

# **Journal of Southern Agricultural Education Research**

**Volume 56, # 1  
2006**

**ISSN 1935-6412**

## **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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**Volume 56, #1**

**Journal of Southern Agriculture Education Research**

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## Editor's Comments

In this fourth year as Editor of the Journal of Southern Agricultural Education Research (JSAER) I have seen the publication make important progress toward the goal of becoming a regional journal recognized for high quality. The additional peer review process started in 2004, and the procedures of multiple reviews adopted in 2005, were continued. I believe these have both contributed to improving the quality of the JSAER. Todd Brashears was elected as Editor-Elect for the 2007 Volume and will assume the Editor role in 2008. In addition, the JSAER was approved by the National Serials Data Program of the Library of Congress for an International Standard Serial Number (ISSN). Both of these were important steps in ensuring the accessibility and permanence of the JSAER.

Following the procedures first implemented in 2004, articles found acceptable for publication in the Proceedings of the 2006 Southern Region AAAE Research Conference (SR-AAAERC), whose authors had indicated that they be considered for publication in the JSAER, were submitted to a second peer review process. The Co-Chairs of the SR-AAAERC, Dr. Randol Waters, University of Tennessee, and Dr. Carrie Fritz, University of Kentucky, served as the Co-Editors and worked hard to meet deadlines. The four members of the Southern Region AAAE Research Committee served as the Editorial Board for 2006 JSAER. The members for 2006 were Scott Burris, Texas Tech University; Mark Kistler, Virginia Tech University; Tracey Kitchel, University of Kentucky; and T. Grady Roberts, Texas A&M University. They were a joy to work with, and their thoughtful and thorough reviews contributed to the quality of this issue.

In all, 23 articles, accepted through the SR-AAAERC review process, were submitted to be considered for publication in the 2006 JSAER and accepted for review by the JSAER Editorial Review Board. Of these, 16 were published. The review procedure, adopted with Volume 55, allows JSAER reviewers to "Accept with Major Revision," and "Accept with Minor Revision" in addition to the "Accept" and "Reject" options available to reviewers in Volumes 53 and 54. Given these options, the following decisions were made. Three articles were Accepted, twelve were Accepted with Minor Revision, seven were Accepted with Major Revision, and two were rejected.

Following additional reviews of the 21 articles, five were removed from consideration by their authors, leaving 16 articles to appear on these pages. The acceptance rate could be viewed as 16/23 or 69.5%. The Editorial Board established a policy that the Editor would 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 42 articles submitted to the 2006 SR-AAAERC, 36 were published in the conference proceedings (86%), and 16 were published in Volume 56 of the JSAER for an official acceptance rate of 38%.

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 working with the Editor Elect on Volume 57 to attain our long-term goal of establishing this journal as an important source of regional literature in the field.

**THE AGRICULTURAL LITERACY OF URBAN/SUBURBAN AND RURAL TWELFTH  
GRADE STUDENTS IN FIVE ILLINOIS HIGH SCHOOLS: AN EX POST FACTO  
STUDY**

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***Abstract***

*This criterion group ex-post facto study sought to replicate an Oklahoma study which assessed the agricultural literacy of twelfth grade students. Seniors were selected from a random cluster sample of five Illinois high schools in two geographic locations, urban/suburban and rural. An instrument based on the Food and Fiber Systems Literacy Framework (FFSL), and used in an earlier study, was employed. Comparisons were made between students in five Urban/Suburban and Rural schools, between Agricultural Education students and General Education students, and between the five agricultural themes of the FFSL Framework. Unlike the antecedent study, rural school students scored higher in agricultural knowledge than their Urban/Suburban counterparts. Also in contrast, Agricultural Education students scored higher than General Education students in all five FFSL themes. But similar to the Oklahoma students, the low agricultural knowledge scores of students, overall, indicated that twelfth grade students who participated in the study were not agriculturally literate.*

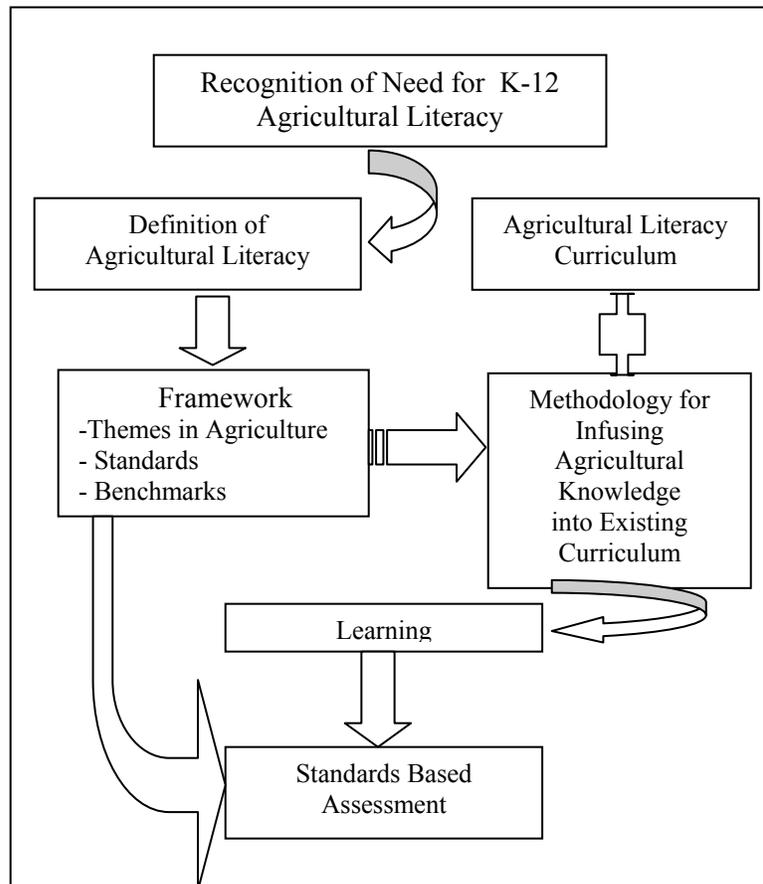
## **Introduction**

Efforts in agricultural literacy in Illinois have been expanding, with a combined budget of \$1,557,580 in 2005 for 61 county Ag Literacy Consortia with full or part-time coordinators (Miller, 2005). Because most agricultural literacy efforts target K-8 students, and due to the fact that a previous study indicated high school seniors are not agriculturally literate (Pense & Leising, 2004), assessment of Illinois twelfth grade students was warranted. This study sought to replicate an Oklahoma study to determine whether “program completers” were agriculturally literate, and to use the Food and Fiber Systems Literacy Framework (Leising, Igo, Heald, Hubert, & Yamamoto, 1998) as a diagnostic tool to assess student strengths and weaknesses in thematic areas of agricultural literacy.

The Oklahoma study found that Agricultural Education students and General Education students did not differ in their overall mean agricultural knowledge scores, and students in rural schools obtained lower overall mean agricultural knowledge scores than did students in urban and suburban schools (Pense & Leising, 2004). Poorer achievement in Oklahoma’s rural schools seemed consistent with research indicating rural communities are in decline (Ball & Wiley, 2005, as cited in Center for Integrated Agricultural Systems, 1991; O’Hare, 1988). Further, this study sought to not only understand whether the Illinois efforts in agricultural literacy have produced positive results among high school students, but also to determine whether students in rural schools are falling behind their urban/suburban counterparts.

## **Theoretical/Conceptual Framework**

Pense, Leising, Portillo, and Igo (2005) employed the grounded theory approach (Wiersma, 1995) to develop a conceptual model (Figure 1) used to evolve the framework employed in this study. Initially, the NRC (1988) proposed that an agriculturally literate person would be one who would understand the food and fiber system in relation to its historical, economic, social and environmental significance. An operational definition of agricultural literacy was later provided by Frick (1990), “Agricultural literacy can be defined as possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to: synthesize, analyze, and communicate basic information about agriculture” (p. 6). With this conclusive definition the grounded theory approach, advocated by Wiersma, to curriculum and the assessment of agricultural literacy led to the development of the Food and Fiber Systems Literacy (FFSL) Framework (Leising & Zilbert, 1994). The FFSL Framework was further refined in Oklahoma (Leising et al., 1998), and identified five themes in agriculture with corresponding standards, and grades K-12 benchmarks.



*Figure 1.* Conceptual model of the Food & Fiber Systems Literacy Framework role in the development of agricultural literacy curriculum and assessment. (Leising, Pense, and Portillo, 2003, p. 4).

The five themes of the FFSL Framework and agriculture’s complementary concepts (standards) addressed the multiple concepts of Caine and Caine’s Brain-Based Theory (1994). Balshweid (2002) surmised that the Brain-Based Theory and the Experiential Learning Theory of Dewey (1938) suggests interface between context and content giving students multiple opportunities for “transfer and overlap” (p. 57) of these standards. By organizing standards into grade-grouped benchmarks (K-1, 2-3, 4-5, 6-8, 9-12), the framework provided a systematic means of addressing these overlapping complementary concepts in agricultural literacy (Pense et al., 2005).

#### Agricultural Literacy Assessment

Igo’s study (1998) used the FFSL Framework to infuse agriculture into the core curriculum of K-8 classrooms. He concluded that it was possible to use the standards and grade-grouped benchmarks of the framework to infuse instruction about agriculture and increase student knowledge of agriculture. The study found strong relationships between student agricultural knowledge gains and the number of instructional connections teachers made to the

FFSL Framework.

A qualitative study of seven fifth-grade rural students (Meischen & Trexler, 2002) employed two frameworks to guide interviews and analysis of student understanding in the area of livestock and meat. The authors employed Benchmarks for Science Literacy (American Association for the Advancement of Science, 1993) and the Food and Fiber Systems Literacy Framework (Leising, Igo, Heald, Hubert, & Yamamoto, 1998) to determine student understanding and the ability to converse about livestock and meat were incomplete.

### **Purpose and Objectives**

Assessment based upon a curriculum framework had not been previously conducted to determine the agricultural literacy of students within the state of Illinois. The purpose of this study was to assess the food and fiber systems knowledge of twelfth grade students in Illinois prior to graduation. The specific objectives were:

1. Determine whether General Education students and Agricultural Education students in selected urban/suburban and rural schools were agriculturally literate in twelfth grade.
2. Determine strengths and weaknesses of agricultural knowledge for General Education students and Agricultural Education students in selected urban/suburban and rural schools using the five thematic areas of agriculture identified in the FFSL Framework.
3. Compare Agricultural Education students' and General Education students' knowledge scores about agriculture.

### **Methods and Procedures**

The methodology for this study was a criterion group ex post facto research design. Wiersma (1995) has stated ex post facto is appropriate when the variables being studied are not manipulated, but studied in their natural context. Babbie (1986) stated that ex post facto may be employed to determine cause and effect relationships between past events. Wiersma also noted that ex post facto research designs may explain relationships and effects occurring between the variables.

#### *Population and Sampling*

The population of this study included 202 twelfth grade students purposively selected from a random cluster sample of five schools (three rural and two urban/suburban). The five schools were randomly selected from lists provided by the five district supervisors in Illinois employed by the agency, Facilitating Coordination in Agricultural Education (FCAE). Schools having strong agricultural education programs were deemed suitable for the comparison study being conducted.

In order to compare students in two groups, a target population of 50 or more students was determined for each group. The groups to be studied included those majoring in agricultural studies (defined as students who had taken three or more semesters of agricultural coursework) and those in general education studies (students who had not taken any agricultural classes). Most authors suggest that a sample include 30 or more students in each group for experimental research, however a larger number is desirable in a descriptive study employing a purposive sample (Ary, Jacobs, & Razavieh, 1990). To obtain an adequate number of Agricultural Education students, FCAE district supervisors were asked to include only schools with strong agricultural education programs. This resulted in two urban/suburban schools and three rural schools randomly selected from the generated list.

Random sampling of subjects was not feasible given the limitations of testing intact groups and the large numbers of classes in each school. The final sample of 202 was included in the study, of which 53 met the definition for Agricultural Education students while 144 were General Education majors. Although the population was homogenous in age, the purposive sampling (Wiersma, 1995), determined by school administrators, allowed a cross-section of students according to geographic location, gender, ethnicity and academic ability. The term 'judgment sample,' rather than 'purposive sample,' is employed by Worthen, Sanders, and Fitzpatrick (1997) and is said to be effective in describing a subgroup and permitting a better understanding of the program as a whole.

Due to the difficulty of admittance to test sites in urban public schools, and because urban and suburban schools scored similarly in the Oklahoma study (Pense & Leising, 2004), the two school types were grouped as one.

### *Instrumentation*

The instrument, designed by Pense and Leising (2004), was based on the grade group 9-12 benchmarks of the FFSL Framework. Instruments based on the FFSL Framework, which were used in previous studies to measure student knowledge about agriculture in grades K-8, provided guidance for the instrument development process:

1. The researcher employed three methods to generate and validate the test questions used to assess agricultural knowledge:
  - a. Each item was referenced to one of five thematic areas of agriculture in the FFSL Framework. Each item was also referenced to the grade level grouping 9-12 standards and benchmarks of the Framework. Furthermore, by employing a method of criterion referencing, a "representative sample of items was established from a well defined domain of behavior to ensure validity" (Center for the Study of Evaluation, 1979, p. 10).
  - b. A panel of three credentialed Agricultural Education teachers and three graduate students in Agricultural Education, all of whom had no contact with any of the test sites, agreed to serve on the test development panel to write question items. Adkins-Wood (1960) underscores the need for item writers to possess several important qualities to increase content validity, including a thorough knowledge of the subject matter, an intimate

understanding of specific teaching objectives, and a facility in the clear and economical use of language.

- c. The questions were validated by a panel of secondary school teachers of various disciplines to ensure that: 1) each item addressed its corresponding FFSL benchmark content 2) the content was grade-level appropriate, and 3) each item was language appropriate. According to the Microsoft Word™ spelling and grammar check, readability ranged from sixth to twelfth grade reading levels.

2. The instrument underwent considerable revision:

- a. It was written in a format that would be consistent with a criterion-referenced knowledge achievement test.
- b. Multiple-choice items were employed as they are most widely used for measuring knowledge, comprehension and application outcomes (Gronlund, 1998).
- c. The test was also scrutinized to ensure that each item was written according to rules established for multiple-choice items (Gronlund, 1998).

#### *Pilot Testing: Item Revision and Reliability*

Two pilot tests were conducted with twelfth grade students in two rural Oklahoma high schools (Pense & Leising, 2004). The first was conducted on May 15, 2001 with an intact English IV class yielding a reliability coefficient of 0.846 using the Kuder/Richardson-20 (KR-20) Method. The instrument was then reviewed and questions revised based upon both input from students and indices indicating difficulty and discrimination from an item analysis (Wiersma & Jurs, 1990). The second pilot test was conducted on September 4, 2001 in a U.S. Government class and yielded a reliability coefficient of .933.

A computed estimate of the reliability is deemed by some as indicative of a criterion referenced test's adequacy, yet clear disagreement exists in the literature. Wiersma and Jurs (1990) cite eight factors through which reliability of an instrument may be enhanced. Each of the following factors were addressed during instrument development: homogeneous items, discriminating items, enough items, high-quality copying and format, clear directions to the student, a controlled setting, motivating introduction, and clear directions to the scorer (Pense & Leising, 2004).

#### *Data Collection*

Data was collected during the fall semester of the 2004-2005 school year. By testing in the fall, access to the data collection sites was less restrictive due to spring testing requirements set by No Child Left Behind (Illinois State Board of Education, 2005). According to J. G. Leising (personal communication, October 13, 2004) students scored ten percentage points higher in the pilot test conducted in the fall than those students tested in the spring during the Oklahoma study. Incentives of soft drinks and candy were also employed in this replication

study to reward students for their participation and in an attempt to encourage best effort (Dillman, 2000).

Other data collection procedures were the same as used in the Oklahoma study (Pense & Leising, 2004). Testing was administered at each project site by the same researcher. Each instrument was numbered in an effort to keep scores separate and school identity clear. Researchers did not identify individual students with their corresponding test numbers to ensure anonymity. Before testing, students were given an introduction to the study and test instructions were read to all participants. Answers were recorded by students on a general purpose NCS<sup>®</sup> answer sheet.

School administrators provided profile data on each school participating in the research study. Demographic information of each school was based on documents submitted by schools for state and federal funding. Qualitative observations were also made by the researcher. Demographic information for each individual student was obtained through a ten item questionnaire attached at the end of the testing instrument.

Students required 25 to 50 minutes to complete the test questions on the instrument. Those exams completed in less than ten minutes were not included in the sample as they were not deemed to be “honest expressions” of the students’ knowledge. By so doing, skewed results were less likely to occur.

Data were entered into an SPSS-12.0 version data file. In cases where marks on the students’ answer sheets were not readable by the scanning machine, corrections were entered by hand to assure completeness and accuracy of the data. Descriptive statistics were used to report frequencies, percentages, means and standard deviations.

## **Results and Findings**

With an overall mean percent score of 52.15%, Agricultural Education students scored nearly 10 percentage points higher than General Education students. Both Agricultural Education and General Education students in rural settings had higher mean percents than their urban/suburban counterparts (Table 1).

Students from Urban/Suburban schools scored over 17 percentage points lower than students from rural schools on the agricultural knowledge test. Urban/suburban students had a total mean percent score of 35.87 while their rural counterparts had a total mean percent score of 53.35 (Table 1).

A summary of the five thematic areas (Table 2) showed larger mean percent scores in all five themes for rural students. Rural students scored at least 10.36 percentage points higher in each of the thematic areas. Overall, Agricultural Education students (Table 3) scored higher in all five thematic areas, scoring at least 6.28 percentage points higher than General Education students in each of the five thematic areas.

Table 1

*Summary of Selected Illinois 12th Grade Agricultural Education Students' and General Education Students' Mean Percent Scores by Geographic Location of School and Student High School Major*

Student H.S. Major	Urban/Suburban			Rural			Student H.S. Major Totals		
	<i>n</i>	<i>M %</i>	<i>SD</i>	<i>n</i>	<i>M %</i>	<i>SD</i>	<i>n</i>	<i>M %</i>	<i>SD</i>
Ag. Education	14	35.86	17.50	40	57.50	15.37	53	52.15	18.53
Gen. Education	<u>80</u>	<u>35.88</u>	<u>12.82</u>	<u>64</u>	<u>50.75</u>	<u>12.57</u>	144	42.49	14.67
School Type Totals	94	35.87	13.50	104	53.35	14.03			

Table 2

*Summary of Selected Illinois 12<sup>th</sup> Grade Students' Thematic Mean % Agricultural Knowledge Scores According to School Type*

Agricultural Themes	Urban/Suburban			Rural		
	N	Mean %	S.D.	N	Mean %	S.D.
(1) Understanding Agriculture	94	38.36	16.39	108	51.00	16.15
(2) Hist., Geography & Culture	94	38.70	20.85	108	62.90	23.32
(3) Science & Environment	92	34.09	20.11	107	55.82	22.07
(4) Business & Economics	93	29.00	20.14	108	48.86	19.64
(5) Food, Nutrition & Health	94	34.73	15.60	108	45.09	15.76

The mean percent scores for the five thematic areas according to geographic locations of students' schools and students' high school majors were then examined. Urban/suburban students scored much lower in Thematic Area 1 than rural students, with a mean percent difference of 12.64 (Table 2). Thematic Area 2 had a mean percent difference of 24.20 (Table 2), with urban students scoring lower. Thematic Area 3 had a mean percent difference of 21.73 (Table 2), with urban students again scoring lower than the rural students. Thematic Area 4 had a

mean percent difference of 19.86 (Table 2), with urban students scoring, once again, less than their rural counterparts. Thematic Area 5 had a mean percent difference of 10.36 (Table 2), with urban students scoring lower than rural students.

Table 3

*Summary of Selected Illinois 12th Grade Students' Thematic Mean % Agricultural Knowledge Scores According to Student Major*

Agricultural Themes	Ag Ed Students			Gen Ed Students		
	N	Mean %	S.D.	N	Mean %	S.D.
(1) Understanding Agriculture	56	49.64	19.69	146	43.36	16.18
(2) Hist., Geography & Culture	56	60.20	25.97	146	48.40	24.24
(3) Science & Environment	55	54.18	25.60	144	42.55	22.10
(4) Business & Economics	56	44.43	22.90	145	36.57	21.66
(5) Food, Nutrition & Health	56	46.09	16.06	146	38.00	16.15

Overall, Agricultural Education students scored higher than General Education students in all of the thematic areas (Table 3). Thematic Area 1 had a mean percent difference of 6.28 (Table 3), with General Education students' scoring lower than Agricultural Education students. Thematic Area 2 had a mean percent difference of 11.80 (Table 3), with General Education students' scores lower than those of Agricultural Education students. Thematic Area 3 had a mean percent difference of 11.63 (Table 3), with General Education students scoring lower than Agricultural Education students. Thematic Area 4 had a mean percent difference of 7.86 (Table 3), with General Education students' scores lower than those of Agricultural Education students. Thematic Area 5 had a mean percent difference of 8.09 (Table 3), with General Education students' scores lower than those of Agricultural Education students.

### Conclusions

The conclusions in this study should not to be generalized beyond the 202 selected 12<sup>th</sup> grade students in the five Illinois high schools that participated in the study. The major findings presented in the study support the following conclusions:

1. Both Agricultural Education students and General Education students, regardless of their school type, possessed some agricultural knowledge.
2. Agricultural Education students obtained higher scores than General Education students in

their level of overall knowledge about agriculture.

3. Students enrolled in urban/suburban schools scored much lower in agricultural knowledge than students in rural schools for all five thematic areas of the Food and Fiber Systems Framework; urban/suburban school students were especially weak in Theme 4: Business & Economics.
4. Overall, 12<sup>th</sup> grade students in the five Illinois high schools that participated in this study demonstrated a lack of agricultural literacy, as defined by the FFSL Framework.
5. Agricultural literacy was considerably lower in the urban/suburban schools than in the rural schools included in this study.
6. Agricultural Education students obtained their highest score in Theme 2: History, Geography & Culture; followed by Theme 3: Science & Environment. Agricultural Education students scored lowest in Theme 4: Business & Economics (15.77% lower than Theme 2). Their second to lowest score was in Theme 5: Food, Nutrition & Health.

### **Recommendations**

The following recommendations were made based upon the major findings of the study:

1. As in the Oklahoma study (Pense & Leising, 2004), overall low agricultural knowledge scores indicated that students participating in the study were not agriculturally literate. These findings suggest materials and curriculum should be developed in order to integrate applicable agricultural concepts for every discipline taught at the schools studied.
2. Agricultural educators in the five schools studied should make every effort to ensure that gaps in agricultural knowledge be eliminated by teaching those thematic areas where scores were low.
3. The Agricultural Education programs of the five Illinois high schools in this study should place more emphasis on developing curriculum for Theme 4: Business & Economics; and for Theme 5: Food, Nutrition and Health.
4. A methodology and delivery plan should be developed to help infuse the Food and Fiber System Literacy (FFSL) Framework into the curriculum of the five high schools in this study.
5. Replication of this study using the FFSL Framework is recommended in other states to better understand the strengths and weaknesses of student acquisition of knowledge in agriculture according to student major, school type, and thematic areas of agriculture.

### **Implications**

Based on conclusions from this study and the findings of similar research (Pense &

Leising, 2004), Agricultural Education curricula across the nation may be too narrow in scope. A need exists to review Agricultural Education curricula and programs, improve upon them using the established criteria in the FFSL Framework (themes, standards and benchmarks), and thereby improve student agricultural literacy at the secondary level.

Agricultural educators, industry leaders, and extension educators should also help to expand the agricultural knowledge of educators in other disciplines, such as those teaching the science curriculum. Science teachers agreed students learn more through an integrated curriculum (Warnick, Thompson, & Gummer, 2004). This could contribute to an increased agricultural literacy among K-12 students, and given time, the entire population as well.

Agricultural literacy has been studied for nearly 20 years. During this time, programs have been developed to promote agriculture; most of these literacy efforts have targeted grades K-8. These programs could be explored and scrutinized to ensure that students entering secondary schools are agriculturally literate.

This study replicated the research conducted in Oklahoma. Ongoing discussion and research with a focus on twelfth grade students should be continued to determine if students have an understanding of agriculture. A larger population should be explored, including schools that do not currently have agricultural education programs.

