.

Procedures

This study used a descriptive survey design. The population for the study included all Virginia high school students (juniors and seniors) enrolled in the 2003 Virginia Governor's School for Agriculture at Virginia Tech (*N*=86).

The instrument was developed based upon a review of literature of prior studies (Moore, Ingram & Dhital, 1996; Frick & Wilson, 1996; Talbert, 1996). The questionnaire was divided into three sections. Section I measured students' knowledge of agriculture using true/false statements. Section II measured students' perceptions toward specific agricultural issues (pesticides and the environment, soil erosion, animal rights/welfare and biotechnology) using questions based on a five-point Likert-type scale (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree). Section III consisted of demographic variables (gender; age; home location; relatives who work on a farm or in the agribusiness industry; completed a high school agriculture/horticulture course; and FFA and/or 4-H membership.

Face and content validity were established by the Academic Dean and Associate Dean in the College of Agriculture and Life Sciences, faculty in the Agricultural and Extension Education Department, and a former high school agriculture educator. Revisions were made based on recommendations from the group. A pilot study was conducted using eight randomly selected Virginia State FFA officers with varying experiences with agriculture. Cronbach's alpha reliability for Section II of the instrument was .74.

The Governor's School Assistant Director administered pre-test to all participants at orientation and post-test the final week of the Governor's School. Descriptive statistics including means, standard deviations, frequencies, percentages, and cross tabulations were used to identify students' knowledge and perceptions.

Findings

Objective One: Demographic profile of the respondents

As indicated in Table 1, 63% of the respondents were female. Forty-five percent identified that they live in a suburb, 22% in a town or city, and 19% in a rural area. Forty-eight percent indicated that they have a relative(s) who own or work on a farm and 35% have a relative(s) who work in the agribusiness industry. Twenty percent have taken a high school agriculture/horticulture course and 22% are/were an FFA member. Nineteen percent indicated that they are/were a 4-H member.

Table 1.
Demographics of Governor's School Participants

Variable		%
Gender	Female	63.0
	Male	37.0
Age	15	5.0
	16	42.0
	17	52.0
	18	1.0
Home	Farm	14.0
	Suburb	45.0
	Town or city	22.0
	Rural Area	19.0
Relative(s) on a farm	Yes	48.0
	No	52.0
Relative(s) in agribusiness	Yes	35.0
	No	65.0
High school agriculture/horticulture	Yes	20.0
	No	80.0
FFA member	Yes	22.0
	No	78.0
4-H member	Yes	19.0
	No	81.0

Objective Two: Students' Knowledge of Agriculture Before and After Completing the Governor's School

At least 90% of the students correctly answered seven of the 21 statements (3, 5, 8, 14, 15, 20, and 21) in Section I of the pre-survey (Table 2). For each statement, students had three options to choose from; true, false, or not sure. Of the aforementioned statements, 3 and 21 identify one's knowledge of food and food safety; 5, 8, and 20 focus on global agriculture; and statements 14 and 15 identify ones knowledge of biotechnology. Only 34% of the students correctly answered statement 9, 44% were "not sure", and just 8% correctly answered statement 19 on the pre-test. Statement 9 asked the student if they agreed/disagreed that approximately 25 cents of every dollar spent on food in the U. S. goes to the farmer or producer, and 19 stated that animal welfare and animal rights are one and the same.

At least 90% of the students correctly answered 10 of the 21 statements (3, 5, 7, 8, 10, 12, 14, 15, 20, and 21) on the post-survey. Statement 7 focused on animals as a source of medicinal products; statement 10 on soil erosion; and 12 focused on food safety. The largest percent increase in correct student responses on the post-survey were for statements 4, 9, 11 and 19, although fewer than 90% correctly answered each statement. The largest percent increase (as noted in Table 2) is statement 19, concerning the difference between animal welfare and animal rights. The number of students "not sure" about statements 4, 9, 11, and 16 declined.