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# **AN INVESTIGATION OF THE CRITICAL THINKING ABILITY OF SECONDARY AGRICULTURE STUDENTS**

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## **Abstract**

The purpose of this study was to examine the relationship between student characteristics and critical thinking. Additionally, this study sought to determine the unique variance in critical thinking explained by achievement level. The target population for the study was identified as secondary agriculture students. As part of a larger study, the sample consisted of 105 secondary agriculture students purposefully selected based on characteristics of the teacher. Critical thinking ability was determined by the Watson-Glaser Critical Thinking Appraisal<sup>®</sup> (WGCTA<sup>®</sup>) (Form S). Mean scores for critical thinking indicate that some level of critical thinking is present in secondary agriculture students. Males and females were similar in their ability to think critically. Upper classmen outperformed lower classmen on critical thinking. Students categorized as higher academic achievement levels exhibit higher critical thinking skills than those students categorized as lower achievement levels. Academic achievement level uniquely contributed 18 percent of the variance in critical thinking score.

## **Introduction and Theoretical Framework**

Education has long focused on teaching students to give a correct answer. Students often complete assignments, do well on tests and get good grades; yet, do not learn to think critically (Brooks & Brooks, 2001). According to Brooks and Brooks (2001), teachers too often ask students to recite, define, describe, or list facts. Students are less frequently asked to analyze, infer, connect, synthesize, evaluate, think and rethink. Students have become familiar with this process of passing knowledge back and forth without inquiring into how this information applies to the real world (Black & Deci, 2000). The concern over development of critical thinking skills, or lack thereof, has led to a renewed focus of education.

The current educational climate reflects the importance of learning not only content information, but also developing skills for thinking critically (Pithers & Soden, 2000). The need for instructional design to improve the thinking process has been substantiated in numerous reports over the last 25 years (Halpern, 2003). In recent years, more emphasis has been placed in the student's ability to understand and use information, not to merely possess it (Richardson, 2003). Furthermore, college faculty identified critical thinking, along with problem solving, as skills necessary for every college graduate (Diamond, 1997).

While there appears to be unanimous agreement regarding the importance of developing students' critical thinking skills, there is much less agreement on exactly what constitutes critical thinking. The concept of critical thinking was reflected in the teaching of Greek philosophers such as Socrates, Plato and Aristotle (Burbach, Matkin, & Fritz, 2004; Staib, 2003). Dewey (1909, 1997) described critical thinking as the suspension of judgment and healthy skepticism. Multiple descriptions of critical thinking can be found in the literature (Beyer, 1987; Burden & Byrd, 1994; Ennis, 1962; Halpern, 2003; Pascarella & Terenzini 1991; Simon and Kaplan, 1989; Stahl & Stahl, 1991). Critical thinking is often linked with, compared to, and used interchangeably with problem-solving (Dressel & Mayhew, 1954; Facione, 1990; Moore & Parker, 1994; Pascarella & Terenzini, 1991; Sternberg & Baron, 1985) and higher order thinking (Burden & Byrd, 1994; Ennis, 1985; Facione, 1990; Whittington, Stup, Bish, & Allen, 1997).

Early efforts of Dressel and Mayhew (1954) established a framework for evaluating critical thinking. Their work identified five abilities associated with the concept of critical thinking. Building on the work of Dressel and Mayhew, Watson and Glaser (1994) provided the following definition:

Critical thinking is a composite of attitudes, knowledge, and skills which includes: (1) attitudes of inquiry that involve an ability to recognize the existence of problems and an acceptance of the general need for evidence in support of what is asserted to be true; (2) knowledge of the nature of valid inferences, abstractions, and generalizations in which the weight or accuracy of different kinds of evidence are logically determined; and (3) skills in applying the above attitudes and knowledge. (p. 9)

Consistent with this definition, Watson and Glaser created a data collection instrument to measure those skills associated with critical thinking. The Watson-Glaser Critical Thinking Appraisal<sup>®</sup> (WGCTA<sup>®</sup>) (1994) measures critical thinking through five abilities: inference,

recognition of assumptions, deduction, interpretation, and evaluation of arguments. Each of the five abilities is represented by a score on a sub-test of the instrument; and collectively, they represent an ability to think critically.

*A Nation at Risk* (National Commission on Excellence in Education, 1983) questioned the faltering achievement of American students and called for investigations into existing educational structures. The National Commission on Excellence in Education specifically identified concerns about students' lack of ability in critical thinking, higher-order thinking and problem solving skills. This concern over students' ability to think critically was further substantiated by Norris (1985), who indicated that critical thinking was lower than expected in the United States at every stage of schooling.

The importance of critical thinking has been reinforced by industry expectations. The Secretary's Commission on Achieving Necessary Skills (SCANS) (1991) addressed this issue in their report entitled *What Work Requires of Schools*. The commission found that high performance workplaces required competencies in critical thinking. Among those critical thinking competencies identified were creative thinking, decision making, problem solving, and reasoning (SCANS, 1991).

Support for the development of critical thinking skills has also been apparent in the expectations of student performance in public schools. As a result of legislation, the Missouri Department of Elementary and Secondary Education (DESE)(1996) developed the Show-Me Standards outlining expectations of secondary students. These standards were a result of Senate Bill 380, "The Outstanding Schools Act" (1993), which called for the State Board of Education to adopt performance standards. The Show-Me Performance Standards target the development of critical thinking skills.

The standards are categorized into four goals. Goal one of the Show-Me Standards (DESE, 2004) states, "Students in public schools will acquire the knowledge and skills to gather, analyze, and apply information and ideas"(p. 3). In addition, Goal Three of the Show-Me Standards posits, "Students in public schools will acquire the knowledge and skills to recognize and solve problems"(p. 3). Finally, Goal Four asserts, "Students in public schools will acquire the knowledge and skills to make decisions and act as responsible members of society"(p. 3). The value of critical thinking skills is evident by the references to analysis, problem solving, and decision making in three of the four goals.

Critical thinking has been examined through a variety of perspectives. Early studies in agricultural education sought to identify the critical thinking ability of students enrolled in secondary agriculture classes. Findings indicated that secondary agriculture students did possess some ability to think critically (Rollins, 1990, Cano, 1990). Future studies have since contributed to what Cano initially described in 1990 as a shallow research base.

Studies have explored the relationship between critical thinking and student characteristics. Torres and Cano (1995) reported that learning style explained significant variance in critical thinking. In contrast, Rudd, Baker; and Hoover (2000) found no significant difference in critical thinking by learning style. However, they did find gender to be a significant

contributor to critical thinking disposition. More recently, Meyers and Dyer (2004) found no difference in student's disposition to think critically by gender or learning style.

Stronger connections have been made between critical thinking and academic ability. Rollins (1990) found the best indicator of critical thinking ability in Iowa secondary agriculture students to be the score on the Iowa Tests of Education Development (ITEDs) reading sub-test, accounting for 28% of the variance in critical thinking score. Cano and Martinez (1991) reported a substantial positive relationship between critical thinking and cognitive ability as defined by the Developing Cognitive Abilities Test. Ricketts and Rudd (2005) identified grade point average, as an indicator of academic performance, as the best known indicator for explaining critical thinking.

Critical thinking continues to emerge as a primary focus in education. While the body of literature related to critical thinking continues to grow, there continues to remain disagreement of factors that are associated with the ability to think critically. One consistent product of previous studies on critical thinking has been the call for continued investigation.

### **Purpose and Objectives**

The purpose of this study was to examine the relationship between selected student characteristics and critical thinking. Additionally, this study sought to determine the unique variance in students' critical thinking explained by their achievement level. The following research objectives guided the study.

1. Describe selected characteristics (gender, grade classification, achievement level, and grade classification) of secondary agriculture students.
2. Explore critical thinking scores according to classifications of gender, grade classification, and achievement level.
3. Explain the variance in critical thinking score accounted for by achievement level ability when controlling for differences in gender and grade classification.

### **Methods and Procedures**

#### *Population and Sample*

This study was part of a larger investigation and utilized a descriptive correlational design. While the target population for the study was identified as secondary agriculture students in Missouri, participants were limited by the design of the larger study. Subjects in the study were part of a purposive sample. Students were included in the study based on selection criteria of their agriculture teacher. Twelve teachers were selected based on characteristics of their teacher preparation program. All selected teachers had been exposed to a similar pre-service departmental philosophy of education, completed similar requirements for teacher certification, and received similar instruction in teaching methodology. The resulting sample consisted of 140 students. Achievement score data were unavailable for 35 students resulting in a usable sample for this study of 105. Due to the limitations of the sampling procedures,

findings from this study are representative of subjects included in the study and should not be generalized beyond this sample.

### *Instrumentation*

Two data collection instruments were used. Critical thinking ability was determined by the Watson-Glaser Critical Thinking Appraisal<sup>®</sup> (WGCTA<sup>®</sup>) (Form S). The WGCTA<sup>®</sup> is a standardized, copyrighted, assessment tool for assessing the success of programs and courses in developing critical thinking skills (Watson & Glaser, 1994). The instrument includes exercises which are purported to be examples of problems, statements, arguments and interpretations of data which are regularly encountered at work as well as at school and in other activities. The WGCTA<sup>®</sup> is designed to measure critical thinking as a composite of attitudes, knowledge, and skills. The instrument is available in parallel forms A and B and is also available in an abbreviated version (Form S). Form S was used for this study as it is approved for secondary students and can be completed in approximately 45 minutes.

The reliability of the WGCTA<sup>®</sup> had been previously established and was detailed in the test manual. Reliability estimates for Form S of the WGCTA<sup>®</sup> were reported as a Cronbach's alpha coefficient of .81 ( $r = .81$ ) (Watson & Glaser, 1994). According to Watson and Glaser (1994), "the content validity of the WGCTA<sup>®</sup> in classroom and instructional settings may be examined by noting the extent to which the WGCTA<sup>®</sup> measures a sample of the specified objectives of such learning programs. The statewide objectives of public education in Missouri clearly identify the importance of critical thinking skills as evident by the references to analysis, problem solving, and decision making. The construct validity of the WGCTA<sup>®</sup> can be evaluated by noting its relationship to other tests. Watson and Glaser (1994) report significant relationships between the WGCTA and test of general intelligence (*Otis-Lennon Mental Ability Tests*, the *California Test of Mental Maturity*, and the *Wechsler Adult Intelligence Scale Verbal IQ*).

A second data collection instrument was developed by the researcher. This instrument was completed by the agriculture teacher and consisted of demographic information (gender and grade classification) and achievement data. Student achievement was operationally defined as the score on the 7<sup>th</sup> grade administration of the science portion of the "Missouri Assessment Program" (MAP). The MAP is a standardized assessment system developed to evaluate student proficiency on the state adopted academic standards. The MAP assesses students in communication arts and science in grades 3, 7, and 10. Mathematics and social studies are tested in grades 4, 8, and 11. As part of the larger study, teachers reported the score on the science portion of the MAP as that was the area most related to agriculture. The seventh grade administration was utilized because it was the most recent administration completed by all secondary students in the study.

## **Findings**

Complete data were available for 105 students. Table 1 displays a summary of descriptive characteristics. Approximately two-thirds of the students (66%) were male and approximately one-third (35%) were female. Sophomores represented a majority ( $n = 59, 56\%$ )

of the sample followed by freshmen (17, 16%), seniors (n = 16, 15%), and juniors (13, 12%). Further data analysis revealed the mean critical thinking score of 21.3 (SD = 4.36). Critical thinking scores ranged from 10 to 33. The mean achievement score was 685.85 (SD = 25.38). Student's achievement scores on the MAP ranged from 610 to 752.

Table 1  
*Descriptive Characteristics (n = 105)*

Characteristic	Frequency	Percent	Mean	S.D.	Min-Max
Gender					
Male	69	66			
Female	36	34			
Grade Classification					
Freshman	17	16			
Sophomore	59	56			
Junior	13	12			
Senior	16	15			
Critical Thinking Score			21.38	4.36	10-33
Achievement Score (MAP)			685.85	25.38	610-752

Achievement scores were collected in raw score form but were reported categorically by achievement level for descriptive purposes (Table 2). Almost half (44%,  $n = 46$ ) of the students in the sample were in the *progressing* category. Thirty two percent ( $n = 34$ ) of the sample was categorized as nearing proficiency. The remainder of the sample consisted of *step 1* ( $n = 13$ , 12%), *proficient* ( $n = 11$ , 11%), and *advanced* ( $n = 1$ , 1%).

Table 2  
*Achievement Categories of MAP Scores by Treatment Group (n = 105)*

Achievement Category	Frequency	Percent
Step 1	13	12.4
Progressing	46	43.8
Nearing Proficiency	34	32.3
Proficient	11	10.5
Advanced	1	0.9
Total	105	100.0

Objective two sought to explore critical thinking scores by categories of gender, grade classification, and achievement level (Table 3). The mean critical thinking score for males was 21.96 compared to a mean for females of 21.78. By grade classification, the lowest critical thinking scores belonged to freshman ( $M = 20.24$ ). Sophomores scored slightly higher followed by juniors. Seniors had the highest critical thinking score. A similar pattern was found in achievement level groups. Students classified as Step 1 had a mean critical thinking score of 19.43. The mean for students in the progressing category had a mean of 20.83. Students in the nearing proficiency category were slightly higher with a mean of 23.06 followed by students in the proficient category ( $M = 26.22$ ). Only one student met the criteria of advanced and subsequently scored a 28 on critical thinking.

Table 3  
*Mean Critical Thinking Scores by Selected Variable Categories (n=105)*

Characteristic	Mean	S.D.	Min-Max
Gender			
Male	21.96	4.58	13-33
Female	21.78	4.40	14-33
Grade Classification			
Freshman	20.24	3.38	17-28
Sophomore	21.78	4.37	13-33
Junior	22.00	3.94	16-28
Senior	24.00	5.44	16-33
Achievement Level			
Step 1	19.43	3.25	15-26
Progressing	20.83	3.45	13-28
Nearing Proficiency	23.06	4.64	16-33
Proficient	26.22	5.67	17-33
Advanced	28.00	*	*

\* (n = 1)

A correlation matrix was generated containing the dependent variable of critical thinking, the variable of interest, and the control variables (Table 3). Control variables, and their correlation with the dependent variable, were gender ( $r_{pb} = .02$ ) and grade classification ( $r_s = .23$ ). Achievement level had a moderate, positive correlation ( $r = .43$ ) with critical thinking. The correlation matrix also served as a diagnostic tool for evaluating multicollinearity. According to Pedhazur (1997), collinearity, described as the correlation between independent variables, may have devastating effects on regression statistics. Correlations between independent variables ranged from .19 to .28 and were considered low according to Davis (1971) conventions.

Table 3  
*Correlation Matrix of Independent and Dependent Variables*

Variable	X1	X2	X3	Y
Gender <sup>a</sup> (X1)	1.0	.28	.24	.02
Grade Classification (X2)		1.0	.19	.23
Achievement Level (X3)			1.0	.43
Critical Thinking (Y)				1.0

<sup>a</sup> 0 = female; 1 = male

Hierarchical multiple regression was used to determine the amount of unique variance in critical thinking explained by achievement level (Table 4). The model ( $F = 9.72, p < .05$ ) indicated 24% of variance in achievement ( $R^2 = .24$ ) was explained by gender, classification, and critical thinking ability. To isolate the unique contribution of critical thinking abilities, the control variables were entered into the model first. Gender and classification accounted for 7% ( $R^2 = .07$ ) of variance in achievement. The addition of achievement level to the model resulted in a change in  $R^2$  of .18. The change indicates achievement level contributed 18% of the variance in critical thinking ( $t = 4.95, p < .05$ ).

Table 4  
*Hierarchical Regression of Critical Thinking on Selected Variables*

Variable	R Square		<i>b</i>	<i>t</i>	<i>p</i>
	R Square	Change			
Control Variables	.06	.06			
Gender <sup>a</sup>			1.19	2.44	.02
Classification			-0.45	-0.49	.63
Variable of Interest <sup>b</sup>	.24	.18			
Achievement Level			2.19	4.69	.01*

Note. For Model  $F = 9.72, p < .05$ .

<sup>a</sup>0 = female, 1 = male.

<sup>b</sup> Adjusted  $R^2 = .20$ .

\* $p < .05$  for individual variables.

### Conclusions and Recommendations

In the study, 35% of the students were female and 65% were male. Data from the Missouri Department of Elementary and Secondary Education (DESE, 2005) indicate approximately 30% of students enrolled in secondary agriculture classes for 2003-04 were female and approximately 70% were male. Therefore, it can be concluded that the sample approximates the gender distribution of secondary agriculture students in Missouri. Sophomores, juniors, and seniors made up almost 85% of the sample. While this is uncharacteristic of statewide enrollment figures, it is understandable given the selection criteria for this study. Teachers were included based on their ability to incorporate a specific unit of instruction into one of their courses. The unit most appropriately fit into an Ag Science II or Natural Resources class. Each of these courses is typically regarded as upper level courses.

State reports for 2004 indicated the 40% of students state-wide were performing at or above the *nearing proficiency* level on the MAP. Forty-four percent of the students in this study were classified as *nearing proficiency* or higher. The MAP achievement levels imply that students in agriculture courses are performing at least as well as the state-wide population of students. As education continues to deal with accountability issues, it is reassuring that agriculture students are performing as well as general populations. Future research is necessary to investigate the contributions agriculture programs make toward standardized testing.

Mean scores for critical thinking indicate that some level of critical thinking is present in secondary agriculture students. A lack of comparative information on secondary level critical thinking ability makes interpreting the level inherently more challenging. Students in the study scored considerably lower than normative data for various professions on the same form of the WGCTA (Watson & Glaser, 1996). More information is needed for students at a similar grade level.

Helmstadter (1985) criticized the WGCTA indicating that mean scores tend to progress logically with age. Findings from this study indicated that an increase in grade classification resulted in an increase in critical thinking ability. Upper grade-level students outperformed lower grade-level students on critical thinking. In spite of Helmstadter's concern, Rollins (1990)

study resulted in similar findings using a different measure of critical thinking. It is not clear whether that increase is a result of education or a result of development.

Educators should continue to value the development of critical thinking. As teachers strive to incorporate strategies into their classroom, differences among grade levels should be considered. While findings from this study only indicate that differences may exist between students at different grade levels, additional studies should be conducted to determine the extent to which grade level impacts a student's ability to think critically. Likewise, strategies most effective for developing critical thinking should be identified through future research and employed in agriculture programs.

There exists some disagreement in the literature regarding the influence of gender on critical thinking. Rudd, Baker, and Hoover (2000) described gender as a significant variable in critical thinking disposition. In contrast, current findings indicate males and females are similar in their ability to think critically. This finding is consistent with research on college students (Myers & Dyer, 2004). Possible differences in these findings may be a result in the inconsistent descriptions and measures of critical thinking.

Findings indicate a moderate (Davis, 1971) relationship between achievement level and critical thinking ability. Students categorized as higher academic achievement levels, as defined by the MAP, exhibit higher critical thinking skills than those students categorized as lower achievement levels. This relationship is in agreement with previous studies that have linked measures of academic ability and critical thinking (Cano & Martinez, 1991, Ricketts & Rudd, 2005; Rollins, 1990).

A variety of definitions of critical thinking have been posed. While some call for harmony or unity in our approach to critical thinking, perhaps the partitioning of critical thinking as a construct is more appropriate. Contradictory findings related to critical thinking could be a result of many sub-constructs. The relationship between academic achievement and critical thinking may indicate that efforts to measure critical thinking may be really measuring academic achievement. As definitions are continually refined, our instruments of measurement must be refined as well.

Eighteen percent of the unique variance in critical thinking scores can be attributed to achievement level category. Similarly, Rollins (1990) found that 28% of variance in critical thinking, measured by the Cornell Critical Thinking Test, could be explained by score on the Iowa Test of Education Development (ITED) reading subtest. Both findings support the argument that academic performance is the best-known variable for explaining critical thinking.

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## **EXPERIENTIAL LEARNING IN SECONDARY AGRICULTURAL EDUCATION CLASSROOMS**

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### **Abstract**

*The purpose of this qualitative study was to examine the use of experiential learning in secondary agricultural education classrooms. Interviews were conducted with four agricultural education teachers to determine their knowledge and familiarity with experiential learning, use of The Kolb Model of Experiential Learning in their classrooms, and their self-perceived role when using experiential learning in an agricultural education classroom. Additionally, teacher-perceived benefits and challenges posed by the use of experiential learning in the agricultural education classroom were identified. The findings suggested that the teachers lacked formal prior knowledge about experiential learning. However, phases of experiential learning were implemented in agricultural education courses, but did not always follow the cyclical process illustrated in Kolb's model. Teachers perceived their role in the experiential learning process as a guide, or facilitator of learning. The teachers recognized multiple benefits of experiential learning including increased subject matter retention among students, active engagement, use of higher order thinking skills, and academic success. The challenges of experiential learning were class enrollment, time, supervision and management of student activities, modifications in teaching style, and maturity level of students.*

## **Introduction**

As agricultural education broadens its scope and mission, educators must recognize and employ successful and meaningful teaching and learning strategies within their classrooms. Research and empirical evidence identifies this transition into a new era and strongly supports the benefits of experiential learning in agricultural education (Cheek, Arrington, Carter, & Randell, 1990; Camp, Clarke, & Fallon, 2000). Zubrick (1990) states, "...it is not only logical but crucial that the profession rethink and renovate the concept of experiential education as practiced in agricultural education" (p.3).

"Agricultural education has always had a strong orientation toward learning by doing, or experiential learning" (Zilbert & Leske, 1989, p.1). The learning by doing theory emphasized in an agricultural education program offers students the opportunity to utilize principles learned in class and apply them in real life situations (Cheek et al., 1990). However, experiential education is not just simply learning by doing (Proudman, 1992). The experiential learning activities must be structured correctly in order to strengthen the link between cognitive learning and life skills (Wulff-Risner & Stewart, 1997).

The definition of experiential education is dependent upon each person and each situation. "Experiential education refers to learning activities that involve the learner directly in the phenomena being studied. The nature of the involvement is direct and purposeful, addressing a real world problem in a natural setting" (Zurbrick, 1990, p.3). Dewey (1938) believed that all true learning is based on experiences, and in order to continue learning, one must continually question and evaluate their own experiences. Experiential approaches are not a defined set of activities or restricted to specific goals. This freedom in learning allows for student exploration and the outcomes can be unpredictable and limitless. Experiential learning focuses on the application of classroom instruction, encourages students to be actively engaged in their own learning, and connects prior knowledge to new knowledge. The students must learn to use their minds and explore learning for themselves (Chapman, 1992).

The teacher is an essential element to successful experiential learning. Agriculture educators must assume new roles in the classroom and encourage student interaction with their environment to improve learning and comprehension. The application of classroom knowledge in the context of "real world" situations should be the focus for learning. Hands-on activities lead to a better understanding of subject concepts and provide concrete critical thinking and problem solving behaviors (Mabie & Baker, 1996). If the teacher carries out these roles properly, students will accomplish more than they ever could on their own.

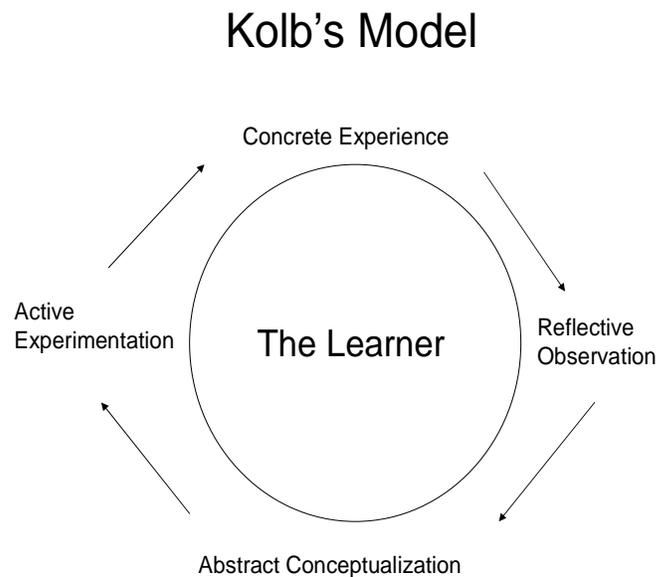
To what extent is learning by doing being used by high school agriscience teachers? This study used qualitative methods to gain an understanding of experiential learning in secondary agricultural education programs. The intent was to examine how experience is being created, utilized, and applied in various educational settings by secondary agricultural education teachers.

## **Theoretical Framework**

Theoretical models provide a guide for a better understanding of problems facing

educators. However, models must be current with reality and address the needs of students and teachers (Dyer & Osborne, 1996). The theoretical framework guiding this study is Kolb's Theory of Experiential Learning (1984). Kolb incorporated concepts from several philosophers who studied teaching and learning in education, including John Dewey, Kurt Lewin, and Jean Piaget, into his theory. He believed that experiential learning was a "holistic integrative perspective on learning that combines experience, perception, cognition, and behavior" and could be applied to any educational setting (p.21).

From the collaboration of the three theorist perspectives, Kolb developed four components of the experiential learning cycle: concrete experience, reflective observation, abstract conceptualization, and active experimentation (see Figure 1).



*Figure 1.* Kolb's Model of Experiential Learning

The concrete experience is described as a "here-and-now experience used to validate and test abstract concepts and provide a focal point for learning and a reference point for testing the implications and validity of ideas created during the learning process" (Kolb, 1984, p.21). Concrete experiences allow for personal application, understanding, and meaning of abstract principles. In this model, the classroom is not a teacher-centered environment; instead, it is primarily student-driven. The teacher is seen as an agent assisting students in educational experiences and making connections between prior knowledge and new learning. The reflective observation component encourages students to critically examine a concrete experience (Zilbert & Leske, 1989). This reflection period forces students to take responsibility for their own learning and engages the learner mentally and emotionally in the recent experience (Proudman, 1992). The use of abstract conceptualization allows students to make generalizations about principles related to the experience and strive for improvement. The final stage, active experimentation, requires the transfer and application of principles to a new situation. Students must be allowed the opportunity to apply the new knowledge and test for validity and usefulness.

In order for this model to be successfully implemented, teachers must adequately prepare students to use the required skills of observation, reflection, conceptualization, evaluation, and experimentation that enable them to learn most effectively from their experiences. In addition, teachers must understand that all experiences are not educational, only quality experiences. Therefore, it is the responsibility of the teacher to create meaningful, engaging, lasting, effective experiences for all students.

### **Purpose and Objectives**

The purpose of this investigation was to explore the use of experiential learning in agricultural education classrooms. The objectives of this study were to:

1. Determine agriculture teacher's knowledge and familiarity with experiential learning in a secondary agriculture classroom.
2. Describe how agriculture teachers use The Kolb Model of Experiential Learning in their classrooms.
3. Determine the self-perceived role of the teacher when using experiential learning in an agricultural education classroom.
4. Explain the teacher-perceived benefits and/or challenges posed by the use of experiential learning in the agricultural education classroom.

### **Methods and Procedures**

#### *Researcher Subjectivity*

A qualitative researcher is never separate from the study (Lincoln & Guba, 1985). Multiple influences that a researcher may impose on a study include personal background, experiences, and education. Therefore, it is only appropriate that the researcher explains personal perspectives that may influence the study and offer a context for readers. Interest in pursuing this particular topic resulted from former experiences as secondary agricultural education teachers. As the researchers reflected upon teaching methods employed in classroom settings, the application of experiential learning was a common process utilized to improve learning. Allowing students to gain experience through active learning was highlighted in all courses and student projects. However, there were many factors, such as time, money, and resources, which prohibited the application of all stages with each learning experience. Additionally, the terminology and stages associated with Kolb's theory were not always applied. For this study, the researchers were interested in the knowledge and application of experiential learning with current secondary agricultural education teachers. Additionally, the current study sought to examine the participants' perceptions regarding the use, benefits, challenges, and perceived role of experiential learning in agriculture classrooms.

#### *Methodology*

A qualitative approach was utilized to explore the use of experiential learning in agricultural education classrooms. Interviewing allowed the researchers to develop an understanding of the experiences of other people related to experiential learning (Seidman,

1998). This technique encouraged an in-depth exploration of participants' teaching techniques through the process of reflection.

The purposive sample for this study was comprised of four current agricultural education teachers in the state. The teachers were selected due to their level of teaching experience. Using electronic mail and the telephone, the teachers were contacted to solicit their cooperation and participation. Two novice (less than five years experience) and two experienced (over 20 years experience) teachers were chosen as participants for the study. Upon agreement to participate, interview times and locations were arranged with the selected teachers.

### **Method of Data Collection**

Semi-structured interviews were used to collect data for the study. The interview questions encouraged each teacher to describe their previous knowledge of experiential learning, discuss experiential application strategies, and explain the benefits and challenges of using experiential activities within the classroom. An interview guide provided structure to the interview process, but the researchers included probing questions for expansion and clarification of answers. A single interview lasting 20-25 minutes was conducted with each teacher. With the consent of the participants, each interview was audio-taped and transcribed at a later time. When completing the open coding process, a line-by-line method was used to identify common themes in the responses of the participants. To enhance the validity and trustworthiness of the study, analyst triangulation was used (Patton, 1990). This type of triangulation was achieved through the use of two interviewers and the comparative analysis of data among multiple individuals.

### **Results**

#### *Objective One*

Objective one sought to determine how knowledgeable and familiar agriculture teachers were with experiential learning. Three of the four participants acknowledged that they lacked prior formal knowledge about experiential learning. When asked about their background and familiarity with experiential learning, participant answers included "I don't really have any classes or background in that area", "Tell me what you're saying", and "I have an idea, but I don't know specifically what you are referring to." Only one participant had been exposed to experiential learning previously during his preservice teacher preparation program. However, a comprehensive understanding of the term experiential learning and its meaning were unclear to participants.

#### *Objective Two*

Objective two sought to describe how agriculture teachers use The Kolb Model of Experiential Learning in their classrooms. According to the participants, the phases of experiential learning are implemented in agricultural education courses, but do not always follow the cyclical process illustrated in Kolb's model. One participant stated, "It'll depend upon the topic as to what happens first.... It depends on the situation." The teachers described a variety of examples that allowed students to have concrete experiences in the classroom. The examples

included experiences ranging from artificial insemination to plant propagation. The model identifies the importance of participating in the concrete experience first to serve as a basis for observation and reflection (Kolb, 1984). However, the teachers agreed that the experience may or may not come first depending on the subject, activity, prior student knowledge, and safety concerns related to the experience. As one teacher stated, “normally you introduce the material first. Sometimes it is not always possible, but sometimes I can let them experience without really knowing.”

Some of the reflective strategies cited by the teachers included questioning, rubrics, open thinking, individual papers, and individual or group discussions. However, the teachers did not always incorporate a reflective component or did not approach the reflective observation in a direct, specifically stated manner. “Not all the time, it just depends on time” stated one teacher. Strategies employed in the classroom to promote abstract generalizations included peer and self improvement techniques, individual and group thinking, and the recall of prior experiences to solve problems. The use of active experimentation was dependent on time, cost, number of students, and perceived importance of subject matter.

### *Objective Three*

Objective three sought to determine the self-perceived role of the teacher when using experiential learning in an agricultural education classroom. Chapman (1992) stressed the importance of the teacher providing the minimum structure necessary to assist students in reaching a positive outcome. Additionally, the teacher should generate the concrete experience based on established objectives and assist students in creating linkages. The interview participants identified the role of the teacher as a guide or facilitator of learning, “you’ve got to provide all these things to them and help them out along the way. They are rarely going to make observations about themselves unless you flat out tell them to.” Teachers were also deemed responsible for creating the experiences, assisting throughout the process, guiding students through the proper steps in the experiential learning cycle, advising students, and ensuring a positive learning outcome. One teacher summarized, “Just simply structuring it so that the kids have a flow... you are working with them as an advisor basically and trying to help them have a positive outcome.”

### *Objective Four*

Objective four sought to explain the teacher-perceived benefits and/or challenges posed by the use of experiential learning in the agricultural education classroom. Hopkins (1994) stated that the use of experiential education replaces the rote memorization, abstraction, and isolation commonly found in classrooms with interest, connection, and purpose. Other benefits of experiential education include the development of listening, problem-solving, creative thinking skills, self-esteem, and self-motivation (Leske & Zilbert, 1989), the growth in interpersonal skills and character traits (Conrad & Hedin, 1986), and the opportunity for students to individually process subject matter (Chapman, McPhee, & Proudman, 1995). The teachers credited experiential learning with increased subject matter retention among students, active engagement, use of higher order thinking skills, and academic success. As explained by one teacher, “they can memorize something and tell you what you need to know for a test, but if they can’t actually

apply it then in six months they won't remember that information." In contrast, although teachers valued the use of experiential learning in the classroom, they identified multiple obstacles that prevented them from utilizing the model, "this is not as easy as just throwing it out and giving a test." Challenges recognized were class enrollment, time, supervision and management of student activities, modifications in teaching style, and maturity level of students. This different method of learning requires a new approach to teaching (Kolb, 1984). As stated by one teacher, "there is a big challenge to the teacher because you have to think outside the box....it is more free-flow and you don't have the structure to sit down and be quiet so there might be a lot of management difficulties." Another teacher alluded to additional challenges related to time and supervision,

If everyone is doing very similar things, it is not that big of a problem, but if some students are trying to do stem cuttings and someone else is trying to do air layering, those are two really different things and they have different time requirements and if half of the students are done with their project and the other half are working at a different pace, that can be difficult to manage.

### **Conclusions**

Experiential education is viewed as a process where the learner constructs knowledge, skills, and value from direct experience. This process is applicable to any agricultural program and allows for practical, guided experience to learn and test skills, supported by critique and reflection. One of the principles of experiential education is that students actively engage in their own education and "experiences are structured to require that learner to take initiatives, make decisions, and be accountable for the results" (Luckmann, 1996). Each participant agreed that this type of learning offers quality experiences, active engagement, reflective observations, and application useful for comprehensive understanding.

All participants engaged students in various experiential activities to maximize learning, yet lacked prior formal knowledge of Kolb's theory and terminology. Participants implemented the cyclical phases of Kolb's cycle in the classroom when possible, but did not always follow the recommended order. They believed the order of experiences was highly dependent upon subject matter, prior student knowledge, and safety concerns. Each commented on the benefits of increased subject matter retention, positive learning, active student engagement, and the use of higher order thinking skills common with experiential activities. However, challenges with using the process, such as planning, modifications to teaching style, and time, prohibited consistent use.

Participants stated that the teacher is an essential element in this process as a guide to learning that provides assistance and linkages to material. In order for successful, high quality experiential learning to occur within the classroom, the teacher must initially create the experience with thought, skill, and input from the group. This planning allows key points to be discovered, provides the minimum necessary structure for activities, assists students in making successful connections between the experience and the education, and establishes a goal to teach towards (Chapman, 1992). Each participant commented that experiential education requires teachers to change their way of thinking and allows students an opportunity for self discovery

learning. Teachers must create an emotionally safe environment, be actively involved in the learning process, and teach to all learning styles. Experiential learning is not easy to facilitate and challenges both students and teachers to reach out of their “comfort zone” and into a new experience (Proudman, 1992). Finally, participants believed that it is important for students to see the relationship between the material and the situation in relation to the original objectives in order to be successful.

### **Recommendations**

Research confirms that people do learn from their experiences (Cheek, et. al, 1990; Kolb, 1984; Dewey, 1938). Experience plays a central role in the learning process and educators should place more emphasis on this concept when developing curriculum. Experiential learning offers a critical link between the classroom and the real world. Active involvement with individual projects, group activities, and real life situations improves student motivation, behaviors, and understanding of abstract theories. Teachers should incorporate similar opportunities into their classes and encourage students to participate in these methods. These opportunities are positively correlated with student achievement scores, enhancing leadership development skills, and teaching personal responsibilities (Cheek, et al., 1990).

By employing new strategies and teaching applications, agricultural educators can continually enhance their programs and positively impact student learning and growth. During application, educators must permit meaningful experiences and progressive understanding using Kolb’s cycle to assist in the acquisition and assimilation of subject matter. Educators should implement various forms of experiential learning into their courses, such as internships, field placement, work/study assignments, and structured exercises, to increase student learning. This personal experience offers opportunities for meaningful interaction, teacher guidance, and individual responsibility for learning.

It is also important that the process and purpose of the learning activities consistently align the students’ knowledge and desired outcomes. Focus on student needs will improve interest, motivation, and retention of material. However, experiences are not always educative and must serve to promote future growth. Quality experiences must not only advance the learner’s mental growth, but also establish connections, be focused, and encourage future interactions with new experiences. The teacher must create and direct student experiences that promote enjoyment, engagement, and influence their behavior to seek out future experiences.

So, how do teachers implement a philosophy of experiential education? Teachers should connect material and integrate concepts for increased student retention and understanding. Therefore, much attention and forethought must be given to developing suitable conditions for learning experiences in order for them to be meaningful and lasting. Effective organization helps to distinguish an educational experience from a non-educative experience. If the experience is selected, organized, and arranged suitable to the students’ needs and directed towards an end purpose, then it can be classified as educational. Teachers must employ successful educational techniques that allow learners to interact, connect abstract ideas and concrete experience, observe consequences, and reflect on the results within the classroom environment. Teaching and learning theories must be connected to actual teaching experiences with adequate time for

student reflection and evaluation. Teacher preparation courses must emphasize the importance of using all components of experiential learning for positive student learning.

To gain the experience of using each component of Kolb's model, teachers must be provided with the opportunity to participate in experiential learning activities. Professional development workshops should utilize an experiential program design that offers personal experience. According to the National Research Council (2000), the most successful professional development activities engage teachers in the learning methods that they will incorporate into their classrooms. Therefore, teachers must be encouraged to practice using the experiential learning cycle and collectively discuss how it can be implemented in classroom settings. To encourage pre-service student understanding of Kolb's model for teaching purposes, there are several activities that could be included in teacher preparation programs. In the curriculum planning course, students should create lesson plans and units that utilize an experiential approach towards subject matter. In addition, students would be required to teach a lesson, identify the explicit use of the components of Kolb's model, and evaluate its effectiveness. For further reinforcement, focus on teaching and implementing each component of Kolb's model during field experiences should be required. In summary, teacher preparation programs and professional development workshops can reinforce the importance of experience in education through the continuous utilization and evaluation of experiential learning.

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# **FACTORS INFLUENCING PUBLIC SCHOOL ADMINISTRATORS' HIRING PRACTICES OF AGRICULTURAL EDUCATION TEACHERS**

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## **Abstract**

*Teacher recruitment in agricultural has been a constant cry for the past 30 years. Researcher rate the shortage of teachers in agriculture as a top problem facing the agricultural education profession. But does a shortage of agricultural education exist? Some suggest that that a shortage of "quality" teachers exists, not a shortage of qualified teachers. This study sought to answer those questions. Results of this study indicate that in this state, in this year, a shortage of qualified agricultural education teachers did not exist. Further, a shortage of "quality" teachers did not exist as administrators expressed satisfaction with the potential teachers they interviews. Administrators in this study placed enthusiasm for teaching and the use of community relations skills as the most important factors they look for when hiring an agricultural education teacher. This supports Cantrell's (2003) research which found that administrators sought candidates who could orally present their knowledge of agriculture in an enthusiastic manner and who could develop rapport with members of the community. Experience in production agriculture, college activities, and grade point average were placed at the bottom of a list of presented candidate qualities.*

## Introduction

Historically, most vocational educational teachers have been hired under a system of alternative certification or emergency provisions. In most cases vocational teachers have entered the teaching profession using criteria much different from other 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). But if only one of these were available, preference was given to employing vocational teachers who were deemed competent in their trade. In the early 1900s, the Federal Board of Vocational Education, led by Charles Prosser, advocated that if vocational teachers were required to meet the same certification requirements as common school teachers that the teacher's proficiency in their technical field would suffer. Further, it was the Board's opinion that: 1) colleges and universities were ill equipped to train vocational teachers, 2) professional teacher education was impractical for vocational teachers, and 3) practical experience in a trade should precede education in how to teach (Lynch, 1997). This made a different road map for vocational teachers as compared to general education teachers. The prevailing philosophy has been that teaching an experienced trades person to teach is much easier than teaching a prospective (or practicing) teacher a trade, or business. Consequently, many vocational and technical education teachers were employed because of their extensive experience in a craft or trade (Lynch, 1997).

Agriculture teachers (and home economics teachers) however completed certification requirements similar to other common school teachers. Boys were deemed to be qualified to teach vocational agriculture if they had lived and worked on their parents' farm and graduated from a vocational agriculture department in a county high school. Girls were deemed qualified to teach home economics if they had successfully completed a series of homemaking projects under the tutelage of her mother and her homemaking teacher. It was concluded that agriculture teachers and home economics teachers could be college trained, but only if they had previously completed high school programs and had practical experiences incorporated into their preparation as teachers. It was the technical content that was most important. Technical content that was best learned on the job, and not the ability to teach, was what teachers were hired upon (Lynch, 1997).

Teacher recruitment in Agricultural Education has been the focus for many years. Almost thirty years ago, Stewart and Shinn (1977) reported that a shortage of Agricultural Education Teachers was one of the five areas of greatest concern of teachers, supervisors and teacher educators. Twenty years later, in his study involving agricultural education leaders, Connors (1998) identified the recruitment and retention of secondary agriculture teachers as one of the two most critical issues facing the agricultural education profession.

Further evidence of teacher shortage is the hiring of agriculture teachers under emergency provisions or alternative certification. The hiring of uncertified agriculture teachers is often done under the assumptions of teacher shortage. School administrators, faced with otherwise not filling a teaching position, hire teachers under emergency and alternative certification programs (Roberts & Dyer, 2004), (Feistritz, 1999). In 2001, emergency certification was claimed for 242 agriculture teachers employed nationally (Camp, Broyles, & Skelton, 2002). The alternative teacher certification movement has risen out of a need for more teachers. Faced with the threat of

teacher shortages and concern about the quality of the teaching force, states have relaxed the requirements for certain teachers in order to meet the demand (Feistritz, 1999).

But does a shortage of agricultural education teachers actually exist? Camp, Broyles, and Skelton (2002), in a biennial report on the national supply and demand of agricultural education teachers, found that the number of newly prepared agricultural education teachers (n=857) actually exceeded the number of replacement teachers needed (n=798). The 2001 crop of newly minted teachers was at a 14 year high; 45.7% more teachers than were prepared in 1989. The surplus is further widened when former Agricultural Education Teachers and previous Agricultural Education graduates are brought into the mix. Camp, Broyles and Skelton confirm the arguments of Brown (1995) and Parmley, Bowen, and Warmbrod (as cited in Camp, Broyles, and Skelton 2002) who contend that the perceived teacher shortage in agricultural education is not a true shortage, but a shortage of teachers willing to accept a teaching position. Low teacher pay, inadequate benefits and a desire to return to school are the most important reasons teachers given by teachers leaving the profession (Luekens, Lyter & Fox, 2004). The shortage then is a shortage of potential teachers willing to take a teaching position in a specific location for specific salary.

In a study of administrators who hired first year Agricultural Education Teachers in Oklahoma, Cantrell (2003) found that administrators were most interested in a new teacher's academic achievement in college, knowledge of agriculture and knowledge of teaching. Administrators desired beginning teachers with experience in the FFA and supervision of student projects (SAE) but placed lower importance on experience in production agriculture. While administrators valued teachers who exhibited skill in integrating technology, serving a diverse student population and educating students with special needs, classroom management and building rapport within the community were rated higher.

Boulton (1979) studied administrators and the value that is placed on educational credentials when deciding on candidates to interview. Selected interviewees for teaching positions were chosen based on cooperating teacher recommendations, college supervisor recommendations and the candidate's subject area concentration. Jamison (1987) describes the job interview for teaching candidates as the most important screening device used in the hiring process. During the job interview, Seiferth (1979) found the personal impression job candidates leave on potential employers seemed to be the most influential consideration in the administrative hiring decision. The least important consideration was family ties in the community or school. Another relatively less important trait was a sizable number of personal and situational characteristics such as gender, minority group status, and marital status. The results support the findings of similar research studies done in the past (Seiferth, 1979). Mortaloni (1984) studied public school administrators regarding several areas associated with teacher preparation programs. 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 student teaching center, and the candidate's grade in student teaching.

### **Purpose and Objectives**

The purpose of this study is to examine the criteria used by administrators in Oklahoma

when hiring Agricultural Education teachers. The following research questions were developed for the study.

- 1) Does a shortage or surplus of secondary agricultural education teachers exist within the state?
- 2) Is there a shortage of quality among secondary agricultural education teaching candidates within the state?
- 3) What qualities are most important in selecting candidates for positions in teaching secondary agricultural education?
- 4) How satisfied are administrators with the applicant pool and those selected for interviews for open secondary agricultural education positions in the state.

### **Procedures**

A non-experimental, descriptive research design using quantitative methods was used in this study. A mailed questionnaire was used to obtain data and summary statistics were used to report on factors administrators' used in hiring agricultural education teachers. This research design is appropriate given no treatment or intervention is provided (Kerlinger, 1986). Using instruments developed by Lunger (2000), Rhodes (1993), Bolton (1973), and Jamison (1987), a questionnaire was developed which was designed to gather information on the importance administrators placed on teaching practice, teacher qualities, and teacher characteristics. Face validity was established by a panel of experts consisting of agricultural education and college of education faculty and professional staff of the department of career and technical education. The instrument was pilot tested using five administrators who had hired agricultural education teachers the previous year and who were not part of the study population. No major changes were made to the instrument as a result of the pilot. The questionnaire also included questions related to the number of applicants, interviews and the hiring process. Finally, demographic data was collected on the person most likely to influence the hiring decision.

In the summer of 2004 a list of all teaching position changes in the state obtained from the state department of career and technology education. The state department of career and technology education served as the official contact point where teaching positions were announced as open and announced as bring filled. By July 31<sup>st</sup>, 56 Agricultural Education had been hired for the 2004-05 school year. Schools were included if they hired an Agricultural Education Teacher between May 1<sup>st</sup> and July 31<sup>st</sup>. After July 31<sup>st</sup>, three schools hired teachers for the upcoming year, but these schools were not included in the population because many schools were about to be in session and the perceived applicant pool for those schools was very low. One school district hired two new teachers and was sent only one questionnaire, reducing the study population to 55 school districts. Program specialists with the State Department of Career and Technology supplied the names of the contact person at each school. This contact person was identified as the most appropriate person to receive the questionnaire.

### **Study Population**

Schools in the population were largely small, rural, schools with single teacher agricultural education departments. Table 1 shows the distribution of schools based on enrollment in grades 9-12. Over three-quarters of the schools in the study had less than 500 students enrolled in grades 9-12.

Table 1

*Enrollment in Grades 9-12 for Schools in Target Population*

Enrollment	<i>N</i>	%
< 100	17	30.9%
100 – 499	27	49.1%
500 – 999	5	9.1%
> 1000	6	10.9%
Total # of Schools	55	100.0%

Figure 1 displays information regarding the source of agricultural education teachers hired by schools in the study. Nearly half of the teachers hired were agricultural education teachers simply moving from one school to another. Recent graduates of teacher preparation programs represented the bulk of those hired who had no previous teaching experience

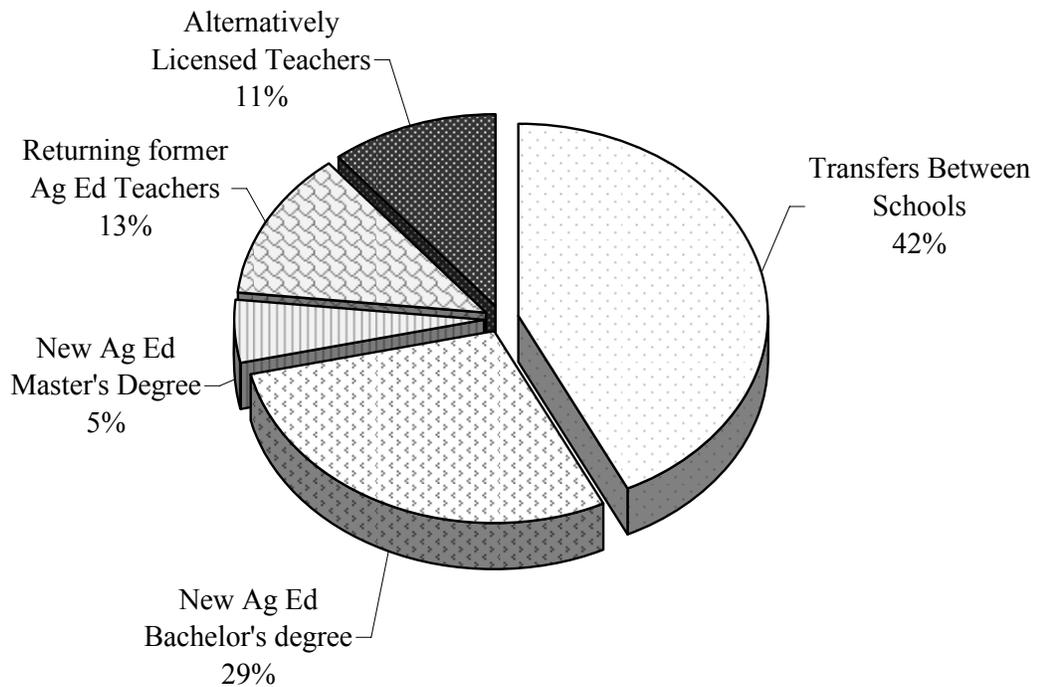


Figure 1. Sources of New Hires for Agricultural Education Positions

A four-page, booklet formatted questionnaire with cover letter and self-addressed return envelope was mailed to all subjects along with a cover letter and return envelope. A U.S. Postage stamp was affixed to each envelope giving the appearance of a personal letter. Three weeks later a second questionnaire was mailed to those who had not responded. Usable responses were received from 48 of the 54 administrators for an overall response rate of 89%. Non-response error was addressed by comparing non-respondents to respondents on school demographic data as suggested by Lindner, Murphy and Briers (2001). Non-respondents were found to be significantly different in terms of school enrollment therefore results of this study can only be generalized to the respondents and not the total population of administrators and schools.