Table 2.
Students' Knowledge of Agriculture

	Pre		Post	
	Correct	Not Sure	Correct	Not Sure
Statement	%	%	%	%
1. There are more farmers in the U.S. than there were 10 years ago.	80	11	89	3
2. Less than 3 percent of the U.S. gross national product is from agriculture.	71	11	69	7
3. E. Coli bacteria is found only in hamburger.	90	5	94	4
4. The use of pesticides has increased the yield of crops.	71	18	81	7
5. U.S. research has improved farming methods in other countries.	98	2	97	1
6. To kill E. Coli or Salmonella bacteria in meat, one must freeze it before cooking.	87	7	78	5
7. Animals can be a valuable source of medical products.	80	9	90	5
8. The U.S. does not sell its feed grains (corn, soybeans, wheat, etc.) on the world market.	93	7	91	6
9. For every $1.00 consumers spend on food in the U.S., the farmer/rancher receives approximately 25 cents.	34	44	56	17
10. Soil erosion does not pollute U.S. lakes and rivers.	88	5	93	2
11. One of every five jobs in the U.S. is related to agriculture.	58	21	75	9
12. Salmonella bacteria is most often found in eggs and poultry meat.	84	6	91	3
13. Pesticides can't be used in organic food production.	57	7	64	6
14. Biotechnology has increased the pest resistance of plants.	95	4	93	2
15. Tomatoes that stay fresh longer are an example of biotechnology.	90	7	90	5
16. The average U.S. farm is larger than 500 acres.	57	24	52	9
17. Grain exports are usually transported between continents by airplane.	52	26	47	19
18. Biotechnology has increased animal production in the U.S.	8	12	20	9
19. Animal welfare and animal rights are the same.	8	12	78	7
20. Several countries depend on U.S. agriculture exports for food and fiber.	93	5	92	2
21. Hamburger is made from the meat of pigs.	97	1	90	3

Note. N=86 on pre and post-tests.

Objective Three: Students' Perceptions Toward Current Agricultural Issues Before and After Completing the Governor's School

Students were asked to rate 19 statements using the following scale: Strongly Disagree (*M*=1.0-1.49), Disagree (*M*=1.5-2.49), Neutral (*M*=2.50-3.49), Agree (*M*=3.5-4.49), and Strongly Agree (*M*=4.50-5.0). On the pre-test (Table 3), students agreed (4.32) that biotechnology has increased crop yields in the U.S., but didn't agree or disagree (3.48) that foods derived from biotechnology should be labeled in U.S. supermarkets. Students were

neutral (2.53) that only organic methods should be used to produce foods but agreed (3.70) that organic production methods are a realistic alternative to using pesticides. Students agreed that livestock (cattle, pigs, etc.) have the same rights as people (3.61) but disagreed (1.58) that livestock should not be used for food.

Table 3.
Students' Perceptions Toward Current Agricultural Issues

Statement	Pre Test		Post Test	
	M	*SD*	*M*	*SD*
1. U.S citizens spend higher percent of their income on food than in other countries.	2.30	1.20	2.10	1.09
2. Agriculture employs a large number of people in this country.	3.48	1.14	2.30	1.05
3. Pesticides can be used safely when producing food.	3.51	1.01	2.13	0.90
4. Organic production methods are a realistic alternative to using pesticides.	3.70	0.76	2.48	0.92
5. Confinement housing is an acceptable practice when raising livestock.	2.75	1.07	2.74	1.10
6. Biotechnology has increased the yield of crops in the U.S.	4.32	0.71	1.74	0.65
7. Agriculture is the largest polluter of groundwater.	3.17	0.98	2.89	1.08
8. Farmers are concerned about the humane treatment of animals.	3.54	1.10	2.35	0.97
9. The world food supply has increased as a result of improved technology.	4.27	0.80	1.73	0.74
10. Foods derived from biotechnology should be labeled in U.S. supermarkets.	3.48	1.01	2.45	1.11
11. Only organic methods should be used to produce foods.	2.53	.86	2.50	0.95
12. Farmers should not use chemicals in crop production.	3.42	0.96	2.55	0.94
13. Livestock (cattle, pigs, etc.) have the same rights as people.	3.61	1.09	2.36	1.08
14. Processing adds more to the cost of food than the raw product.	3.69	0.75	2.15	1.04
15. Farmers have no control over food prices in the supermarket.	3.05	1.17	2.70	1.13
16. Foods derived from biotechnology are safer than food grown by conventional practices.	3.28	0.68	3.04	0.83
17. The government should exert more control over farming.	3.39	0.98	2.81	0.92
18. Agriculture is the greatest polluter of our water supplies.	3.50	0.92	2.60	1.05
19. Livestock (cattle, pigs, etc.) should not be used for food.	1.58	0.93	1.88	1.06

Note. N=86 on the pre and post-tests; scale: 1 = Strongly Disagree to 5 = Strongly Agree.

On the post-test (Table 3) students disagreed that pesticides can be used safely when producing food (2.13) and were neutral that organic production methods are a realistic alternative to using pesticides (2.48). Students were neutral (2.50) when asked if only organic methods should be used to produce food. The students disagreed that foods derived from biotechnology should be labeled in U.S. supermarkets (2.45) and were neutral (3.04) when asked if food derived from biotechnology were safer than food grown by conventional practices. Students were neutral (2.74) when asked if confinement housing is an acceptable

practice when raising livestock; agriculture is the largest polluter of our groundwater (2.60); and farmers have no control over food prices in the supermarket.