### Findings

Table 2 shows a demographic profile of the respondents. In a cover letter attached to the questionnaire, the contact person is asked to forward the questionnaire to the person most responsible for the hiring decision if that person was not who was contacted. Therefore the individual completing the instrument may not have the same person who initially received the mailing.

Table 2

#### *Demographic Profile of Respondents*

Variable		<i>M</i> ( <i>n=48</i> )	<i>Range</i>
Age		48.23	30-62
Years in current position		7.06	1-29
Years at current school		4.85	1-20
Highest education of administrator	Masters	17	
	Master + 30	27	
	Doctorate	4	
Administrative title	Superintendent	34	
	Building Principal	14	

The school superintendent was identified in 34 of the 48 responses as the person who for all practical purposes made the recommendation to the school board on whom to hire for the open position. Fourteen respondents indicated that the building principal made that recommendation and two respondents indicated that the school board hired the agricultural education teacher. School superintendents and building principals were primarily involved in the interview process, with a school board member, the entire school board, and another teacher being involved in the interview process about one quarter of the time.

Table 3

*Personnel Involved in Interviewing Teacher Applicants*

Personnel	Interviews Candidates <i>n</i> =48		Recommends to school board <i>n</i> =48	
	<i>f</i>	%	<i>f</i>	%
School Superintendent	37	77%	34	71%
Building Principal	37	77%	14	29%
School Board Member	11	23%	0	-
School Board	10	21%	2	4%
Other Teacher(s)	11	23%	0	-
Parent(s)	5	10%	0	-
Community Member(s)	2	4%	0	-
Student(s)	1	2%	0	-

Respondents were asked to rate on a scale of 1 to 5, (1 being high and 5 being low), the importance of teaching practices, teacher qualities and teacher characteristics in hiring an agricultural education teacher. The scale found in Table 4 was developed to further interpret the scores.

Table 4

*Attitudinal Scale Developed for Teacher Practice, Qualities and Characteristics*

Mean Score <sup>a</sup>	Attitude
1.00 – 1.49	Very Important
1.50 – 2.49	Approaching Importance
2.50 – 3.51	Undetermined Importance
3.51 – 4.49	Approaching non-importance
4.50 – 5.00	Not Important

<sup>a</sup>1=Very Important, 5=Not Important

Eighteen questions were categorized into the three subgroups of teaching practice, teacher qualities, and teacher characteristics. The three subgroups were checked for internal consistency using Cronbach's alpha coefficient. Cronbach's alpha is appropriate for estimating

internal-consistency reliability within a scale (Isaac & Michael, 1995). Cronbach's alpha for each subgroup were: .70 for teaching practice, .77 for teacher qualities, and .78 for teacher characteristics.

Table 5

*Administrator's Opinion of the Importance of a Candidate's . . .*

1. Teaching practices	<i>M</i>	<i>SD</i>	
a. use community relations skills	1.21	0.46	Very Important
b. use classroom management skills	1.30	0.46	Very Important
c. use technology in the classroom	1.68	0.75	Approaching Importance
d. to educate a diverse student population	1.85	0.90	Approaching Importance
e. integrate other subjects into their teaching	1.98	0.70	Approaching Importance
f. work with students with special needs	2.11	0.93	Approaching Importance
Mean of means	1.68		Approaching Importance
2. Teaching quality indicators	<i>M</i>	<i>SD</i>	
a. experience w/ FFA programs & activities	1.35	0.52	Very Important
b. experience in showing livestock	1.74	0.79	Approaching Importance
c. experience in production agriculture	1.87	0.80	Approaching Importance
d. experience in college activities	2.44	0.68	Approaching Importance
e. agriculture grade point average	2.50	0.80	Undetermined Importance
f. overall grade point average	2.83	0.66	Undetermined Importance
Mean of means	2.12		Approaching Importance
3. Teacher characteristics	<i>M</i>	<i>SD</i>	
a. enthusiasm for teaching	1.13	0.39	Very Important
b. verbal communication skills	1.26	0.48	Very Important
c. expression of maturity	1.32	0.51	Very Important
d. neat and well groomed appearance	1.40	0.53	Very Important
e. appearance of self-confidence	1.43	0.76	Very Important
f. knowledge of teaching methodology	1.70	0.71	Approaching Importance
Mean of means	1.37		Very Important

The number of applications received per teaching position averaged almost 19 and ranged from a low of five to a high of 39. Nearly five candidates were interviewed for each open

position. Twenty four schools reported receiving applications from a least one candidate who was seeking alternative certification.

Table 6

*Number of Applicants, Candidates and Interviewees for Agricultural Education positions*

	<i>M</i>	<i>Range</i>
Number of applications for each position	19.19	5 - 39
Number of applicants with teaching experience	7.56	0 – 20
Number of alternatively certified applicants	1.61	0 – 5
Number of applicants interviewed	4.96	2 - 12
Number of applicants who brought a portfolio to the interview	1.68	0 - 6

Respondents were asked to rate their personal satisfaction with the quality of the applications they received and the quality of those candidates they interviewed. Table 5 shows that respondents were more impressed with the quality of those interviewed than they were with the applicant pool.

Table 7

*Administrator Evaluation of the Quality of Applicants and Interviewees*

Administrator Assessment	Satisfaction	
	<i>M</i>	<i>SD</i>
Quality of Applicants	1.93	.88
Quality of Interviewees	1.58	.73

*Note.* 1=very satisfied – 5 = very dissatisfied

## Conclusions

Based on the objectives of the study, the following answers are offered to imbedded questions.

Research Question One: Is there a teacher shortage in secondary agricultural education? Findings from this study support research Camp’s assertion that the shortage is regional in nature and that teacher education institutions are preparing a surplus of teaching candidates. School administrators in the study population looking to hire an agricultural education teacher in the summer of 2004 enjoyed a large pool of applicants. The researcher cautions readers though, that no effort was made to describe the applicants who may (and probably did) make application for a

number of positions. The fact nevertheless remains that administrators had an ample supply of applicants from which to choose.

Research Question Two: Is there a shortage of quality secondary agricultural education teachers? Findings from this study indicate that administrators are generally well satisfied with the applicant pool that applied from the open position in their school. Additionally administrators were even more impressed with the pool of candidates they chose to interview for the position.

Research Question Three: What qualities are most important in selecting teacher candidates? Administrators in this study placed enthusiasm for teaching and the use of community relations skills as the most important factors they look for when hiring an agricultural education teacher. This supports Cantrell's (2003) research which found that administrators sought candidates who could orally present their knowledge of agriculture in an enthusiastic manner and who could develop rapport with members of the community. Experience in production agriculture, college activities, and grade point average were placed at the bottom of a list of presented candidate qualities.

Research Question Four: How satisfied are administrators with the applicant pool and those selected for interviews? Administrators in this state are satisfied with the quality and quantity of the applications they are receiving for open positions in agricultural education. Administrators' satisfaction with the performance of interviewees is even greater than that of the applicant pool.

### **Discussion/Implications**

This study raises important questions in the agricultural education teaching profession. It contradicts the long standing view of many in the agricultural education profession who claim that there is a perpetual shortage of agricultural education teachers nationwide. This study also contradicts an even more popular view; that we have a shortage of quality pre-service agricultural education teachers. School administrators were pleased with the quality of applicants they received and even more pleased with the quality of those they interviewed for agricultural education positions. Recruitment of students into teacher education programs in agricultural education has been a constant cry for the last 30+ years. And while this research was conducted in the summer of one employment year, in one state it is event from this study that in that state, in that year, a shortage of agricultural education teachers in terms of quality and in terms of real candidates did not exist.

While we know the size of the administrator's candidate pool, we know very little about the job search from the teacher's perspective. Additional research is needed to determine the how aggressive pre-service teachers have been in the job hunt, and determine their willingness to relocate. It is important that this research study be repeated when feasible and practical in subsequent years in other states. Only when the agricultural education profession is willing to look at the supply and demand of agricultural education teachers in a fresh light will we be able to answer the teacher shortage question.

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## FEMALE AGRICULTURAL EDUCATORS IN GEORGIA

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### Abstract

*Nationally, there is a gap between the number (43%) of newly qualified and potential agricultural education teachers that are female and the number (22%) of female agriculture teachers (Camp, Broyles, & Skelton, 2002). This non-experimental and descriptive survey was designed to determine the demographics of female agricultural educators in Georgia (N=70), and to determine their self-perceptions regarding acceptance by others in the profession in an effort to close the aforementioned gap. The average female agricultural educator in Georgia was 32 years old, had never married or was married with one child, had a Masters degree and six years of teaching experience, had previous experience with either the FFA or 4-H in high school, had previous experience in some agricultural industry area, spent an average of 43 hours a week completing her professional duties with an additional 23 hours dedicated to personal and family obligations. Additionally, she contacts her female mentor (another agricultural educator) on a daily or weekly basis through e-mail. Georgia female agricultural educators were rather indifferent about their gender as a barrier. In fact, females in this study were satisfied with their careers and felt accepted by students, administrators, parents of students, and the community. Recommendations include using the results of this study to recruit female teachers into the profession, more effective use of volunteers and resources (Foster, 2003), and a more formal system of mentoring for female agricultural educators (Foster, 2001).*

## **Introduction and Theoretical Framework**

Agriculture education programs were originally designed for males and have been traditionally male dominated since their creation, forming an “attitudinal bias” against women in the profession (Foster, 2001, p. 384). When the National FFA Organization was established in 1928, it was a social outlet and club for male students enrolled in Vocational Agriculture classes. It was not until well after the Civil Rights movement that women were allowed membership. With the admission of women into the program in 1969, Vocational Agriculture changed dramatically. As female enrollment increased, many male teachers seemed uncomfortable in dealing with the new dynamic of females in the program (Foster, 2001). The need for female agriculture educators surfaced and was soon to be reinforced by developing issues such as socio-economic changes, legislation, and court decisions mandating nondiscriminatory practices in education. As a result, women began to consider educational occupations that had traditionally been male intensive (Ries, 1980). Agricultural education, a traditionally male occupation, became a viable career option for women (Cano, 1990).

Even though agricultural education was now a viable career option for women, these women found difficulty in breaking down gender barriers, dispelling myths about their abilities, and establishing their worth. Agriculture is perceived by the general public to be a male career choice even though the influence of women is far-reaching (Webb & Iverson, 1994). When women began being accepted into agriculture education, there was still the unfounded bias that women were only suited to teach horticulture classes, because employers and other agriculture educators rationalized that women could not physically handle other agricultural areas, that others would not accept women within other areas, that marriage would end women’s professional careers, and that women would be a distraction for men within the workplace (Whent, 1994). Foster reported that at the end of each school year when contracts were brought before her local Board of Education, a school board member approached her annually to say, “You’ve done an outstanding job this year. Both my children love your classes and I believe they have learned a great deal. However, I want you to know that I voted against re-hiring you because I believe a woman’s place is in the home” (Foster & Conrad, 1998, p. 19). In times like these a female mentor is helpful. According to Whittington (1988) failure to provide necessary support (like a mentor) can cause women to leave non-traditional professions like agriculture teaching. Mentorship level (Burlew, 2005) or the quality of mentorship is associated job satisfaction (Chao, Walz, & Gardner, 1992).

However, a review of the literature and a review of many states’ teacher directories may suggest that a woman’s place is in the agricultural education classroom. Gregg, Hampton, and Juergenson (1975) concluded “women do not have any more problems in the classroom than men and that contrary to common belief, women are accepted in the community, even though in most areas, agriculture teaching is still considered to be a man’s profession” (p. 272). Cano (1990) reported that male teachers perceived female teachers as competent to teach agricultural subject matter. Fortunately, as perceptions of female agricultural educators change, more women are seeking to enter the profession.

The number of female agriculture teachers has risen in recent years (Knight, 1987; Camp, 1998, Camp, et al., 2002), and extrapolation of Camp’s, et al. 2002 data reveals that 43 percent

of the newly qualified potential teachers that graduated in 2001 were female. According to The United States Department of Labor's (2005) statistics, females make up 46.48 percent of the total United States workforce, meaning that the percentage of trained agriculture teachers that are female almost equals the percentage of females that are represented in the workforce in America. These numbers are encouraging, but there seems to be more to the story.

In summarizing Foster's (2003) report of national datum, Knight (1987) found approximately five percent of secondary agriculture teachers to be female, and Camp et al. (1998, 2002) found the number to be 15.8 percent and 22 percent, respectively. Although the numbers of female agriculture teachers are rising, and the number of newly trained and potential female agriculture teachers is noteworthy, only 22 percent of secondary agriculture teachers are female. One-fifth is not equality. What is happening to females that at one point decided they wanted a career in agricultural education?

The need for female agricultural educators is great since 38% of the National FFA Organization's membership is female. In fact, those females hold greater than 50% of state leadership positions across the country (National FFA, 2005). Today's agricultural education professionals are teaching, training, developing, and working with female and male students (Sibiga & Mannebach, 1997) on an almost equal basis.

Educational and hiring institutes are continuing to open their doors to female educators, but are not retaining as many women as men within the field. An Iowa State University study (Carter, 1992), reported that from 1980 to 1985 fewer females than males took initial jobs related to their majors and more females started at lower salaries. In addition, females were not as satisfied with their current positions and felt uncomfortable or hindered in the workplace because of their gender, supervisors' demands for overtime, and child care issues (Carter, 1992). Whent surmised that there are subtle and blatant embedded biases that limit the acceptance of women within agriculture education programs and that most agriculture educators are unaware of these biases (Whent, 1994).

Foster, Pikkert and Husmann (1991) studied self-perception of gender bias among women agriculture educators, and concluded that female agriculture teachers were satisfied in their current positions. However, Foster, et al. also determined gender bias was viewed as a deterrent to women entering the agricultural education profession. In fact, significant factors that have been found to contribute to the occupational success or failure of a female include: the pressure or support received from co-workers, family members, and friends, and level of perceived discrimination and sexual harassment (Cano, 1990). Cano reported findings from Kane (1978) and Knight, Henderson, and Ries (1980), which suggested that the major concern shared by women who teach agricultural education, was acceptance by their co-workers, namely male agricultural educators. Despite these problems, Foster's (2001) national study indicated that the vast majority of women loved their work.

The theoretical framework for this study is based on Bandura's (1977) Self-efficacy Theory. According to Bandura, self-efficacy expectations refer to a person's beliefs concerning his or her ability to successfully perform a given task or behavior such as teaching agriculture. Low self-efficacy expectations of a behavior lead to less frequency of performing the behavior

and sometimes avoidance of the behavior. Furthermore, Bandura articulated four sources of information through which expectations can be learned and/or modified. These sources of information include experience (i.e. as with others in the agricultural education profession), modeling (i.e. as from a mentor), verbal persuasion (i.e. as from community leaders), and physiological provocation. Betz and Hackett (1981) extended Bandura's theory into career-related behaviors, specifically to help clarify the continued under representation of women in historically male subjugated careers, like agricultural education. In an effort to contribute to growth of female agriculture teachers in Georgia and to thwart the attrition of these educators through recruitment and counseling, this study was conducted to determine the demographics and self-perceptions of female agricultural educators in Georgia.

### **Purpose and Objectives**

The primary purpose of this study was to identify current female agricultural education teachers in Georgia and to develop a demographic profile for those women. Additionally, this study sought to describe the perceived self-perceptions of female agricultural educators in Georgia. Specific objectives for the study were as follows:

1. Describe female Agricultural Educators in Georgia according to selected personal qualities/characteristics.
2. Describe the mentors of these female Agricultural Educators and the level of support received from other women in the field as perceived by the respondents.
3. Describe female agricultural teachers' self-perceptions regarding acceptance by others in the profession.

### **Methods and Procedures**

#### *Participants and Instrumentation*

The population of this study was all female agricultural educators (N = 70) in Georgia. Fifty-nine participants responded to request for participation from the researchers, yielding an 84.29% response rate. The instrument was adapted from and similar to Foster's 2001 and 2003 national surveys, which described female agricultural educators in the profession. Educational experts of both sexes and multiple academic disciplines reviewed the instrument for content and face validity. As with the Foster studies, reliability was not calculated, because "...asking about many personal attributes and behaviors produces very little measurement error" (Salant & Dillman, 1994, p.87).

#### *Design and Procedures*

Survey research was implemented for this non-experimental and descriptive study. Specific demographic variables of interests were female teachers' years experience, educational level, time expenditures in the classroom, time expenditures on the job not in the classroom, time

expenditures with family, previous industry experience, subject matter taught, age, marital status, and number of children. Two additional variables, teachers' self-efficacy and teachers' level of mentor support were also evaluated.

The survey was administered and data was collected at local agriculture teachers meetings hosted by the State Department of Education. The Statistical Package for the Social Sciences (SSPS 10.1) was used to analyze the data. Means and standard deviations were computed on all questions requiring an agreement rating response.

## **Findings**

### **Objective one: Demographic Profile**

Twenty one percent of Georgia teachers are female. Of the 84% that responded to this the survey, 43% were married and 44% have never been married. Among the respondents, 5% were divorced, 8% were divorced and remarried, and 34% had children. Ages ranged from 23 to 51 with an average age of 32.45 years. Forty percent of respondents had taught 1-5 years, 15% had taught 6-10 years, 10% had taught 11-15 years, 7.5% had taught 16-20 years, and 7.5% had taught over 20 years.

Fifty-one percent of respondents had agricultural education courses in high school and were former members of The National FFA Organization. Sixty-six percent of the respondents conveyed previous experience in some area of the agricultural industry. Thirty-six percent of the women held Bachelors degrees, 44% held Masters degrees, 17% held Specialist degrees, and 3% held Doctoral degrees.

Respondents reported a variety of subjects taught. Topics most frequently taught by women were FFA/Leadership/SAE (75%), Greenhouse Production (69%), and Landscape Design (69%). Topics least likely taught by women were Aquaculture (15%) and Agricultural Business/Marketing (16%). Table 1 details the courses taught by female Georgia agricultural educators.

In addition to time in the classroom (22.5 to 30 hours per week), female agricultural education teachers spend an average of 21 hours per week on related activities. Participants reported weekly averages of seven hours preparing for class, seven hours on FFA activities, five hours on SAE visits, two hours in committee meetings, and 11 hours on other work-related activities. With all activities combined, these women of agricultural education in Georgia obligated 43 hours per week to their career. Respondents spent 23 hours per week on personal/family-related activities, an average of six hours for house/yard work, ten hours for family obligations, two hours for healthcare, three hours for religious activities, and two hours for activities for their own children's education.

Table 1  
Subject matter taught by respondents ( $\mu = 59$ )

<u>Subject</u>	<i>n</i>	%
FFA/Leadership/SAE	44	74.58
Greenhouse Production	41	69.49
Landscape Design	41	69.49
Floral Design	36	61.01
Plant Science	36	61.01
Animal Science	30	50.85
Forestry	25	42.37
Natural Resources	23	38.98
Agricultural Mechanics	20	33.90
Soil Science	18	30.51
Companion Animals	15	25.42
Nursery Production	12	20.34
Food Science	11	18.64
Other	11	18.64
Agricultural Business/Marketing	9	15.25
Aquaculture	8	13.56

#### Objective two: Mentors and Support Systems

Most (85%) female agricultural educators reported some type of regular contact with other female teachers in the profession. When asked about the gender of their mentors, 23% of participants reported having a male mentor, 47% had female mentors, and 30% had mentors of both genders.

Forty-three percent of respondents reported their mentors to be other high school agricultural educators. Twenty-two percent of the respondents reported that teachers of other subjects were their mentors. Other reported mentors included female agriculture educators' friends (10%), parents or relatives (9%), spouses (5%), former agriculture educators (4%), and college professors or advisors (4%).

Only 25% of the respondents had contact with their mentors on a daily basis. Another 26% reported weekly contact, while 16% made monthly contact, 20% made quarterly contact, and 1% only made contact on a yearly basis. The female agriculture educators rated e-mail as their main form of contact with their mentor or support system. Respondents also felt that phone

calls, professional meetings, and in-person contacts were important methods of contacting their mentor.

### Objective three: Self-perceptions of acceptance

In this study, female agriculture educators in Georgia were asked to rate statements that offered insight into self-perceptions regarding acceptance by others in the profession. Teachers were asked to rate items using a five-item summated rating scale ranging from strongly disagree to strongly agree. Item means are reported in descending order in Table 2.

Table 2  
Self-perceptions of acceptance in the profession ( $\mu = 59$ )

Perceptions	M	SD
I feel accepted by my students.	4.56	0.53
I feel accepted by my administrators.	4.24	0.86
I feel accepted by parents of my students.	4.24	0.80
I feel accepted by my community.	4.17	0.77
I am challenged with balancing my family and career.	4.17	0.99
I feel satisfied in my profession.	4.12	0.81
I feel accepted by my male peers.	3.76	1.01
I feel I have to prove that I am adequate to be an agriculture teacher.	3.47	1.13
I have experienced some career barriers due to my gender as a female.	3.14	1.14
I have experienced barriers or challenges as a teacher due to my gender.	3.10	1.12
I feel that male teachers view me as inadequate in my career.	2.48	1.14

*Note.* 1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree.

### Conclusions

According to the respondents of this study, the profile of the female agricultural educator in Georgia is a 32 year old who was either never married or is married with one child, holds a Masters degree, has six years of experience, had experience with either the FFA or 4-H in high school, and had previous experience in some area within the agricultural industry. This woman spends an average of 43 hours completing her professional duties weekly with an additional 23 hours involved in personal and family obligations. She contacts her female mentor, who is probably another agriculture educator, on a daily or weekly basis through e-mail. Additionally, Georgia females in this study most preferred teaching about the FFA, leadership development, and SAE, followed by instruction in greenhouse management and landscape design.

Comparatively, Foster's (2001) national study described the typical female agricultural educator as a 33 year old who was married with children, held a bachelors degree with hopes to pursue a higher level of education, had ten years or less experience, had experience with agricultural education and FFA in high school, and had some previous experience in the agriculture industry. Foster's (2001) national profile of the female agricultural education teacher also described a woman who spent an average of 51.8 hours at her professional occupation each

week and an additional 17 hours meeting family obligations. Foster's typical female had contact with other women in the field once a month, usually by telephone, but also at professional meetings. Her mentor was male and was probably her high school agricultural education teacher (Foster, 2001).

The third objective sought to determine the self-perceptions of female Georgia agricultural educators regarding acceptance by others in the profession. The findings of this study differ from the findings of previous studies (Foster et al., 1991; Kane, 1978; Knight et al., 1980) suggesting that gender bias could be a definite deterrent to women entering the profession. Georgia female agricultural educators were rather indifferent about their gender as a barrier. In fact, females in this study were satisfied with their careers and felt accepted by students, administrators, parents of students, and the community. According to Bandura's (1977) a behavior may be influenced by perceived self-efficacy, so if teaching is a behavior that can persist or cease, the findings of this study indicate that female agriculture teachers should be successful.

### **Recommendations**

As in many states and across the country (Camp, et al., 2002), there is a significant teacher shortage in Georgia. The findings of this study should be published and presented as a recruitment tool for programs of agricultural education. Female students looking for a career need to be made aware of the fact that females in agriculture education are a relatively young group of professionals who value and complete advanced degrees, who work approximately 43 hours per week, who have the option to teach a wide variety of topics, and who have a relatively low divorce rate compared to the national average.

Forty-three hours a week is not that excessive, but the additional 23 hours per week for personal and family responsibilities may begin to wear on female agriculture educators. The authors of this study would like to join Rosencrans and Seevers (2001) and Foster (2003) in recommending that female (and male) agricultural educators identify and use volunteers and community resources more effectively. This could help working agricultural women to achieve more balance in their lives.

This study did not answer any questions pertaining to why the percentage of female agriculture teachers is lower compared to the percentage of newly qualified potential female agriculture teachers. To assist with this problem, state agricultural education leaders should endorse the use of a formal mentoring system that pairs experienced women in the field with beginning teachers (Foster, 2001). Additionally, future research should attempt to experimentally determine the cause of the discrepancy between the number female agriculture teachers and the number of newly qualified potential female agriculture teachers.

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**PERCEIVED DIFFERENCES, BY GENDER,  
IN STUDENT TEACHER - COOPERATING TEACHER INTERACTIONS**

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**Abstract**

*The interaction cooperating teachers have with student teachers is important. The purpose of the study was to describe the differences in the psychosocial support cooperating teachers provided student teachers and the satisfaction of the student teacher-cooperating teacher interaction by gender as reported by both student teachers and cooperating teachers for the University of Missouri and the University of Illinois. Findings suggest a difference between male and female student teachers for two of the five psychosocial functions provided, and a difference between male and female cooperating teachers for one of the five psychosocial functions. Although there is a difference in interaction satisfaction between male and female student teachers, a difference was not found between male and female cooperating teachers. The implications for this study suggest that teacher educators monitor student teacher-cooperating teacher interactions for gender differences, and perhaps intervene to secure a successful relationship.*

## Introduction

There is some body of research that has identified variables leading to success in student teaching (Darling-Hammond & Hammerness, 2005). One element is the length of student teaching experience. Research suggests that lengthening experiences, in concert with adding graduated responsibilities to the student teacher, can improve that student teacher's teaching and self-confidence. In addition, having student teaching experiences clearly linked with coursework also influences a student teacher's teaching and self-confidence. Yet another indicator is a stronger clinical experience and more teacher education coursework can improve the achievement of student teachers' students. Finally, the support the student teacher receives is also important to that student teacher's success. Different individuals can provide support such as university supervisors, informal mentors and cooperating teachers as a formal mentor.

Kitchel and Torres (2005; 2006) synthesized that the cooperating teacher is the most important aspect to student teaching in agricultural education. This is supported by research in the field (Deeds, Flowers, & Arrington, 1991; Edwards & Briers, 2001; Garton & Cano, 1996; Harlin, Edwards, & Briers, 2002; Norris, Larke, & Briers, 1990; Schumacher & Johnson, 1990). In reviewing a study by Harlin, Edwards, and Briers (2002), student teachers rated the cooperating teacher-student teacher relationship as the most important element when compared to the other elements of student teaching. This ranking was consistent before and after student teaching.

In piecing together potential variables of interest into one theoretical framework, the use of Dunkin and Biddle's model has been used (Kitchel and Torres, 2006). Two sets of variables exist in this model: *presage* and *context*. The variables affect pupil behavior. Presage variables, such as experiences, personal traits and teacher training, are variables that influence the behavior of the teacher. Context variables, such as experiences, properties or traits, and school and community contexts, are variables that influence the behavior of the student. As the presage and context variables interact in the classroom, process variables such as teacher and student behaviors, develop. As a result of the interaction and process variable development, product variables result. These product variables can be either immediate or long-term for the student. Immediate results include attitude toward subject and growth of other skills; long-term results include adult personality and professional or occupational skills.

Kitchel and Torres (2006) proposed that the Dunkin and Biddle model can be applied to the context of student teaching whereas a student teacher assumes the role of *pupil* and cooperating teacher assumes the role of *teacher* because of the cooperating teacher's supervision role with the student teacher. For student teaching, the *classroom* is the cooperating center, of which the interaction between the pupil (student teacher) and teacher (cooperating teacher) results in immediate and long-term product variables for the pupil. Therefore, because of the change in venue can occur, from university classroom to a cooperating site, the classroom is changed to *learning environment*. Within the learning environment, there is an expected interaction between the teacher (cooperating teacher) and pupil (student teacher). Figure 1 illustrates the model as used for student teachers and cooperating teachers.

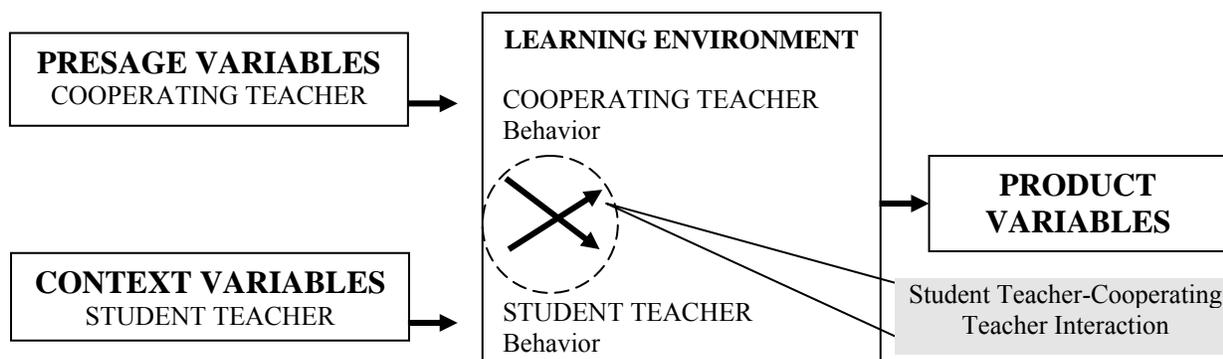


Figure 1. Components and variables of interest in the current study  
*Gender as a Presage and Context Variable*

A characteristic both student teachers and cooperating teachers hold is gender. In general, there are gender differences. At its core, the feminists theory purports *gender equality* (Chafetz, 2004). The bottom line is that males enjoy greater access to resources than females. This inequality is “produced socioculturally and is not immutable” (p. 966). In dealing with such an important issue set within a social (and arguably cultural) context such as the student teacher-cooperating interaction, ignoring gender differences would be an oversight.

How differences in gender manifest in education is still a topic of investigation. One difference in gender among teachers exists in the field of study a teacher might select. “Female teachers are more likely to teach at the elementary level than are males. The reverse was true at the high school level” (Zumwalt & Craig, 2005, p. 123). Gender results for middle schools were found to fall in line with those of high schools. More female teachers were found in the areas of kindergarten, special education, bilingual education, ESL and secondary high school English teachers. Perhaps there are intrinsic reasons why males gravitate toward secondary and females toward elementary levels. In agricultural education, then, we would expect more male than female teachers.

Differences in gender also exist in the area of teacher movement. Zumwalt and Craig (2005) report that younger women have a higher probability of leaving the profession than younger men. This could be explained by women who chose to have children and stay at home, but does it explain all cases. The opposite holds true for older women and older men, in that, older men are more likely to leave the profession than older women. What kind of gender phenomenon is influencing these behaviors in teachers?

There have been several studies on gender in the context of agricultural education (e. g. Baker & Bagget, 1995; Cano & Miller, 1992; Dillingham, Ramirez, & Amsden, 1993; Foster, 2001; Hoover & Yoder, 1994; Johnson, Wardlow, & Franklin, 1998; Thorp, Cummins, & Townsend, 1998). In one study, Cano and Miller (1992) investigated in-service agriculture teachers from Ohio. They found male teachers to be significantly older and to have more experience. In addition, it was found that there was no significant difference in job satisfaction

by gender. Does this have anything to do with the younger, less experienced female group? Related, Fritz and Miller (2003) studied concerns expressed by student teachers from Iowa State University. Student teachers concerns were investigated by gender. The teacher concern areas identified in the study included self-adequacy, teaching tasks and teaching impact. The findings indicated a negligible association between gender and aforementioned teaching concerns. Even though concerns may be similar, how do these concerns influence behavior?

Baker and Bagget (1995) found gender differences when they investigated female agricultural education graduates in Pennsylvania. In looking at raw data from the study, in 1980 there were 23 female agriculture teachers and 341 male agriculture teachers. The proportion was somewhat closer in 1992, but there was still a distinct difference. In 1992, there were 29 female agriculture teachers and 249 male agriculture teachers. From other findings, the researchers concluded that “career guidance is [sic] lacking for women in agricultural education” (p. 515). If this disproportionate trend is widespread and there are concerns about career guidance for female agriculture teachers in general, then questions should be raised as to the mentoring experience female student teachers are receiving. Burris, Kitchel, Greiman and Torres (2006) noted that mentoring research indicates that gender could be an influence in the mentoring relationship. How could this gender influence affect how a mentor interacts with a protégé or mentee?

### *Interaction Defined*

Kitchel and Torres (2006) utilized Kram’s (1985) Mentor Role Theory to describe the interaction between student teachers and cooperating teachers. Hall (1986, p. 161) described “relationships between junior and senior colleagues that contribute to career development” as mentoring relationships. A transfer takes places as the student teacher becomes the junior and the cooperating teacher becomes the senior colleague. According to Hall (1986), these psychosocial functions “enhance a sense of competence, clarity of identity, and effectiveness in a professional role” (p. 162).

There were five *functions* or aspects of psychosocial assistance identified from Kram’s (1985) work. The *Role Modeling* function is “demonstrating valued behaviors, attitudes and/or skills that aid the junior in achieving competence, confidence, and a clear professional identity” (Hall, 1986, p. 162). The *Counseling* function is when a mentor is “providing a helpful and confidential forum for exploring personal and professional dilemmas” (p. 162). When a mentor provides “mutual caring and intimacy that extends beyond the requirements of daily work tasks” and is “sharing experiences outside the immediate work setting,” then he/she is providing the *Friendship* function (p. 162). In providing support related to the *Acceptance* function, a mentor is “providing ongoing support, respect, and admiration, which strengthens self-confidence and self-image” (p. 162). Greiman (2002, p. 22) identified the *Social* function as one that includes “social interaction and informal exchanges about work and outside work experiences.”

Kitchel and Torres (2006) concluded that both student teachers and cooperating teachers perceived that cooperating teachers were providing psychosocial function, but not all at the same rate. The researchers studied this interaction in light of the presage and context variable of personality type. For the most part, there were relatively little to no relationships between personality type and the extent psychosocial functions were being provided. In addition to

psychosocial function support as a means of explaining student teacher-cooperating teacher interaction, Kitchel and Torres (2005) defined the interaction by the amount of satisfaction that occurred within the interaction. Interaction satisfaction was used a dependent variable with personality type. Personality type was not identified as being influential to satisfaction; however, perceived overall similarity was found to be related to satisfaction of the interaction. Perhaps these teachers feel this way because the gender piece assisted in making these pairs feel similar and/or satisfied.

There have been several questions raised in terms of student teacher and cooperating teacher interaction and the gender influence. There are gender differences, but to what degree and how those differences manifest is uncertain. Given the importance of cooperating teachers and their role in student teaching, the interaction the pair has becomes an important aspect to research. The Harvard Business School (2004) reports that women must work “harder and smarter in establishing good mentoring relationships” (p. 119). Therefore, does gender play a role in student teacher-cooperating teacher interactions?

## Methods

The purpose of this relational study was to describe the differences in the psychosocial support cooperating teachers provided student teachers and the satisfaction of the student teacher-cooperating teacher interaction by gender as reported by both student teachers and cooperating teachers from the University of Missouri and the University of Illinois. The following objectives were developed to meet the study’s purpose:

1. Describe characteristics (gender, number of students at cooperating school ag program, age and years of teaching by cooperating teacher) of the student teachers and cooperating teachers.
2. Describe the differences in the psychosocial support cooperating teachers provided student teachers by gender.
3. Describe the differences in the satisfaction of the student teacher-cooperating teacher pair by gender.

Based upon the objective, the following null hypotheses were created for this study:

- H<sub>01</sub>: There are no differences in the amount of psychosocial support student teachers perceive they receive from cooperating teachers by gender.
- H<sub>02</sub>: There are no differences in the amount of psychosocial support cooperating teachers perceive they are giving students teachers by gender.
- H<sub>03</sub>: There are no differences in satisfaction mean scores by gender, as reported by student teachers.
- H<sub>04</sub>: There are no differences in satisfaction mean scores by gender, as reported by cooperating teachers.

### *Population and Sample*

The target population for this study was agricultural education student teachers and their

cooperating teachers from the University of Missouri and the University of Illinois. Oliver and Hinkle (1982) argue that students of a given year could be representative of other enrollment classes. The type of sample ( $n = 60$ ) was a time and place sample of the population for the 2003-2004 academic year, thus yielding 16 pairs of teachers from the one university and 12 pairs from the other university, with inferential statistics being applied to student teaching classes from the University of Missouri and University of Illinois over time. It should be noted that there were two cases where more than one cooperating teacher was identified for one student teacher.

### *Data Collection and Analysis*

Data were collected utilizing the Mentor Relationship Questionnaire (MRQ), as developed by Grieman, 2002 and modified by Kitchel and Torres (2005; 2006). The questionnaire was created utilizing Kram (1985) as a framework. The first part of the instrument addressed psychosocial assistance. There were 15 items constructed to assess the psychosocial functions that the cooperating teacher was providing the student teacher. The student teacher version measured the extent the cooperating teacher provided and the cooperating teacher version measured the extent the cooperating teacher thought he or she provided the psychosocial functions to his or her student teacher. A 7-point, Likert-type scale was utilized, with a scale of: 1 = not at all, 3 = some extent, 5 = large extent, and 7 = very large extent.

There were five items in another part of the MRQ that assessed overall satisfaction of the student teacher-cooperating teacher interaction. For both versions, both the student teachers and cooperating teachers rated these areas from their respective perceptions. Responses were based upon a 7-point, Likert-type scale where 1 = strongly disagree, 3 = disagree, 5 = agree, and 7 = strongly agree. The last part of the questionnaire consisted of demographic information. For the cooperating teacher version, cooperating teachers were asked their age, gender, and years taught. For the student teacher version, student teachers were asked to identify their age and gender.

There were two types of validation on the MRQ. A panel of experts ( $n = 8$ ) reviewed the MRQ for face and content validity. A pilot test was conducted for both instruments with second and third year teachers not in the study to establish reliability. Cronbach's alpha was calculated as reliability estimates on several parts of the instrument, including the part regarding psychosocial functions. These alphas ranged from .93 to .99, between both versions, which was well in the parameters established by Nunally (1967).

For student teachers, the instrument was delivered during student teaching seminars at the end of student teaching. The instrument was administered by university faculty. For cooperating teachers, the MRQ was mailed at the end of student teaching to the cooperating teachers using modifications of Dillman's (2000) Total Design Method. E-mail pre-notices and reminders were sent in place of post cards, because both institutions utilized e-mail to correspond with cooperating teachers. In addition, cooperating teachers were administered a separate instrument (not a part of this study) at the beginning of student teaching with notification that the MRQ was forthcoming at the end of student teaching.

Using data from mailed questionnaires can introduce concerns. This is an issue of non-response. In handling non-response issues, the first strategy Miller and Smith (1983) introduced

was to get back as many responses as possible. Because this strategy was used with personalized initial delivery and continuous personal contacts, non-response was not an issue for this study. For student teachers, 100% response rate was achieved and for cooperating teachers, a 96.6% return rate was achieved. Two student teachers did not have a single cooperating teacher that could be identified from having been placed in a multiple teacher program; therefore, data were collected from both cooperating teachers and student teachers were given two separate MRQ's for each cooperating teacher.

Data were analyzed using SPSS version 12 for Windows platform computers. In determining the appropriate analysis of the data, the primary guidance was scales of measurement. To analyze objective one, mean scores and standard deviations were calculated for interval and ordinal data; percentages and frequencies were calculated for nominal data. To analyze objective two, mean scores and standard deviations were calculated for each of the five psychosocial functions separately by gender and reported separately for student teachers and cooperating teachers. To calculate statistical significance between genders on psychosocial assistance scores, independent samples *t*-tests were calculated with a *p*-value of .05 set *a priori*. Similarly, for objective three, mean scores and standard deviations were calculated for interaction satisfaction, separately by gender and reported separately for student teachers and cooperating teachers. In addition, to calculate statistical significance between genders on psychosocial assistance scores, independent samples *t*-tests were calculated with a *p*-value of .05 set *a priori*.

## Findings

Objective one sought to describe characteristics of the student teachers and cooperating teachers. Table 1 summarizes the findings. There were more female student teachers (61%) than male student teachers (39%). For cooperating teachers, the results were the opposite with more male cooperating teachers (72%) than female cooperating teachers (28%). There were, on average, 178.38 agriculture students per school (*SD* = 144.89). The mean age of student teachers was 22.15 years (*SD* = .95) and the mean age of cooperating teachers was 36.79 years (*SD* = 6.37). Cooperating teachers taught, on average, 13.97 years (*SD* = 6.64).

Student teachers were asked to what extent they felt their cooperating teacher provided psychosocial support. For male student teachers, the mean Acceptance (*M* = 6.56), Counseling (*M* = 6.39), Friendship (*M* = 6.44), Role Model (*M* = 5.06), and Social (*M* = 5.22) function mean scores fell in the real limits of large extent. For female student teachers, the mean Acceptance (*M* = 5.68), Counseling (*M* = 5.40), Friendship (*M* = 5.21) and Role Model (*M* = 5.04) function mean scores fell in the real limits of large extent. The Social (*M* = 3.63) function mean score fell in the real limit of some extent (Table 2).

Cooperating teachers were asked to what extent they felt they provided psychosocial support to their student teacher. For male cooperating teachers, the mean Acceptance (*M* = 6.44), Counseling (*M* = 6.02), Friendship (*M* = 6.00), and Role Model (*M* = 5.73) function mean scores fell in the real limits of large extent. The Social (*M* = 3.87) function mean score fell in the real limit of some extent. For female cooperating teachers, the mean Acceptance (*M* = 5.29), Counseling (*M* = 6.21), Friendship (*M* = 6.13) and Role Model (*M* = 5.46) function mean scores

fell in the real limits of large extent. The Social ( $M = 3.00$ ) function mean score fell in the real limit of some extent (Table 3).

As reported by student teachers, the largest difference between males and females was found with the Social function, with a difference of 1.59. The second largest difference between the genders, which was 1.23, was found with the Friendship function, followed by the Role Model function with a difference of 1.02, then the Counseling function with a difference of .99, followed by the Acceptance function with a difference of .88. All differences indicated higher mean scores for males than females in all functions. In addition, except for the Social function, scores were in more of agreement, as indicated by standard deviations, for males. For the functions Acceptance ( $SD_{\text{female}} = 1.65$ ;  $SD_{\text{male}} = .69$ ), Counseling ( $SD_{\text{female}} = 1.63$ ;  $SD_{\text{male}} = .63$ ) and Friendship ( $SD_{\text{female}} = 2.02$ ;  $SD_{\text{male}} = .62$ ), standard deviation scores were more than double for females than males (Table 2).

Table 1  
*Demographic Characteristics of Student Teachers (n = 28) and Cooperating Teachers (n = 29)*

Characteristic	Mean	S.D.	Frequency	Percent
Student Teacher Gender				
Male			11	39.29
Female			17	60.71
Cooperating Teacher Gender				
Male			21	72.41
Female			8	27.59
Number of Students in Cooperating School's Agriculture Program	178.38	144.89		
Age of Student Teacher	22.15	.95		
Age of Cooperating Teacher	36.76	6.37		
Years Cooperating Teacher Taught	13.97	6.64		

Table 2  
*Extent Cooperating Teacher Provided Psychosocial Functions as Reported by Student Teachers*

Function	Both (n = 31)		Male (n = 12)		Female (n = 19)		Difference ( $M_m - M_f$ )
	Mean	S.D.	Mean	S.D.	Mean	S.D.	
Acceptance	6.02	1.41	6.56	.69	5.68	1.65	.88
Counseling	5.78	1.41	6.39	.63	5.40	1.63	.99
Friendship	5.69	1.72	6.44	.62	5.21	2.02	1.23
Role Model	5.43	1.64	6.06	1.05	5.04	1.84	1.02
Social	4.25	2.30	5.22	2.21	3.63	2.02	1.59

Note. Scale is 1 = not at all, 3 = some extent, 5 = large extent, and 7 = very large extent

Table 3

*Extent Cooperating Teacher Provided Psychosocial Functions as Reported by Cooperating Teachers*

Function	Both ( <i>n</i> = 29)		Male ( <i>n</i> = 21)		Female ( <i>n</i> = 8)		Difference ( <i>M<sub>m</sub></i> - <i>M<sub>f</sub></i> )
	Mean	<i>S.D.</i>	Mean	<i>S.D.</i>	Mean	<i>S.D.</i>	
Acceptance	6.13	.92	6.44	.73	5.29	.88	1.15
Counseling	6.07	.46	6.02	.44	6.21	.50	-.19
Friendship	6.03	.61	6.00	.63	6.13	.59	-.13
Role Model	5.66	.77	5.73	.84	5.46	.53	.27
Social	3.63	1.78	3.87	1.84	3.00	1.55	.87

*Note.* Scale is 1 = not at all, 3 = some extent, 5 = large extent, and 7 = very large extent

Table 4

*Independent T-test Results Comparing Males to Females for Each of the Psychosocial Functions as Reported by Student Teachers and Cooperating Teachers*

Function	Student Teachers ( <i>n</i> = 31)		Cooperating Teachers ( <i>n</i> = 29)	
	<i>t</i>	<i>df</i>	<i>t</i>	<i>df</i>
Acceptance <sup>a</sup>	2.04	26.02	3.59 *	27.00
Counseling <sup>a</sup>	2.37 *	25.28	-1.01	27.00
Friendship <sup>a</sup>	2.49 *	23.02	-.48	27.00
Role Model <sup>a,b</sup>	1.96	28.82	1.06	20.18
Social	1.96	29.00	1.19	27.00

\*  $p < .05$ ; <sup>a</sup> Equal variance not assumed for student teachers; <sup>b</sup> Equal variance not assumed for cooperating teachers

As reported by cooperating teachers (Table 3), the largest difference between males and females was found with the Acceptance function, with a difference of 1.15. The second largest difference between the genders, which was .87, was found with the Social function, followed by the Role Model function with a difference of .27, then the Counseling function with a difference of .19, followed by the Friendship function with a difference of .13. Males' mean scores for the Acceptance, Role Model and Social functions, were higher than females.

*T*-tests were calculated between males and females for both groups of teachers by each psychosocial function (Table 4). For student teachers, statistically significant differences were found between males and females for the functions Counseling and Friendship. For cooperating teachers, only one function, Acceptance, indicated statically significant differences. Therefore, for Counseling and Friendship, null hypothesis one that states there are no differences in the amount of psychosocial support student teachers perceive they receive from cooperating teachers by gender was rejected. For the functions Acceptance, Role Model and Social, the researchers failed to reject null hypothesis one which states there are no differences in the amount of psychosocial support student teachers perceive they receive from cooperating teachers by gender. For null hypothesis two, which states there are no differences in the amount of psychosocial support cooperating teachers perceive they are giving students teachers by gender, the hypothesis was rejected for the Acceptance function, but the researchers failed to reject the null hypothesis for the remaining functions.

The third objective was to describe the differences in the satisfaction of the student teacher-cooperating teacher pair by gender. Each of the satisfaction mean scores and standard deviations has been reported by function and differentiated by gender. Independent *t*-values were also calculated to determine if statistically significant differences existed between genders. Table 5 summarizes the mean score results; Table 6 summarizes for *t*-test findings.

Table 5

*Amount of Satisfaction of the Student Teacher-Cooperating Teacher Interaction by Gender, as Perceived by Student Teachers and Cooperating Teachers*

Perceived By	Both		Male		Female		Difference ( $M_m - M_f$ )
	Mean	<i>S.D.</i>	Mean	<i>S.D.</i>	Mean	<i>S.D.</i>	
Cooperating Teacher	6.32	1.28	6.52	1.18	5.78	1.43	.74
Student Teacher	5.94	1.73	6.90	.29	5.33	1.98	1.57

*Note.* Scale is 1= Strongly Disagree, 3 = Disagree; 5 = Agree; 7 = Strongly Agree

Table 6

*Independent T-test Results Comparing Males to Females on Satisfaction of Interaction as Reported by Student Teachers and Cooperating Teachers*

Function	Student Teachers ( <i>n</i> = 31)		Cooperating Teachers ( <i>n</i> = 29)	
	<i>t</i>	<i>df</i>	<i>t</i>	<i>df</i>
Satisfaction <sup>a</sup>	3.41 *	19.20	1.44	27.00

\**p* < .05; <sup>a</sup> Equal variance not assumed for student teachers

For student teachers, the perceived satisfaction on interaction mean score reported by male student teachers of was 6.90 (*SD* = .29), placing it in the real limits of Strongly Agree. The perceived satisfaction mean score reported by female student teachers was 5.33 (*SD* = 1.98), placing it in the real limits of Agree. The difference in mean scores, by gender, was 1.57. It should be noted that the difference in standard deviations between males and females on Satisfaction was 1.69 (Table 5). For cooperating teachers, the perceived satisfaction mean score reported by males was 6.52 (*SD* = 1.18), placing it in the real limits of Strongly Agree. The mean score reported by females was 5.78 (*SD* = 1.43), placing it in the real limits of Agree. The difference in mean scores, by gender, was .74 (Table 5).

Table 6 includes the independent samples *t*-test findings for student teachers and cooperating teachers. The *p*-value was less than .05 for student teachers whereas the *p*-value was greater than .05 for cooperating teachers. Therefore, null hypothesis three, which states there are no differences in satisfaction mean scores by gender, as reported by student teachers, the hypothesis is rejected. For null hypothesis four, which states there are no differences in satisfaction mean scores by gender, as reported by cooperating teachers, the researchers failed to reject the null hypothesis.