Objective 4: Identify differences in student perceptions toward specific agricultural issues (biotechnology, animal rights/welfare and the environment) between students who were involved in a 4-H Program, high school agriculture/horticulture class(s), and those whose families own or work on a farm.

The researchers used crosstabs on Likert-type data collected from the pre-test to compare differences in perceptions of VGSA students involved in an agricultural activity (4-H or high school agriculture/horticulture class) and whose relatives owned and/or worked on a farm versus those students who were not involved in an agricultural activity or farming. As previously stated, 19% of the students indicated they were a 4-H member, 20% had taken an agriculture/horticulture class and 48% had a relative(s) involved in farming. Results are reported in Tables 4, 5, and 6.

Over 88% of all students agreed or strongly agreed that biotechnology has increased crop yields in the United States. Greater than 50% of students who indicated they were not a 4-H member; had not taken an agriculture/horticulture class; and/or did not have a relative involved in farming agreed or strongly agreed that GMO foods should be labeled, in comparison to 44% and 41% are/were a 4-H member and who had taken an agriculture/horticulture class. Fifty-three percent of students who had a relative(s) on a farm agreed or strongly agreed that GMO foods should be labeled and 35% were undecided. Between 52-59% of all students were undecided if GMO foods are safer than foods grown conventionally and only 5% of students who indicated they had a relative on a farm agreed or strongly agreed with that statement.

Only 34% of students who are/were a 4-H member and 30% who had taken an agriculture/horticulture class agreed or strongly agreed that confinement housing is an acceptable practice, 43% of students with a relative(s) involved in farming agreed or strongly agreed that confinement housing is an acceptable practice, and 36% were neutral. Seventy-three percent who are/were a 4-H member and 69% of students who had taken an agriculture/horticulture class agreed or strongly agreed that farmers were concerned about humane treatment of animals. Approximately 50% of the students who indicated no involvement in agriculture (4-H; agriculture/horticulture class; or family farm) agreed or strongly agreed with the aforementioned statement. An average of 90% of all students disagreed or strongly disagreed that livestock (cattle, pigs, etc.) should not be used for food. Over 62% of the students enrolled in 4-H, had taken an agriculture/horticulture class, and did have relatives on a farm disagreed or strongly disagreed that livestock have the same rights as humans in comparison to approximately 56% of the students who were not enrolled in 4-H, not taking an agriculture/horticulture class, and do not have relatives on a farm.

Approximately 60% of all students not enrolled in 4-H, not taking an horticulture/agriculture class, and do have relatives on a farm agreed that organic production

is a realistic alternative to using pesticides. Forty-three percent of students enrolled in 4-H agreed or strongly agreed that organic production is a realistic alternative to using pesticides in comparison to 50% of the students were undecided. A low percentage ranging from six to 14% percent of all students agreed or strongly agreed that only organic methods should be used to produce food, and 47% to 63% of all students disagreed or strongly disagreed with the statement. Over 65% of students who are/were a 4-H member and had taken an agriculture/horticulture class disagreed or strongly disagreed that agriculture is the largest polluter of groundwater versus 14% of those students who hadn't participated in 4-H or an agriculture/horticulture class.

Table 4.
Students' Perceptions of Biotechnology

Biotechnology has increased crop yields in the U.S.						
	4-H		Ag Class		Relatives on a Farm	
Scale	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
SA-A	88	93	88	93	93	91
N	6	7	6	7	5	9
D-SD	6	0	6	0	2	0
GMO foods should be labeled in the U.S.						
SA-A	44	55	41	55	53	53
N	50	30	35	33	35	32
D-SD	6	15	24	12	12	15
GMO foods are safer than foods grown conventionally						
SA-A	19	5	18	7	5	11
N	56	57	52	57	53	59
D-SD	25	38	30	36	42	30

Note. Scale: SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree or SD = Strongly Disagree. N=86.

Table 5.
Students' Perceptions of Animal Rights/Welfare

Confinement housing is an acceptable practice						
	4-H		Ag Class		Relatives on a Farm	
Scale	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
SA-A	34	42	30	35	43	41
N	25	34	40	31	36	30
D-SD	31	24	30	24	21	29
Farmers are concerned about humane treatment of animals						
SA-A	73	49	69	50	56	50
N	27	31	31	30	34	27
D-SD	0	20	0	20	10	23

Livestock have the same rights as people						
SA-A	25	15	23	15	21	13
N	0	29	6	28	17	30
D-SD	75	56	71	57	62	57

Livestock should not be used for food						
SA-A	0	6	0	6	2	7
N	6	7	6	7	7	7
D-SD	94	87	94	87	91	86

Note. Scale: SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree or SD = Strongly Disagree