### Conclusions, Implications and Recommendations

According to student teachers, there are no statistically significant differences between

the extent male and female student teachers are receiving psychosocial assistance from their cooperating teaching for the functions Acceptance, Role Model and Social. There are statistically significant differences for the functions Counseling and Friendship. Burris et al. (2006) noted that gender influences mentoring; the findings of the current study shed light as to where the differences exist and do not exist.

Why is there a disparity among the functions? This has implications for female student teachers, as they do not feel they are getting the same friendship and counseling support from the cooperating teachers as male student teachers do. A question this study cannot answer is how these differences are affecting female student teachers. It is recommended that cooperating teachers be aware of the amount of Counseling and Friendship offered to the student teachers and perhaps how they are being perceived. In addition, teacher educators may need to intervene to ensure that female student teachers are receiving the proper amount of Counseling and Friendship functions. Interventions may include assigning outside mentoring or establishing assignments that build on the cooperating teacher providing the Counseling and Friendship functions more.

In additions, for the functions Acceptance, Counseling and Friendship, female student teachers were less agreeable across scores than males; standard deviations for female student teachers were more than double than males for these functions. This implies that there is a disparity in thought among the females as some felt their cooperating teacher provided much more of a certain function than others. Teacher educators should investigate this phenomenon to replicate the aspects that make these perceptions scores high and eliminate aspects that make these low scores so low.

According to cooperating teachers, there are no statistically significant differences between male and female cooperating teachers in terms of the extent student teachers are receiving psychosocial assistance for the functions Counseling, Friendship, Role Model and Social. There are statistically significant differences for the functions Acceptance. Why do female cooperating teachers believe they are doing a poorer job of helping their student teachers acclimate to the profession?

The implications of this conclusion are that females cooperating teachers may either be doing a poorer job of profession acclimation, or that they have a different or higher standard for the Acceptance function than their male counterparts. It is recommended that interviews be conducted with student and cooperating teachers to discover a more in-depth rationale for these differences. It is also recommended that teacher educators monitor the amount of Acceptance function cooperating teachers are providing, as interventions may need to occur to either increase the amount of Acceptance a cooperating teacher is providing a student teacher or use interventions to alleviate potential stress that a female cooperating teacher is experiencing due to their lower perception of providing the Acceptance function.

In terms of satisfaction on the student teacher-cooperating teacher interaction, there were statistically significant differences in satisfaction between male and female student teachers, but not cooperating teachers. Again, this study cannot uncover the reason behind the differences. Does this affect the amount of female teachers we have in our profession? Could this be a piece

to the findings of Baker and Baggett (1995)? Perhaps many dissatisfied female student teachers end their educational career because they are receiving a poorer experience (or at the least they perceive they do). It is recommended to investigate, via interviews, potential interaction dissatisfiers to aid teacher educators in increasing the satisfaction.

Yet another area for further research, in regard to research objectives two and three, it is suggested to investigate the male-female relationships further. The findings of this study only investigate male and female differences from a rudimentary level. Each pair should be identified as being a female-female, female-male, male-female, and male-male to see if gender arrangement has an influence on psychosocial assistance and interaction satisfaction.

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# **GRADUATE FELLOWS IN THE CLASSROOM: MIDDLE SCHOOL STUDENTS' SCIENCE, TECHNOLOGY, ENGINEERING, OR MATHEMATICS BELIEFS AND INTERESTS**

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## **Abstract**

The purpose of this research was to determine if the interaction of a NSF Graduate Fellow in the classroom affected middle school students' science, technology, engineering, or mathematics (STEM) beliefs or interests. The study utilized a pre-test/post-test design and data were collected from a local voluntary population ( $N = 1145$ ). The survey instrument consisted of Likert scaled questions and open-ended responses. STEM belief and interest scales were summated to determine an overall belief and/or interest for each subject. Descriptive statistics and multivariate analysis were performed on the summated scales. Overall, middle school students' STEM beliefs and interests were less positive on the post-test than on the pre-test, the notable exception being interests in technology which increased. Multivariate analysis indicated that NSF Fellow and grade level, not teacher, affected the rate at which students' STEM beliefs and interests changed. This study indicated that NSF Fellows affected the rate at which middle school students' STEM beliefs and interests changed, but did not indicate if that influence was positive or negative when accounting for grade level.

## Introduction

Many are concerned about the public's decreasing science literacy and the decreasing number of students entering science careers, especially the agricultural sciences such as agronomy and crop science (McCallister, Lee, & Mason, 2005; Munn, Skinner, Conn, Horsma, & Gregory, 1999). Research indicates students' attitudes toward science become increasingly negative at higher grade levels and scientific content and its real-world applications also become increasingly disconnected (Morell & Ledermann, 1998; Weinburgh, 2003). Negative attitudes toward science are further reinforced by a stereotypical image (a lonely profession of white male scientists in lab coats with facial hair and glasses working in chemistry labs) held by the general public and many public school science teachers (Finson, 2002). Finson stated "that the extent to which an individual's perceptions are stereotypical has direct consequences on that individual's likelihood of selecting science coursework and entering a science-related field" (p. 343). This notion may be true especially for females and minorities educated in classrooms by teachers who subconsciously hold stereotypical images of scientists, and who transfer this image to their students either consciously or unconsciously (Finson).

The National Center for Education Statistics (NCES) reported that 39% of eighth graders in the United States scored below the basic level in science, while only 32% scored at or above the proficient level (NCES, 2002). State and national expectations of student achievement have risen to counter this disparity, increasing the burden on school districts. National Council of Teachers of Mathematics (NCTM) sought new, improved methods to reform education that create meaningful, context-rich learning environments for students, and effectively increase student achievement in a teacher-friendly manner (Harris, Marcus, McLaren, & Fey, 2001).

A reform effort, which research showed was successful in changing college and high school students' stereotypical images of scientists, centers on educator/scientist collaborations. Such collaborations between scientists and educators have demonstrated positive results, increasing students' positive attitudes toward science, teacher content knowledge, and use of inquiry learning (Caton, Brewer, & Brown, 2000; Davis et al., 2003; Evans, Abrams, Rock, & Spencer, 2001; Finson, 2002; Munn et al., 1999; Tanner, Chatman, & Allen, 2003; Weinburgh, 2003;). Scientists who collaborated with educators in the classroom had opportunities to share their excitement and enthusiasm for their field with students, potentially improving the scientific content in students' science education. Research also indicates that scientists' involvement in the classroom may have the added benefit of increasing inquiry learning and student scientific literacy levels (Caton et al., 2000; Munn et al., 1999).

Scientists, by demonstrating they do not have to fit the preconceived stereotype, have the potential to serve as positive role models for students, especially for female and minority students (Finson, 2002). Studies have indicated that as a result of students' interaction with scientists, students learned that scientists were "real" people who enjoyed their work and were not the solitary, lonely people so often portrayed as the stereotypical scientist. Other potential benefits of scientists actively participating in the classroom are increased opportunities for students to learn about the wide range of opportunities available in the sciences and increased opportunities for in-depth inquiry activities that connect science with real-world applications (Caton et al., 2000; Munn et al., 1999; Tanner et al., 2003; Weinburgh, 2003). Caton et al. found

that “partnerships between teachers, scientists, and university science educators have the potential to improve significantly the content and effectiveness of science education” (p. 14). Wildman & Torres’ (2001) also found that agricultural professionals and personal role-models positively influenced students’ decisions to pursue agricultural careers. This finding indicates that collaboration between agricultural professionals and classroom educators has the potential to reverse current negative trends and increase student enrollment in the agricultural sciences.

### *Program Goals*

Funded by a three year grant from the National Science Foundation, Texas A&M University developed the Partnership for Environmental Education and Rural Health (PEER) GK-12 project. This GK-12 project (currently completing its first year) utilizes an interdisciplinary partnership between differing colleges in the Texas A&M University system. Graduate and undergraduate fellows from various disciplines, public junior high school math and science teachers, and junior high school students within a 40 mile radius of College Station, Texas participate in the project. The goal of this collaboration is to enhance the quality of middle school student educational experiences using inquiry learning and improve middle school student’s attitudes toward the STEM (Science, Technology, Engineering, and Mathematics) areas. The PEER GK-12 project has a long-term goal of developing a rural middle school model that will integrate current research and education, be transportable, relevant, engage students, provide under-represented, geographically isolated students enriching educational opportunities, and improve the interest, knowledge, and understanding of students in STEM areas (PEER, 2004).

### **Purpose and Objectives**

The purpose of this research was to determine if NSF Graduate Fellows’ (NSF Fellows) classroom interactions affected rural middle school students’ beliefs or interests in STEM subjects. The objectives to fulfill this purpose were:

1. Determine rural middle school students’ pre- and post-test beliefs about STEM.
2. Determine rural middle school students’ pre- and post-test interests about STEM.
3. Examine the interaction effects of NSF Fellows’ on students’ STEM beliefs and interests.
4. Test multiple interaction effects (NSF Fellows, teacher status, and grade level) on students’ STEM beliefs and interests.

### **Methodology**

This paper was part of a larger study, the GK-12 PEER project at Texas A&M University. This study focused solely on middle school students’ interests and beliefs about STEM subjects. The study utilized a pretest/posttest design and a voluntary sample. Middle school program and teacher drop-out resulted in pre-test data being collected from 12 lead teachers and 12 other teachers representing 10 schools in a 40-mile radius of the university; a total of 2,184 students responded to this study. Invalid surveys decreased the number of usable

responses; only those students who completed both the pre- and post-tests were included in the data analyses ( $N = 1145$ ).

Pre and post tests contained Likert-type scale questions and open-ended responses. Reverse coding of some statements was used to reduce biasing effect (Tuckman, 1999). The Likert scales measured students' agreement levels (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree) with 12 statements pertaining to beliefs about STEM, and eight statements pertaining to interests in STEM. Statements were drawn from surveys originally developed for use in the National Science Foundation's *Mississippi Information Technology Workforce* project. Versions of these statements have been pilot tested with audiences similar to the population in this study (Lindner et al., 2004; Swortzel, Jackson, Taylor, & Deeds, 2003).

Sample statements for students' beliefs about science included: *I enjoy science class*; *Science is difficult for me*; *Scientists help make our lives better*; and *Being a scientist would be a lonely job*. Samples of the eight statements pertaining to interests in STEM included: *I like to use computers to learn about science*; *Science class activities are boring*; *The things we study in science are not useful to me in daily living*; *I don't usually try my best in science class*.

STEM belief and interest scales were summated to determine an overall belief and/or interest for each STEM area. Cronbach's alpha coefficient was used to determine summated scale reliabilities for both the pre- and post-surveys. Reliability coefficients for the pre-test were: Beliefs scale (.79) and Interests scale (.40). Reliability coefficients for the post-test were: Beliefs scale (.83) and Interests scale (.65).

The pre-test Interest scale reliability coefficient was below the acceptable range according to Tuckman (1999), who stated "Observational reliabilities should be at .75 or above...and .50 or above for attitude tests" (p. 445). However, it was included in the analysis because the post-test reliability coefficient met the acceptability criterion.

Twelve NSF Fellows were assigned to a "lead teacher" in middle school math and science classrooms in nine local schools. NSF Fellows in this project served as resource and content specialists. The Fellows provided content-rich, in-depth, and inquiry-based learning activities for students that lead teachers may not otherwise have had the knowledge, time, or resources to conduct. In the classroom, NSF Fellows were to serve as role models, correct student misconceptions about scientists and science, increase student awareness of the importance of science and scientific methods in everyday life, and help students develop positive attitudes toward math and science. NSF Fellows also were to help teachers develop an appreciation for teaching by inquiry methods, and increase teachers' abilities and comfort levels with inquiry teaching methods.

NSF Fellows were expected to spend approximately 10 hours/week interacting with middle school students in the classroom, four hours/week preparing materials and developing inquiry-based activities, and one hour/week attending weekly meetings to discuss program insights and problems. NSF Fellows were expected to serve as a resource to other teachers in the

schools, and by the last 12 weeks of the school-year, spend approximately 60% of their time in their lead teachers' classrooms and 40% interacting with students in other teachers' classrooms.

Rural middle school students' beliefs about STEM subjects were collected at the beginning of the school-year. Participating middle school teachers administered the pre-tests prior to the NSF Fellows' classroom involvement.

Descriptive statistics were used to describe middle school students' STEM beliefs and interests before and after NSF Fellow classroom interactions. Multivariate analyses were performed on the data to determine the interaction effect (if any) of the NSF Fellows' and/or teachers' effects on students' STEM beliefs and interests. There were no engineering classes at the middle school level; therefore no results were reported for engineering.

## Results

Data were analyzed from 1,145 matched pre- and post-tests. Of the respondents, 45.2% ( $n = 517$ ) were male, 48.9% ( $n = 560$ ) were female, and 5.7% ( $n = 65$ ) did not declare their gender. Four hundred and seventy one students (41.1%) were in the 6<sup>th</sup> grade, 25.6% ( $n = 290$ ) were in the 7<sup>th</sup> grade, and 32.8% ( $n = 371$ ) were in the 8<sup>th</sup> grade. There were 844 students (73.7%) in science classes, 19.1% ( $n = 219$ ) in mathematics classes, and 7.2% ( $n = 82$ ) in technology classes. Sixty-two percent of the total population was Caucasian, 19% was Hispanic, 16% was African American, 2% was Native American, and 2% was Asian. Lead teachers' classrooms accounted for 727 students (63.5%) and 418 students were in other teachers' classrooms (Table 1).

Table 1

*Demographics for (N = 1145)*

Variables		<i>f</i>	Percent
Grade	6th	471	41.1
	7th	290	25.3
	8th	371	32.4
	Missing	13	1.1
Gender	Male	517	45.2
	Female	560	48.9
	Undeclared	65	5.7
	Missing	3	.3
Subject	Science	844	73.7
	Math	219	19.1
	Technology	82	7.2
Teacher	Lead	727	63.5
	Other	418	36.5

### Objective 1

In order to determine specific areas where students indicated pre/post-test changes, descriptive statistics were applied to the individual pre and post-test results. The majority of middle school students' STEM beliefs were less positive on the post-test than were on the pre-test. Students' science post-test beliefs were more positive about scientists making their lives better ( $M = 4.26$ ) and getting to do experiments in class ( $M = 4.32$ ). Students' beliefs remained constant in wishing to take more science classes ( $M = 2.91$ ), and technology classes ( $M = 3.16$ ). All other beliefs were less positive on the post-test than were on the pre-test (Table 2).

Table 2

#### *Descriptive Statistics for Middle School Students' STEM Beliefs (N = 1145)*

STEM Beliefs Statements	Science <sup>a</sup> (n = 838)		Technology <sup>a</sup> (n = 82)		Math <sup>a</sup> (n = 219)	
	Pre	Post	Pre	Post	Pre	Post
I enjoy _____ class.	3.84	3.74	4.06	4.01	3.73	3.51
I think I could be a good _____.	2.67	2.63	3.16	2.95	2.93	2.57
I like to find answers to questions by doing experiments.	3.77	3.69	4.10	4.06	3.58	3.54
I get to do experiments in my _____ class.	4.19	4.32	4.05	4.01	3.00	3.73
Being a _____ would be exciting.	3.27	3.17	3.50	3.28	2.94	2.69
_____ is difficult for me.*	3.43	3.43	3.50	3.51	3.21	3.20
I like to use the _____ book to learn _____.	2.63	2.32	3.04	2.61	2.53	2.87
_____ is useful in everyday life.	3.96	3.89	3.98	4.36	4.33	4.20
Studying hard in _____ is not cool.*	3.48	3.43	3.86	3.95	3.55	3.49
_____s help make our lives better.	4.20	4.26	4.16	4.35	3.89	3.76
Being a _____ would be a lonely job.*	3.43	3.41	3.68	3.77	3.36	3.41
I want to take more _____ classes.	2.91	2.91	3.16	3.16	2.86	2.68

Note. <sup>a</sup>Means for pre- and post-Fellow experiences. Likert-type scale: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree.

\* Indicates items that have been reverse coded.

Students' STEM beliefs improved most in Technology. Post-test results improved, in that students held more positive beliefs about the usefulness of technology in everyday life ( $M = 4.36$ ), and technology making their lives better ( $M = 4.35$ ) (Table 2). For all other statements, students' beliefs were less positive at the end of the school-year. Students were more positive in their beliefs about using the math book to study math ( $M = 2.87$ ) and getting to do experiments in math class ( $M = 3.73$ ) on the post-test. Students post-test beliefs were less negative in that mathematicians have lonely jobs ( $M = 3.41$ ), and were more negative in their beliefs for all other statements. There were no engineering classes at the middle school level; therefore there are no results to report for engineering (Table 2).

### Objective 2

In order to determine changes in students' STEM interests, descriptive statistics were

applied to the individual pre and post-test results. Students' science interests were more positive toward working in small groups on the post-test ( $M = 3.89$ ), and were less positive for all other statements on the post-test (Table 3).

Table 3

*Descriptive Statistics for Middle School Students' STEM Interests (N = 1145)*

STEM Interest Statements	Science <sup>a</sup> (n = 838)		Technology <sup>a</sup> (n = 82)		Math <sup>a</sup> (n = 219)	
	Pre	Post	Pre	Post	Pre	Post
I think _____ is important only at school.*	3.89	3.85	3.84	4.24	3.98	4.08
I like to use computers to learn about _____.	3.94	3.75	3.67	4.18	3.78	3.87
_____ tests make me nervous.*	2.82	2.77	3.02	3.21	2.86	2.76
I like to use _____ equipment to study _____.	4.31	4.04	3.94	4.19	3.79	3.60
I don't usually try my best in _____ class.*	4.03	3.89	4.38	4.13	4.08	3.79
The things we study in _____ are not useful to me in daily living.*	3.79	3.71	4.06	4.26	4.04	4.04
I like to work in a small group in _____ class.	3.66	3.89	3.61	3.61	3.82	3.80
_____ class activities are boring.*	4.19	3.83	4.38	3.93	3.86	3.75

*Note.* <sup>a</sup>Means for pre- and post-Fellow experiences. Likert-type scale: 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, 5 = strongly agree.

\* Indicates items that have been reverse coded.

Students' technology interests improved the most overall. Students held more positive interests in using technology equipment ( $M = 4.19$ ) and computers ( $M = 4.18$ ) to study technology on the post-test. Students held more positive interests about technology not being useful in their daily living ( $M = 4.26$ ). Students' interests for working in small groups ( $M = 3.61$ ) in technology remained constant. For all other statements, student interests were less positive at the end of the school-year (Table 3).

Post-test responses showed increased positive interests for using computers to learn about mathematics ( $M = 3.87$ ) and mathematics only being important at school ( $M = 4.08$ ). Students' post-test responses were less positive for all other interest statements. There were no engineering classes at the middle school level; no results were reported for engineering (Table 3).

The individual belief and interest scales were summated to determine students' overall STEM beliefs and interests. The summated beliefs scale ranged from zero to 60, with scores below 30 indicating negative attitudes. The summated interests scale ranged from zero to 40, with scores below 20 indicating negative attitudes.

Students' overall post-test beliefs and interests in science were less positive ( $M = 40.92$  and  $29.52$  respectively) than were their pre-test beliefs and interests ( $M = 41.61$  and  $29.55$  respectively). Overall, students held less positive post-test beliefs about technology ( $M = 43.78$ ),

but students' post-test interests were more positive ( $M = 31.56$ ). Students' overall post-test math beliefs ( $M = 39.30$ ) were less positive, but their post-test math interests ( $M = 29.47$ ) were more positive. There were no engineering classes at the middle school level; therefore there are no results to report for engineering (Table 4).

Table 4

*Descriptive Statistics for Middle School Students' STEM Beliefs and Interests (N = 1145)*

	Science (n = 838)		Technology (n = 82)		Math (n = 219)	
	M	SD	M	SD	M	SD
STEM Summated Scales						
Pre-test STEM Beliefs	41.61	7.56	44.11	6.91	39.87	7.89
Post-test STEM Beliefs	40.92	7.84	43.78	7.06	39.30	9.01
Pre-test STEM Interests	29.55	4.73	30.33	4.20	29.30	4.33
Post-test STEM Interests	29.52	4.86	31.56	4.51	29.47	5.20

*Note.* STEM Beliefs ranged from: Science = 14-60; Technology = 26-60; and Math = 12-60. STEM Interests ranged from: Science = 3-40; Technology = 20-40; and Math = 12-40.

*Objective 3*

Changes in students' STEM beliefs and interests were analyzed using the repeated measures function of SPSS for NSF Fellow to determine if there was an interaction effect between NSF Fellow and students' STEM beliefs and/or interests. A four-way repeated measures analysis was performed to determine interaction effects when all three factors (grade, teacher, and NSF Fellow) were present in the classroom.

Within subjects analysis by NSF Fellows indicated no statistically significant ( $\alpha = 0.05$ ) difference between pre and post-test student mean STEM beliefs. Within subjects analysis indicated a statistically significant ( $\alpha = 0.05$ ) interaction effect between NSF Fellow and students' STEM beliefs. Between subjects analysis indicated a statistically significant ( $\alpha = 0.05$ ) pre- and post-test difference in STEM beliefs between NSF Fellows (Table 5).

Table 5

*Analysis of Variance for NSF Fellow and Student STEM Beliefs (N = 1145)*

Source	df	F	$\eta^2$	P
Between Subjects				
Intercept	1	32819.381	.967	.000
NSF Fellow	8	22.316	.136	.000
Error	1135	(84.694)		
Within Subjects				
beliefs	1	.021	.000	.885
beliefs * NSF Fellow	8	4.752	.032	.000
Error(beliefs)	1135	(25.727)		

*Note.* Values enclosed in parenthesis represent mean square errors.

Within subjects analysis of students' STEM interests by NSF Fellow indicated a statistically significant ( $\alpha = 0.05$ ) difference between pre- and post-test means. Within subjects analysis indicated a statistically significant ( $\alpha = 0.05$ ) interaction effect between NSF Fellow and students' STEM interests. Between subjects analysis indicated a statistically significant ( $\alpha = 0.05$ ) pre- and post-test difference in means between NSF Fellows (Table 6).

Table 6

*Analysis of Variance for NSF Fellow and Student STEM Interests (N = 1145)*

Source	df	F	$\eta^2$	P
Between Subjects				
Intercept	1	51085.911	.978	.000
NSF Fellow	8	24.915	.150	.000
Error	1130	(28.362)		
Within Subjects				
interest	1	4.836	.004	.028
interest * NSF Fellow	8	2.348	.016	.017
Error(interest)	1130	(12.385)		

Note. Values enclosed in parenthesis represent mean square errors.

*Objective 4*

To answer objective four, tests on the multiple interaction effects (NSF Fellows, teacher status, and grade level) were performed on students' STEM beliefs and interests. Within subjects analysis indicated there were statistically significant ( $\alpha = 0.05$ ) differences between pre- and post-test means for students' STEM beliefs. Within subjects analysis indicated statistically significant interaction effects ( $\alpha = 0.05$ ) between grade level and STEM beliefs, and between NSF Fellow and STEM beliefs. No statistically significant interaction effect ( $\alpha = 0.05$ ) was indicated between teacher effect and students' STEM beliefs (Table 7).

Table 7

*Analysis of Variance by Grade level, Teacher, and NSF Fellows for STEM Beliefs (N = 1145)*

Source	df	F	$\eta^2$	P
<b>Between Subjects</b>				
Intercept	1	14286.728	.928	.000
Teacher	1	.128	.000	.721
Grade	2	9.520	.017	.000
NSF Fellows	8	2.923	.021	.003
Teacher * Grade	0		.000	
Teacher * NSF Fellows	0		.000	
Grade * NSF Fellows	0		.000	
Teacher * Grade * NSF Fellows	0		.000	
Error	1113	(25.109)		
<b>Within Subjects</b>				
Beliefs	1	5.571	.005	.018
Beliefs * Teacher	1	2.271	.002	.132
Beliefs * Grade	2	3.784	.007	.023
Beliefs * NSF Fellows	8	2.981	.021	.003
Beliefs * Teacher * Grade	0		.000	
Beliefs * Teacher * NSF Fellows	0		.000	
Beliefs * Grade * NSF Fellows	0		.000	
Beliefs * Teacher * Grade * NSF Fellows	0		.000	
Error(Beliefs)	1113	(81.491)		

*Note.* Values enclosed in parenthesis represent mean square errors.

Within subjects analysis indicated there were statistically significant ( $\alpha = 0.05$ ) differences between pre- and post-test means for students' interests in STEM. Within subjects analysis indicated statistically significant interaction effects ( $\alpha = 0.05$ ) between grade level and STEM interest, and between NSF Fellow and STEM interests. No statistically significant interaction effect ( $\alpha = 0.05$ ) was indicated between teacher effect and students' STEM interests (Table 8).