Table 6.
Students' Perceptions of Environmental Issues

Organic production is a realistic alternative to using pesticides						
	4-H		Ag Class		Relatives on a Farm	
Scale	Yes (%)	No (%)	Yes (%)	No (%)	Yes (%)	No (%)
SA-A	43	66	59	62	55	68
N	50	30	41	32	43	25
D-SD	7	4	0	6	2	7

Agriculture is the largest polluter of ground water						
SA-A	43	21	23	26	26	25
N	0	40	23	35	31	34
D-SD	56	39	54	39	43	41

Only organic methods should be used to produce food						
SA-A	6	16	6	16	14	14
N	31	37	35	36	36	36
D-SD	63	47	59	48	50	50

Agriculture is the greatest polluter of water supplies						
SA-A	12	14	11	15	12	16
N	12	36	24	33	19	43
D-SD	76	50	65	52	69	41

Note. Scale: SA = Strongly Agree, A = Agree, N = Neutral, D = Disagree or SD = Strongly Disagree

Conclusion

The VGSA was designed for a selective group of individuals that are identified as gifted by the local school system and recognized by the Virginia Department of Education. The 2003 demographics revealed that 45% of the population lived in suburbs, and 80% of the

population did not participate in a agriculture/horticulture class. The researchers then question the agricultural knowledge of the VGSA scholars prior to attending the school since 31% of the Virginia secondary schools offer agriculture education.

Eleven of the 21 statements about the students' knowledge of agriculture changed from the pre-test to post-test. During the four week interval, the students participated in coursework, research projects, field trips and other experiences relating to agriculture. The four week intense experience increased the agricultural literacy of the scholars. Not only did the student's change their answers about agriculture during the four week period, but they also changed their answers from "not sure" to a definitive answer (agree or disagree). All twenty-one questions showed a decrease in the "not sure" category. As stated earlier, the VGSA is an intense program where the students must complete rigorous coursework, cutting edge research projects, field trips, and other experiences relating to agriculture which causes a students' confidence level to increase.

The major area of agriculture that displayed the greatest discrepancy was the area of agricultural economics. Current public concerns are pollution, environmental issues, animal rights, and genetically modified foods. Agricultural economics knowledge and awareness may not be strong due to the lack of media coverage. Lichter et al (1991) noted that reporters preferred liberal activist groups of environmental information over more conservative sources.

Awareness through the use of media and prior experiences will affect a student's perceptions. The results of this study reach the same conclusions as Nordstrom et al (1999) that all VGSA students knew something about agriculture, but the students with agricultural experience were more knowledgeable.

The VGSA students' perceptions of biotechnology were positive, especially when asked if biotechnology has increased production. However, the students perceived that genetically modified foods should be labeled, due to safety concerns. The VGSA offered a course on biotechnology which may have affected their concern about labeling.

Perceptions about the cruelty of farm animals varied greatly. The students agreed that animals should be used for food; however, they had mixed perceptions about confinement of animals. Confinement of farm animals has entered the media depicting the negative side of livestock production. Richards et al (2000) noted that farm practices if not understood can be misinterpreted and considered cruel and inhumane. The misunderstanding of farm practices may have influenced the VGSA students' perceptions.

The VGSA students also noted that organic is a realistic alternative to pesticides but disagreed that organic method should be the sole procedure for producing food. The researchers conclude that the VGSA students perceived pesticides as an issue which coincides with other findings (Richards et al, 2000; Trexler & Meischen, 2002).

Recommendations/Implications

Based on the findings of this study, the VGSA did prove to be a successful tool for expanding participants' literacy of agriculture. Thus, it is recommended that the VGSA be used as a model for other land-grant institutions. Currently there are only two known Governor's schools across the nation; The VGSA, and the Pennsylvania Governor's School for Agricultural Sciences (PGSAS). This type of program not only serves as an agricultural literacy tool, but also provides an opportunity for administrators and faculty to recruit future scholars to colleges of agriculture. Because of VGSA's success, the researchers suggest that additional funding be identified to support a larger number of participants. It is also recommended that VGSA administrators change the admissions policy so students that are not labeled as "gifted" be given the same opportunity to participate. As a final note, a longitudinal study should be conducted to determine if in fact the VGSA did persuade student participants to enroll in a college level agriculture program and move into the ever expanding field of agriculture upon graduation.

The population for this study was limited to the participants of the 2003 VGSA; therefore, the knowledge and perceptions of agriculture identified in this study may not reflect that of the general population of high school aged students in the Commonwealth of Virginia. Results of the post-test true/false statements indicated a decrease in the number of answers, especially in the agricultural economics area. This could be due to the fact that not all topics (statements) were addressed during in VGSA classes, projects, etc.

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