Table 8

*Analysis of Variance by Grade level, Teacher, and NSF Fellows for STEM Interests (N = 1145)*

Source	df	F	$\eta^2$	P
<b>Between Subjects</b>				
Intercept	1	22540.123	.953	.000
Teacher	1	.237	.000	.626
Grade	2	4.702	.008	.009
NSF Fellows	8	2.837	.020	.004
Teacher * Grade	0		.000	
Teacher * NSF Fellows	0		.000	
Grade * NSF Fellows	0		.000	
Teacher * Grade * NSF Fellows	0		.000	
Error	1109	(27.120)		
<b>Within Subjects</b>				
Interests	1	4.477	.004	.035
Interests * Teacher	1	.201	.000	.654
Interests * Grade	2	5.808	.010	.003
Interests * NSF Fellows	8	2.598	.018	.008
Interests * Teacher * Grade	0		.000	
Interests * Teacher * NSF Fellows	0		.000	
Interests * Grade * NSF Fellows	0		.000	
Interests * Teacher * Grade * NSF Fellows	0		.000	
Error(Interests)	1109			

*Note.* Values enclosed in parenthesis represent mean square errors.

### Discussion

One would think that teachers would be the main factor affecting student STEM beliefs and interests, due to their daily classroom interaction with students. However, the results in this study indicated that NSF Fellows and student grade level, not teacher, affected the rate at which students' STEM beliefs and interests changed, supporting the findings of Wildman and Torres (2001). Previous research that students become more negative at higher grade levels (Weinburgh, 2003) may account for the grade level effect on student attitudes in this study and explain the overall decrease in students' STEM beliefs and interests, but the effect that NSF Fellows had on students' STEM beliefs and interests shows much promise for the GK-12 project. This effect indicates that content specialists interacting with middle school students have the potential to affect students' beliefs and interest in subject areas. It is possible that agricultural science programs promoting agricultural professionals interacting in middle school classrooms could achieve the same effects. Further research is recommended on possible effects that agricultural professionals may have on middle school students' attitudes toward math and science, or on pursuing careers in agriculture.

The results indicated that the active, consistent involvement of NSF Fellows in the classroom had a significant effect on middle school students' STEM beliefs and interests,

supporting similar research on scientists' influence on high school and college students (Caton et al., 2000; Davis et al., 2003; Evans et al., 2001; Finson, 2002; Munn et al., 1999; Tanner et al., 2003; Weinburgh, 2003; Wildman & Torres, 2001). Although this research indicated that NSF Fellows affected the rate at which middle school students' STEM beliefs and interests changed, it did not indicate if that change retarded or accelerated student negativity toward STEM subjects, when accounting for the grade level effect (Weinburgh, 2003). If the interaction of NSF Fellows positively affects student attitudes, these types of collaborations have the potential to reverse the current negative trends in STEM subjects and positively affect student enrollment in those same subjects. It is possible that similar results would occur in agricultural science programs. Therefore, additional research on students' STEM beliefs and interests in agricultural science classrooms is needed.

Despite the overall decrease in students' STEM beliefs and interests, students' interest in technology increased. Students expressed increased positive attitudes on more of the individual technology belief and interest statements than in either science or mathematics. Further research might help illuminate why technology would show such marked improvement over math and science.

Further research is recommended on specific effects NSF Fellows have on student beliefs and interests in STEM subjects. The Fellows' classroom effect should be studied at elementary and high school levels, as well as the middle school level to determine the true effect of Fellows' consistent classroom involvement at the different grade levels. Research on short-term exposure to scientists in the classroom have indicated positive results for increasing positive student attitudes (Caton et al., 2000; Munn et al., 1999; Lindner et al., 2004), but more research is needed to determine the effect of consistent, long-term interactions between scientists and public school classrooms. The results of this study may be applicable only to a specific population and caution should be used in generalizing these results to a broader population.

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# IMPORTANT ELEMENTS OF THE STUDENT TEACHING EXPERIENCE IN AGRICULTURAL EDUCATION: A COMPARISON OF COOPERATING TEACHERS' AND STUDENT TEACHERS' PERCEPTIONS

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## Abstract

*This study compared cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience and identified selected characteristics of cooperating centers. Forty-nine cooperating teachers and 25 student teachers provided data. Questionnaire items were divided into five "core" areas based on a review of literature. Respondents rated the elements using a scale of "5" = "High Importance" to "1" = "No Importance." Return rates were 77% for cooperating teachers and 100% for student teachers. Reliability estimates for the five core areas ranged from .47 to .87 for cooperating teachers and from .60 to .84 for student teachers. The overall importance scale of 34 items yielded estimates of .93 and .91, respectively. Both groups rated 33 of the 34 elements as "important." No significant differences ( $p < .05$ ) between groups were detected by core area or overall. The "Cooperating Teacher-Student Teacher Relationship" was rated the most important core area of the student teaching experience by both groups. Teacher educators should make preservice teachers aware of the important elements of the student teaching experience that were identified by this study. In particular, beginning cooperators should receive professional development toward that end. The importance of the mentor-mentee relationship should be emphasized. In addition, the finding that both groups rated selected elements that comprised the core area "Supervised Agricultural Experience Programs" as less important warrants further inquiry and discussion in the profession.*

## Introduction and Conceptual Framework

Schumann (1969) argued that the most important component of the preservice professional development of an aspiring agriculture teacher is the student teaching experience. Norris, Larke, and Briers (1990) asserted, “the student teaching center and the supervising (cooperating) teacher are the most important ingredients in the student teaching experience” (p. 58). Other researchers (Barnes & Camp, 2002; Bunting, 1988; Covington & Dobbins, 2004; Deeds, 1993; Deeds, Arrington, & Flowers, 1988; Garton & Cano, 1994; Martin & Yoder, 1985; Roberts, 2005; Roberts & Dyer, 2004) have supported that assertion to varying degrees.

What is more, DeMoulin (1993) stated that students should demonstrate a positive change in their attitudes about teaching and “come away from the student-teaching experience with a positive attitude toward their chosen profession” (p. 160). In support, Deeds and Barrick (1986) concluded that the perceptions of preservice teachers regarding the quality of program in which their early field-based experiences transpired were related to the extent that their attitude was positive. Byler and Byler (1984) analyzed student teacher morale before and after student teaching and found “a significant relationship after the student teaching experience between student teachers’ morale and the morale of their cooperating teachers” (p. 27). Clearly, the student teaching experience holds great potential for impacting student teachers positively and setting them on a course of professional induction that is rewarding and purposeful.

Martin and Yoder (1985) theorized a successful student teaching experience as one in which a “team approach” (p. 19) defined the relationship between cooperating teacher and student teacher. They contended that success of the relationship depended “upon the general supervisory climate in the department and on the educational leadership abilities of the cooperating teacher” (p. 21). Further, Korthagen and Kessels (1999) stated that cooperating student teaching centers “must be able to offer a sound balance between safety and challenge” (p. 14), and that the needs of student teachers and the needs of schools must be considered. Henry and Beasley (1996) also investigated the unique and essential role of supervising (cooperating) teachers and centers in facilitating the professional induction of preservice teachers; they supported the aforementioned positions. Barnes and Camp (2002) also agreed as to the important role of cooperating centers.

Concerning instructional practices, DeMoulin (1993) argued that it was the cooperating teacher’s role to encourage student teachers to use innovative teaching practices and to support their creativity. Moreover, Garton and Cano (1994) asserted that cooperating teachers should be selected “who model the desired teaching behaviors expected of student teachers” (p. 213).

Ethell and McMeniman (2000) concluded that “studies in teaching have generally substantiated other expert/novice research,” i.e., “expert teachers have a larger knowledge base from which to draw; they organize knowledge more efficiently in complex interconnected schemas and utilize it more effectively” (p. 88). However, the procedural knowledge undergirding behaviors of expert practitioners, including teachers, is often too “tacit” and lacks sufficient transparency to be meaningful to a novice (Ethell & McMeniman). Moreover, “gaining access to the knowledge and cognitions of expert teachers has to date proved problematic for researchers and teacher educators” (Ethell & McMeniman, p. 99). So,

understanding better the beliefs of cooperating agriculture teachers about important elements of what should be a salient and perhaps even career-defining experience, i.e., student teaching, and comparing their perceptions to those held by student teachers could improve the ability of teacher educators to plan and manage the student teaching experience in agricultural education.

To this end, researchers (Harlin, Edwards, & Briers, 2002; Young & Edwards, 2005) have suggested that the perceptions of these two stakeholder groups be compared to determine if significant differences exist. So, were the perceptions of these two groups—cooperating teachers and student teachers—similar or different concerning selected important elements of the student teaching experience in agricultural education?

### **Purposes and Research Questions**

The efficacy of an individual's student teaching experience may hinge on the attitudes and perceptions of two key actors: cooperating teacher and student teacher. The primary purpose of this descriptive study was to compare cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience in agricultural education. A secondary purpose was to describe selected characteristics of cooperating student teaching centers. The following research questions guided this study:

- 1) What were cooperating teachers' perceptions of important elements of the student teaching experience?
- 2) What were student teachers' perceptions of important elements of the student teaching experience after a 12-week field experience?
- 3) Did significant differences ( $p < .05$ ) exist between cooperating teachers' and student teachers' perceptions of important elements of the student teaching experience?
- 4) What were selected characteristics of the schools that served as cooperating student teaching centers?

### **Methods and Procedures**

This descriptive study sought to compare student teachers' and cooperating teachers' perceptions of important elements of the student teaching experience, and to identify selected characteristics of cooperating centers. The study's student teacher sampling frame ( $n = 25$ ) included all student teachers from the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University during the spring 2004 semester; thus, it was a purposeful sample. The cooperating teacher sampling frame ( $n = 64$ ) included teachers and schools who had either served as cooperating student teaching centers previously or who were future placement sites for student teachers from Oklahoma State University; so, it was also a purposeful sample.

The data collection instrument was developed by Harlin et al. (2002) for use with agricultural education student teachers in Texas. Earlier researchers (Edwards & Briers, 2001) used cooperating teacher focus groups to identify 34 elements of the student teaching experience per five “core” areas derived from a review of literature (Edwards & Briers, 1999; Larke, Norris, & Briers, 1992; Martin & Yoder, 1985). Items were validated further via a postal mail questionnaire follow-up procedure (Edwards & Briers, 2001). Selected questionnaire items were modified slightly to “fit” characteristics of cooperating student teaching centers in Oklahoma but the elements, i.e., items rated for importance, remained the same (Harlin et al.).

Part one of the instrument was divided into five “core” areas of the student teaching experience and included 34 “important elements” ( $\alpha$  = student teachers’ and cooperating teachers’ estimates, respectively): “Classroom and Laboratory Instruction” (5 items;  $\alpha$  = .68; .47), “Supervised Agricultural Experience Programs (SAEPs)” (4 items;  $\alpha$  = .60; .61), “Student Leadership Development (FFA)” (7 items;  $\alpha$  = .82; .85), “School and Community Relationships” (9 items;  $\alpha$  = .75; .83), and “Cooperating Teacher-Student Teacher Relationships” (9 items;  $\alpha$  = .84; .87). Respondents were asked to indicate their perceived “level of importance” for the elements using a Likert-type rating scale: “5” = “High Importance,” “4” = “Much Importance,” “3” = “Some Importance,” “2” = “Low Importance,” and “1” = “No Importance.” Cronbach’s coefficient alpha reliability estimates for the five core areas ranged from .60 to .84 for student teachers and .47 to .87 for cooperators; the overall importance scale yielded estimates of .91 and .93, respectively. Selected characteristics of student teaching centers were identified per the cooperating teachers’ questionnaire.

Student teachers completed the instrument at conclusion of the four-week on-campus portion of student teaching and again at the end of a 12-week off-campus field experience. Data for this study was derived from the instrument completed at the conclusion of the 12-week off-campus field experience. All student teachers from the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University who student taught during the spring 2004 semester participated in the study; so, the rate of return for student teachers was 100%.

Cooperating teachers were postal mailed a research packet during the spring of 2004 that included a cover letter explaining the study, a questionnaire, a pre-coded scan sheet, and a return envelope coded to determine non-respondents. Following a two-week waiting period, non-respondents were contacted and encouraged to return their questionnaires. Teachers who requested another research packet were mailed one. After a similar waiting period, a third mailing of research packets containing a slightly altered cover letter was mailed to remaining non-respondents (Dillman, 1978; Tuckman, 1999). The final rate of return—deemed to be acceptable (Tuckman)—was 77% (49 of 64) for the cooperating teachers representing 45 cooperating student teaching centers. To address the possibility of nonresponse bias, teachers who responded more than one week after receipt of the first return were operationalized as “late respondents” (23) per recommendation of Lindner, Murphy, and Briers (2001). This procedure permitted a near 50-50 split of early and late responders thus improving the power of statistical comparison (Lindner et al.). Accordingly, independent samples *t*-tests were used to compare the two groups; no significant differences ( $p < .05$ ) were detected for the variables of interest.

However, caution is urged when attempting to generalize the study's findings beyond the responding samples.

The *Statistical Package for the Social Sciences v. 13.0.* was used for data analysis. Research questions were analyzed descriptively with frequencies, percentages, means, and standard deviations; a ranking of important elements by core area was determined as well. Independent samples *t*-tests ( $p < .05$ ) were calculated to analyze research question three.

## Findings

As shown in Table 1, 44 of the centers reported campus enrollments of 618 or fewer students; the remainder were larger schools (Table 2). A slight majority of centers (26) had two or more classrooms in their agricultural education departments. The most common laboratory facility was for teaching agricultural mechanics (46). Slightly more than one-half (27) of the cooperating centers had a greenhouse or some other facility for teaching horticulture. A similar number of schools (26) had a project center/feeding facility to support students' livestock SAEs. About one-in-four centers (14) had a land laboratory but very few (2) had an aquaculture facility.

Table 1

*Selected Characteristics of Student Teaching Centers as Reported by Cooperating Teachers (N = 47<sup>a</sup>)*

Characteristics	<i>f</i>	%
Size of School		
< 132 students	10	20
132 - 363 students	20	41
365 - 618 students	14	29
659 - 1229 students	1	2
1275 - 4279 students	2	4
Number of Agricultural Education Classrooms		
1	20	41
2	18	37
3	8	16
Ag Mech Laboratory (Yes)	46	94
Greenhouse (Yes)	21	43
Other Hort. Facility (Yes)	6	12
Aquaculture Facility (Yes)	2	4
Land Laboratory (Yes)	14	29
Project Center/Feeding Facility (Yes)	26	53

*Note.* <sup>a</sup>Two cooperators did not provide data about their schools.

Cooperating teachers' and student teachers' ratings of 34 "important elements" of the student teaching experience are shown in Table 2. Cooperators and student teachers rated elements (items) of the student teaching experience on level of importance ("5" = "High Importance" . . .

“1” = “No Importance”). The overall means were 4.45 and 4.49, respectively, or approximately midway between “much” and “high importance” ( $M \geq 4.00$ ).

The 34 elements were grouped conceptually into five “core” areas and a composite mean was calculated for each area (Table 2). The core area “Cooperating Teacher-Student Teacher Relationships” was rated the highest core area by both cooperators and student teachers ( $M = 4.70$  and  $M = 4.84$ , respectively). Ratings for the remaining core areas resulted in “Classroom and Laboratory Instruction” ( $M = 4.54$ ;  $M = 4.59$ ) ranking second. Cooperating teachers’ ratings resulted in “School and Community Relationships” ranking third ( $M = 4.39$ ); however, “Student Leadership Development (FFA Activities)” ( $M = 4.41$ ) held the third place ranking for student teachers. The pattern was then reversed, i.e., cooperators’ ratings ranked the core area “Student Leadership Development (FFA Activities)” ( $M = 4.32$ ) fourth, and student teachers’ ratings ranked “School and Community Relationships” ( $M = 4.40$ ) as the fourth most important core area. The core area “Supervised Agricultural Experience Programs” had the lowest composite means ( $M = 4.20$ ;  $M = 4.23$ ) and rankings for both groups.

The highest rated individual element according to cooperating teachers’ was “a well rounded program emphasizing instruction, SAEs, and youth leadership activities” ( $M = 4.92$ ;  $SD = .34$ ). “A cooperating teacher who has a positive attitude” was the second highest rated element ( $M = 4.90$ ;  $SD = .31$ ), and the element “a cooperating teacher who is a ‘good’ role model” was rated third ( $M = 4.88$ ;  $SD = .39$ ). Only one of the 34 elements was rated below “much importance”: “all students meeting state SAE requirements, with accurate record books” ( $M = 3.90$ ;  $SD = .71$ ).

Student teachers’ ratings started with “a cooperating teacher who communicates clear expectations to the student teacher” ( $M = 4.92$ ;  $SD = .28$ ). “A student teacher who is willing to be mentored by the cooperating teacher,” “a cooperating teacher who is a ‘good’ role model” and “a cooperating teacher who provides frequent evaluations and feedback to the student teacher” all tied for second ( $M = 4.88$ ;  $SD = .33$ ). “A well-rounded program emphasizing instruction, SAE’s, and youth leadership activities” ( $M = 4.88$ ;  $SD = .44$ ) was rated the fifth most important element. Four of the five highest rated elements were derived from the core area “Cooperating Teacher-Student Teacher Relationships.” Similar to cooperating teachers, only one of the elements was rated below “much importance”: “all students meeting state SAE requirements, with accurate record books” ( $M = 3.88$ ;  $SD = .60$ ). Independent samples *t*-tests revealed no significant differences ( $p < .05$ ) between composite means of the five core area or between the overall means.

Table 2

*Comparison of Means and Core Area Rankings of Cooperating Teachers' and Student Teachers' Perceptions of Important Elements of the Student Teaching Experience*

<i>Elements<sup>a</sup></i>	<i>Coop. Tchr.</i>		<i>Stud. Tchr.</i>		<i>t</i>
	<i>M<sup>b</sup></i>	<i>SD</i>	<i>M<sup>b</sup></i>	<i>SD</i>	
<u>Classroom and Laboratory Instruction</u>					
Daily (systematic) classroom and/or laboratory instruction	4.63	.61	4.72	.54	
A discipline management plan is used in a structured environment	4.69	.55	4.76	.52	
Current technology used in instruction	4.27	.73	4.12	.88	
Creative teaching methods as a basis for daily instruction, e.g., use of multimedia and varied teaching techniques	4.22	.69	4.48	.65	
A well-rounded program emphasizing instruction, SAE's, and youth leadership activities	4.92	.34	4.88	.44	
<b>Composite Mean Ranking</b>	<b>4.54</b>	<b>.34</b>	<b>4.59</b>	<b>.46</b>	<b>.460</b>
	<b>2</b>		<b>2</b>		
<u>Supervised Agricultural Experience Programs</u>					
All students meeting state SAE requirements, with accurate record books	3.90	.71	4.00	.78	
Diversity within the students' SAEs	4.00	.74	3.88	.60	
Project supervision and an explanation of this commitment to the student teacher	4.55	.58	4.60	.50	
Student participation in advanced awards and degrees on district, state, and national levels	4.37	.73	4.44	.71	
<b>Composite Mean Ranking</b>	<b>4.20</b>	<b>.48</b>	<b>4.23</b>	<b>.45</b>	<b>.198</b>
	<b>5</b>		<b>5</b>		
<u>Student Leadership Development (FFA Activities)</u>					
Strong classroom instruction in student leadership development	4.49	.55	4.40	.76	
These activities as essential for a balanced program	4.49	.65	4.44	.65	
A history of successful participation	4.06	.80	4.12	.83	
Cooperating teachers who are familiar with current rules for participation in events (e.g., CDEs)	4.33	.69	4.52	.59	
Cooperating teachers who delegate the training of at least one team to the student teacher	4.27	.73	4.68	.56	
Resources available to train a competitive team	4.41	.73	4.56	.65	
Opportunities for the student teacher to judge or monitor a district or state CDE	4.22	.77	4.12	.67	
<b>Composite Mean Ranking</b>	<b>4.32</b>	<b>.51</b>	<b>4.41</b>	<b>.48</b>	<b>.677</b>
	<b>4</b>		<b>3</b>		

*(table continues)*

<i>Elements<sup>a</sup></i>	<i>Coop. Tchr.</i>		<i>Stud. Tchr.</i>		<i>t</i>
	<i>M<sup>b</sup></i>	<i>SD</i>	<i>M<sup>b</sup></i>	<i>SD</i>	
<u>School and Community Relationships</u>					
Recognized integrity of the cooperating teacher	4.73	.57	4.64	.49	
Departmental support organization(s) (e.g., advisory committees, booster clubs, and Alumni)	4.33	.66	4.48	.65	
A cooperating teacher who supports other school activities (e.g., athletic events)	4.12	.75	4.08	.83	
A cooperating teacher who supports activities in the community (e.g., service organizations)	4.57	.58	4.24	.78	
A spirit of professional cooperation among fellow Teachers	4.57	.61	4.52	.51	
Use of local media	4.27	.61	4.29	.75	
School administrators who are involved in program activities	4.18	.70	4.36	.75	
Community service projects	4.33	.69	4.36	.64	
Availability of facilities (e.g., computer lab, shops, horticultural lab, school farm)	4.41	.67	4.64	.64	
<b>Composite Mean</b>	<b>4.39</b>	<b>.42</b>	<b>4.40</b>	<b>.49</b>	<b>.071</b>
<b>Ranking</b>	<b>3</b>		<b>4</b>		
<u>Cooperating Teacher-Student Teacher Relationships</u>					
A cooperating teacher who is willing to be a mentor	4.85	.41	4.84	.37	
A student teacher who is willing to be mentored by the cooperating teacher	4.86	.41	4.88	.33	
A cooperating teacher who has a positive attitude	4.90	.31	4.84	.37	
A cooperating teacher who is a “good” role model	4.88	.39	4.88	.33	
A cooperating teacher who communicates clear expectations to the student teacher (e.g., role in classroom and calendar of events)	4.84	.43	4.92	.28	
A cooperating teacher who provides frequent evaluations and feedback to the student teacher	4.67	.56	4.88	.33	
Discipline policies that are in place and enforced	4.67	.52	4.80	.41	
“Reinforcement” techniques in teaching (e.g., pace, reteaching, retesting, and accommodation of various learning styles)	4.49	.65	4.76	.44	
Assistance in job placement	4.17	.65	4.76	.52	
<b>Composite Mean</b>	<b>4.70</b>	<b>.35</b>	<b>4.84</b>	<b>.30</b>	<b>1.750</b>
<b>Ranking</b>	<b>1</b>		<b>1</b>		
<b>Overall Mean</b>	<b>4.45</b>	<b>.34</b>	<b>4.49</b>	<b>.35</b>	<b>.386</b>

*Note.* <sup>a</sup>Important elements were derived from an earlier study (Harlin et al., 2002) and modified slightly to reflect the “language” of Oklahoma agricultural educators. <sup>b</sup>5 = High Importance . . . 1 = No Importance

## Conclusions

Cooperating student teaching centers examined in this study tended to be smaller high schools; most had enrollments of less than 619 students. A majority of the agricultural education departments had two or more classrooms; nearly all had an agricultural mechanics facility, and many had other learning laboratories such as greenhouses and project centers.

Cooperating teachers and student teachers rated 33 of the 34 elements of the student teaching experience as “important” or higher ( $M \geq 4.00$ ). Both groups rated “Cooperating Teacher-Student Teacher Relationships” as the most important core area of the student teaching experience. What is more, the order of ranking for all five core areas differed only slightly. The core area “Supervised Agricultural Experience Programs” was rated lowest by both groups. No significant differences ( $p < .05$ ) existed between the two groups regarding “level of importance” by core area or overall (Table 2).

## Recommendations

Prior to student teaching, teacher educators should make preservice teachers aware of the important elements of the student teaching experience that were identified by cooperating teachers and by student teachers who had completed a student teaching experience. To this end, Edwards and Briers (2001) contended that “these elements could serve as ‘talking points’ (i.e., points of reference) for [the] student teacher, when defining and ‘negotiating’ duties, roles, and responsibilities with their cooperating teacher at the onset of student teaching” (p. 40). Bunting (1988) supported this position when she suggested that the cooperating teacher was a significant “socializing influence” (p. 46) for an apprentice teacher during the student teaching experience. Other researchers (Byler & Byler, 1984; Deeds & Barrick, 1986) have supported Bunting’s premise as it relates to the attitudes and morale of preservice students in agricultural education vis-à-vis their field experiences.

During inservice professional development for cooperating teachers, teacher educators should reinforce the importance of “Cooperating Teacher-Student Teacher Relationships” as perceived by both groups. In particular, first-time cooperators should receive professional development supporting their ability to communicate effectively with student teachers and serve as effective and caring mentors (Young & Edwards, 2005).

Consistent with findings and calls made by other researchers (e.g., Camp, Fallon, & Clarke, 1999; Dyer & Osborne, 1995; Harlin et al., 2002; Retallick, 2003), how agricultural education teachers and student teachers conceptualize and operationalize students’ supervised agricultural experiences, i.e., as an integral part of the comprehensive secondary agricultural education model, may be a shifting paradigm. Accordingly, the perceptions of these two groups and those held by agricultural education teacher educators and state staff personnel in regards to planning, implementing, and assessing supervised agricultural experiences warrants further inquiry as well as a sustained dialogue involving all stakeholders.

Both groups rated 33 of the 34 elements of the student teaching experience “important” ( $M = \geq 4.00$ ). However, current practices in student teaching should be examined further to determine if other aspects exist that are “unimportant” or perhaps experiences that may be better

served through early field-based programming (Deeds & Barrick, 1986; Harlin et al., 2002) prior to the student teaching semester.

### **Discussion and Implications**

When the perceptions of Oklahoma cooperating teachers regarding important elements of the student teaching experience in agricultural education were reported in 2005 (Young & Edwards, 2005), it had been more than 30 years since a systematic inquiry had occurred. Collecting that data combined with gathering student teachers' perceptions about the same phenomenon made the comparison described in this manuscript possible. Accordingly, it was interesting to note how similar the groups' rankings were for the five core areas described (Table 2). A mere one-hundredth of a point prevented the groups' core rankings from being identical.

In contrast, using a very similar instrument, Edwards, Harlin, and Briers (2003) revealed some significant differences between the perceptions held by cooperators and student teachers in Texas, i.e., "Supervised Agricultural Experience Programs" and "Classroom and Laboratory Instruction" in particular, as well as between the groups' overall mean ratings. The findings from these two states may provide some support for the position that "philosophical perspectives" can be imparted or "taught." That is, the likelihood that a cooperator who participated in the Oklahoma study graduated from an institution other than the university from which the student teachers matriculated is quite low. However, in the case of the Texas participants a number of different institutions were likely represented by the cooperating teacher participants. What is more, the incomparability of state staff personnel (i.e., manpower-wise) between the two states and its impact on the "consistent" delivery of message, program philosophy, and adherence to prescribed accountability measures favors Oklahoma significantly.

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## IN-SERVICE DELIVERY: METHODS PREFERRED BY GEORGIA AGRICULTURE TEACHERS

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### Abstract

*Agricultural education teachers need to have opportunities to become students again in order to learn new skills and knowledge that will benefit their agricultural education programs. The purpose of this descriptive study was to survey agriculture teachers (N=348) in Georgia to determine their preferences for how in-service training should be delivered. Sixty one percent of the teachers (n=212) completed the survey. Frequencies and percentages were calculated to indicate teachers' preferences for in-service delivery. Teachers' top-rated in-service delivery method was the training sessions held each year at the annual summer teachers' conference, followed by one week short courses held during the summer, a mentoring program with an experienced teacher, a two to three hour seminar/workshop, and web-based courses, workshops, and/or seminars. Years of teaching experience seemed to have a greater influence on the preferences of in-service training than did gender, type of community, or degree held. As a result of this study Georgia agricultural education leadership should design and develop in-service activities that can be delivered (a) via training sessions held during the annual summer conference, (b) through a one week training session held in conjunction with summer break, (c) using a mentoring program with experienced teachers, and (d) through short two to three hour seminars or workshops.*

## **Introduction**

Agricultural educators are constantly challenged to introduce updated content and technologies to the students they serve to better prepare these individuals to enter the workforce and/or postsecondary education. To accomplish this, agricultural education teachers need to have opportunities to become students again in order to learn new technologies, innovative methods for the delivery of materials, and management skills to benefit their programs. It is through in-service training that teachers are able to improve their skills while learning about the newest information and technologies that will help their students become successful.

According to The Committee on Agricultural Education in Secondary Schools Board on Agriculture of the National Research Council (1988), "Teacher preparation and in-service education programs must be revised and expanded to develop more competent teachers...in and about agriculture" (p. 7). Joerger (2002) also emphasized the need for appropriate and timely in-service activities for agricultural educators to ensure that teachers experience success, effectiveness, and growth. Garton and Chung (1996, 1997), Edwards and Briers (1999), Dobbins and Camp (2000), Joerger (2002), Layfield and Dobbins (2002), and Washburn, King, Garton, and Harbstreit (2001) have all identified an extensive list of constructs related to the in-service needs of agriculture teachers, but this study seeks to identify the methods of delivering effective in-service training that teachers will utilize to improve the entire agricultural education program.

## **Theoretical and Conceptual Framework**

According to Boser and Daugherty (1994), in order for the technology education profession to move forward, teachers "...require updated information on curriculum, methodology, and technology to allow them to make philosophical and programmatic changes that augment technology education" (p. 4). The same can be said for agricultural education. As agricultural technology advances, teachers are given the challenge to introduce these technologies to their students in order to prepare them for entering the workforce. In order to accomplish this task, in-service delivery methods need to provide meaningful training, while being convenient for teachers.

The theoretical framework for this study is based on Bandura's (1986) Social Cognitive Theory. Bandura (1978, 1982a, 1986) addresses behavior within a framework of "triadic reciprocity, or reciprocal interactions among behaviors, environmental variables, and personal factors such as cognitions" (Schunk, 2000, p. 80). According to Bandura (1982b) beliefs concerning one's ability to perform a task are influenced by a person's personal factors and the environment. The conceptual framework for this study positions teaching agriculture as the behavior; gender, years of teaching experience, level of education, and type of community as personal factors; and in-service delivery method as the environmental factor (See Figure 1). Notice how each of the three variables influence and are influenced by each other.

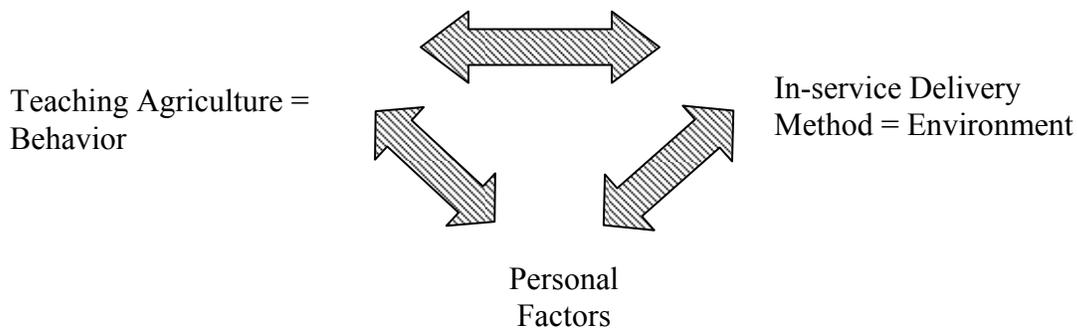


Figure 1. *Triadic reciprocity model as it relates to agriculture teacher behavior and in-service delivery method.* Note. Adapted from "Social Foundations of Thought and Action," by A. Bandura, 1986, p. 20.

According to Boser and Daugherty (1994), in order to conduct meaningful and effective in-service training, university and college faculty and state department of education leadership need to utilize extensive planning, careful delivery, and follow-up with the participants to determine teacher success in the classroom setting. The studies conducted by Borich (1980), Garton and Chung (1996, 1997) and Joerger (2002) have allowed researchers to determine the in-service needs of teachers of agriculture and begin the extensive planning stage of effective in-service training as well as determine the methods of delivery that agriculture teachers prefer for this training. According to Washburn, et al. (2001), to gain the greatest results from the amount of time and resources required to develop in-service activities in order to make these activities meaningful, teachers within the state should be involved in the process of identifying the most critical topics to be addressed. The second step, careful delivery, requires that university and college professors, along with state agricultural education staff, understand what teachers perceive as the most appropriate and effective in-service training environment.

Garton and Chung (1996), Layfield and Dobbins (2002), and Boser & Daugherty (1994) found that the majority of teachers in their studies preferred to have in-service training in the form of a workshop or seminar held during summer conference. Perhaps agriculture teachers in Georgia prefer a more technology-based approach because of its perceived level of convenience (Hiltz, 1998). Agricultural educators are incredibly busy, so the goal is to design in-service training that teachers feel is appropriately designed, timed, and offered.

### **Purpose and Objectives**

The purpose of this study was to survey agriculture teachers to determine their preferences for delivering in-service training. Specific objectives of this study were the following:

1. Describe the demographic characteristics of the agriculture teachers who participated in the study.
2. Describe agriculture teachers' preferences for delivery of in-service training.
3. Compare preferred methods of in-service delivery based on gender, years of teaching

experience, level of education, and the type of community in which the program is located.

### **Procedures**

The population of this descriptive census study included the 348 middle and/or high school agriculture teachers employed during the 2004-2005 school year in Georgia. Surveys were distributed and collected at the Georgia Vocational Agriculture Teachers Conference, regional agriculture teacher meetings, and via an online version of the instrument. Postcard follow-ups were mailed followed by an email that was sent via the agriculture teachers' listserv to encourage participation of those that had not completed the instrument.

A researcher-developed survey was used to determine the in-service delivery preferences of teachers. The instrument was deemed to have face and content validity by a panel of experts consisting of four University faculty, two graduate students, three regional coordinators of agricultural education, and four agriculture teachers. Individuals participating in the study were simply asked to check which forms of in-service delivery were preferred by teachers.

The data collected were entered into Microsoft Excel and then transferred into the Statistical Package for the Social Sciences (SPSS) 12.0™ to analyze the data. Frequencies and percentages were calculated to determine which methods of delivery that teachers preferred. Because all of the questions on the survey involved questions for which respondents had “an accurate, ready-made answer,” the questions did not elicit demands for considerable time, thought, nor variation; the items posed no considerable reliability risks (Dillman, 2000, p. 37).

There were 212 respondents out of 348 middle and/or high school agriculture teachers in the population, yielding a response rate of 61%. To address non-response early respondents ( $n = 121$ ) were compared to late respondents ( $n = 91$ ) on the key variables of interest (in-service delivery methods) using an independent samples t-test. Lindner, Murphy, and Briers (2001) and Miller and Smith (1983) reported that responses of late respondents are often similar to non-respondents, and reasoned that if there is not a difference between early respondents and late respondents, then there is little need to pursue additional efforts to increase responses from non-respondents. With the exception of one form of delivery of in-service training, no other significant differences were found between early and late responders. The one form of delivery, “In-service sessions at the summer Vocational Agriculture Teachers Association summer conference” was significantly different when early ( $M = .76, SD = .429$ ) respondents were compared to late ( $M = .60, SD = .492$ ) respondents,  $t(210) = .700, p < 0.05, d = 0.37$ . With this one exception taken into account, demographics and anecdotal evidence confirmed that the participant sample was largely representative of the population. Hence, this research team's position is in line with that of Gall, Gall, and Borg (2003, p. 176), who reported that, “inferential statistics can be used with data collected from a convenience sample if the sample is carefully conceptualized to represent a particular population.” Readers should examine the description of the sample and make their own determination about generalizing the findings to other populations.

## Findings

### *Objective One - Describe the Demographic Characteristics of Southern Agriculture Teachers*

Georgia agriculture teachers are mostly male ( $f=158$  or 74.5%), and are represented in each age category. Fifty-two percent of the agriculture teachers had ten years teaching experience or less, and thirty-five percent of agriculture teachers had five or less than five years of teaching experience. All of the respondents had at least a Bachelor's degree and over half (57.6%) had at least one graduate degree. In addition, over seventy percent (70.3%) of agriculture teachers are located in rural areas of the state (See Table 1).

Table 1  
*Selected Teacher Demographics*

Demographic Characteristics	<i>f</i>	%
Gender		
Male	158	74.5
Female	54	25.5
Age		
< 25	29	13.7
25-34	60	28.3
35-44	51	24.1
45-54	58	27.4
55-64	16	7.5
>65	2	0.9
Teaching Experience		
<5 years	74	34.9
6-10 years	36	17.0
11-15 years	26	12.3
16-20 years	20	9.4
21-25 years	26	12.3
26-30 years	25	11.8
> 30 years	5	2.4
Highest Degree Earned		
Bachelors	90	42.5
Masters	78	36.8
Specialist	32	15.1
Doctorate	12	5.7
Type of Community		
Rural	149	70.3
Suburban	47	22.2
Urban	16	7.5

*Objective Two - Describe Agriculture Teachers' Preferences for Delivery of In-service Training.*

Teachers were given the opportunity to choose multiple methods of in-service delivery in the study. According to these teachers, the most preferred form of in-service delivery was in-service sessions held at the summer Vocational Agriculture Teachers Association conference ( $f=147$ , 69.3%), followed by a one week short course during the summer ( $f=120$ , 56.6%) and a mentoring program with an experienced teacher ( $f=82$ , 38.7%). According to Table 2, a two to three hour seminar/workshop ( $f=72$ , 34.0%) and web-based courses, workshops, and/or seminars ( $f=72$ , 34.0%) complete the top five preferred methods of in-service delivery. Table 2 lists the in-service delivery methods from the most preferred to the least preferred.

Table 2  
*Georgia Agriculture Teachers' Preferred Form of In-Service Delivery*

In-Service Delivery Method	<i>f</i>	%
In-service Sessions at Summer Vocational Agriculture Teachers Association Conference	147	69.3
One Week Short Course (during summer)	120	56.6
Mentoring Program with Experienced Teacher	82	38.7
2-3 Hour Seminar/Workshop	72	34.0
Web-based Courses, Workshops, and/or Seminars	72	34.0
Course for Credit	60	28.3
Weekday Meeting (during summer)	56	26.4
District In-service Courses (4 meetings at 4 hours each)	46	21.7
Video Tapes	34	16.0
Interactive T.V. (providing your school or regional center could be connected)	32	15.1

*Note.* Respondents could have chosen more than one delivery method.

*Objective Three - Compare Preferred Methods of In-service Delivery Based on Gender, Years of Teaching Experience, Level of Education, and Type of Community in Which the Program is Located.*

Agriculture teachers in Georgia tend to prefer the same methods of delivery for in-service training regardless of gender, years of teaching experience, level of education, and type of community in which the program is located except in a few circumstances. The years of teaching experience had a tendency to influence the preferred forms of delivery more than gender, education, and type of community (See Table 3). Teachers with less than five years experience ( $f=46$ , 62.2%) and those with over thirty years experience ( $f=3$ , 60%) chose a mentoring program with an experienced teacher more often than did teachers who fell in the range of experience of five to thirty years. In addition, almost all teachers with more than thirty years experience ( $f=4$ , 80%) were more interested in a one week short course during the summer and teachers with more than ten years experience had a greater preference for in-service training sessions held during the summer conference.

Table 3  
*The Effect of Years of Teaching Experience on Preferred In-Service Delivery Method*

Form of Inservice Delivery	Years of Experience													
	0-5		6-10		11-15		16-20		21-25		26-30		Over 30	
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Mentoring Program with Experienced Teacher	46	62.2	14	38.9	5	19.2	3	15.0	4	15.4	7	28.0	3	60.0
2-3 Hour Seminar/Workshop	25	33.8	13	36.1	7	26.9	6	30.0	10	38.5	9	36.0	2	40.0
One Week Short Course (during summer)	38	51.4	15	41.7	15	57.7	12	60.0	19	73.1	17	68.0	4	80.0
In-service Sessions at Summer Conference	41	55.4	21	58.3	23	88.5	15	75.0	21	80.8	22	88.0	4	80.0
District In-service Courses (4 meetings at 4 hours each)	14	18.9	9	25.0	5	19.2	2	10.0	5	19.2	8	32.0	3	60.0
Weekday Meeting (during summer)	12	16.2	12	33.3	4	15.4	6	30.0	11	42.3	8	32.0	3	60.0
Course for Credit	27	36.5	11	30.6	7	26.9	1	5.0	7	26.9	5	20.0	2	40.0
Videotapes	7	9.5	9	25.0	5	19.2	3	15.0	4	15.4	5	20.0	1	20.0
Interactive T.V.	14	18.9	3	8.3	3	11.5	3	15.0	4	15.4	4	16.0	1	20.0
Web-based Courses, Workshops, and/or Seminars	29	39.2	12	33.3	10	38.5	7	35.0	7	26.9	4	16.0	3	60.0

*Note.* Respondents could have chosen more than one delivery method.

According to Table 4, a larger percentage of female agriculture teachers ( $f = 30, 55.6\%$ ) preferred to be involved in a mentoring program with an experienced teacher than males ( $f = 52, 32.9\%$ ). In addition, suburban ( $f = 26, 55.3\%$ ) and urban ( $f = 8, 50.0\%$ ) teachers also preferred the mentoring program more than teachers located in more rural areas ( $f = 48, 32.2\%$ ). Teachers that held a doctorate degree ( $f = 1, 9.1\%$ ) least preferred to become involved in a mentoring program.

Female agriculture teachers ( $f = 21, 38.9\%$ ) preferred to take in-service training sessions for college credit more than males ( $f = 39, 24.7\%$ ). In addition, teachers who held a bachelor's degree ( $f = 40, 44.9\%$ ) had a greater tendency to prefer in-service training for credit than

teachers who held higher degrees (Refer to Table 4).

## Conclusions

Agriculture teachers in Georgia are mostly male and well educated, and a large majority of participants had no more than ten years experience. Teachers preferred to have in-service training held during the agriculture teacher summer conference or during a one-week short course held during the summer. Garton and Chung (1996) and Layfield and Dobbins (2002) also found that teachers preferred in-service training be held at these times. In addition, teachers also preferred a mentoring program with an experienced teacher, a two to three hour workshop or seminar, or a web-based course, workshop, or seminar. Therefore, it can be assumed that teachers feel that they are more likely to have time to dedicate to improving the behavior of teaching agriculture if in-service training does not interfere with student development.

Teachers least preferred to have in-service training delivered via videotape or interactive television. This finding was substantiated by Garton and Chung (1996) who also found that few teachers would choose to receive in-service training through videotape or interactive television – possibly because teachers are unfamiliar with the technology and its capability. However, as the number of teacher educators and state staff available to conduct in-service training decrease, alternative ways of providing this training must be explored (Garton & Chung, 1996). One such possibility, according to Layfield and Dobbins (2002), is the use of internet-based video-conferencing.

Years of teaching experience seemed to have a greater influence on teachers' preferences of in-service delivery methods than did gender, degree held, and type of community (rural, suburban, urban). Teachers with five years of experience or less and teachers with more than thirty years of experience ( $n = 5$ ) preferred utilizing a mentoring program with experienced teachers over the other groups. Beginning teachers realize that they have an excellent opportunity to learn from the experiences of veteran teachers, which is a possible reason that such a large percentage of them preferred the mentoring program. According to Eastman and Williams (1993), the emotional support gained through the mentoring process provides agriculture teachers with the security of having someone to turn to for advice and guidance which may result in the building of ones' confidence in their own competence and performance. It is also important to note that experienced teachers preferred a method of professional development that would call upon them to contribute to the learning process.

Table 4  
*The Effects of Gender, Type of Community, and Degree Earned on In-Service Delivery Method*

Form of Inservice Delivery	Gender		Type of Community						Highest Degree Earned									
	Male	Female	Rural	Suburban	Urban	Bachelors	Masters	Specialist	Doctorate									
	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%	<i>f</i>	%
Mentoring Program with Experienced Teacher	52	32.9	30	55.6	48	32.2	26	55.3	8	50.0	38	42.7	31	39.7	11	33.3	1	9.1
2-3 Hour Seminar/Workshop	51	32.3	21	38.9	45	30.2	20	42.6	7	43.8	31	34.8	23	29.5	14	42.4	4	36.4
One Week Short Course (during summer)	94	59.5	26	48.1	83	55.7	27	57.4	10	62.5	48	53.9	40	51.3	24	72.7	8	72.7
In-service Sessions at Summer Conference	111	70.3	36	66.7	104	69.8	35	74.5	8	50.0	60	67.4	52	66.7	26	78.8	8	72.7
District In-service Courses (4 meetings at 4 hours each)	33	20.9	13	24.1	33	22.1	9	19.1	4	25.0	23	25.8	12	15.4	9	27.3	2	18.2
Weekday Meeting (during summer)	41	25.9	15	27.8	37	24.8	11	23.4	8	50.0	28	31.5	19	24.4	7	21.2	2	18.2
Course for Credit	39	24.7	21	38.9	40	26.8	15	31.9	5	31.3	40	44.9	13	16.7	7	21.2	0	0.0
Videotapes	25	15.8	9	16.7	24	16.1	9	19.1	1	6.3	11	12.4	16	20.5	5	15.2	2	18.2
Interactive T.V.	19	12.0	13	24.1	17	11.4	14	29.8	1	6.3	15	16.9	11	14.1	5	15.2	1	9.1
Web-based Courses, Workshops, and/or Seminars	51	32.3	21	38.9	45	30.2	22	46.8	5	31.3	36	40.4	22	28.2	9	27.3	5	45.5

Teachers with more than ten years experience in the classroom also preferred to have in-service training session during the summer conference. This can be attributed to the desire of experienced teachers to maximize their time away from students, while in the process, improving the delivery methods and technical expertise necessary to ensure their students success.

Agriculture teachers located in urban and suburban areas, along with female agriculture teachers, have a greater tendency to prefer to participate in mentoring programs. The former can possibly be explained by the lack of geographical boundaries that hinder agricultural educators in rural areas from the necessary interactions between the mentor and their charge. The latter can possibly be explained by the heavy male dominance that exists in this state's agricultural education profession and the need for beginning female teachers to interact with successful experienced female teachers. Teachers who hold a doctorate were the least inclined to choose the mentoring program as a form of in-service training.

Lastly, female agriculture teachers and teachers who hold a bachelors degree as the highest degree earned prefer to receive course credit for participating in in-service training. Perhaps the increase in knowledge that is gained by the teacher in obtaining a higher degree to improve classroom instruction, the management of the entire program, and ensuring student success, along with the significant increase in annual salary, are some reasons for appreciating course credit for in-service training.

### **Implications and Recommendations**

In this Georgia the number of middle and high school agricultural education teachers is on the rise. Georgia agricultural education staff and university faculty need to design in-service training that meets the needs of the teachers if these training opportunities are to be utilized for the benefit of agriculture education students throughout Georgia. The following recommendations are specific to and appropriate for agricultural education in Georgia, but other states may also benefit from the findings and suggestions that follow.

According to this study, agricultural educators prefer to have in-service training delivered via training sessions held during the annual summer conference, through a one week training session held in conjunction with summer break, through a mentoring program with experienced teachers, and through short two to three hour seminars or workshops. Training sessions should be planned with these delivery options in mind utilizing the expertise of not only state agriculture education staff, but also university personnel and successful agriculture teachers. Involving the expertise of these groups of individuals will build collegiality with the organization and ensure that teachers receive training that is meaningful and worthwhile.

This study should be re-conducted in regularly scheduled intervals to ensure that teachers are not only receiving the technical training to keep up with advances in the agriculture industry, but also have beneficial options available for receiving in-service

training. In addition, further research should be conducted that delves into what makes these particular forms of in-service delivery effective, why and how certain demographics affect teachers' preferences of in-service delivery methods, and what cutting edge technologies and methodologies will help to improve the delivery of in-service training that will better prepare agriculture teachers to serve the students that choose to participate in their programs.

Future research should not only assess the needs of agricultural educators in various states, but also in discovering the most effective way to deliver in-service training. If there are similarities in teachers' needs discovered that cross state borders, collaboration should take place between universities, colleges, and state agricultural education leadership in the pooling of resources that will keep agricultural education proactively involved in ensuring that students succeed in their educational endeavors.

Follow-up studies should also be conducted to measure the relationship between in-service delivery methods and effective classroom instruction and program management of agriculture teachers. According to Boser and Daugherty (1994), effective in-service training requires not only extensive planning and careful delivery, but also follow-up of the participant's success in the teaching setting. Follow-up is important to ensure that educational outcomes are being achieved and money that is spent on in-service delivery is actually making a difference (Boser & Daugherty, 1994).

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**SOURCES FOR LEARNING ABOUT INFORMATION TECHNOLOGY  
CAREERS AND PERSONAL INFLUENCES ON THE USE OF INFORMATION  
TECHNOLOGIES OF HIGH SCHOOL STUDENTS: A LONGITUDINAL TREND  
STUDY**

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**Abstract**

*The primary purpose of this study was to ascertain the sources used by high school students enrolled in agricultural science, business, or biology courses to learn about information technology careers over a three year period. A secondary purpose of this study was to determine the level of influence certain people or groups of people had on these students in their use of information technologies. Instruments used to collect data regarding the importance of sources for learning about information careers and to gather data on the persons who influence students' use of information technologies employed a 4-point Likert-type scale. The scale on the importance of sources instrument was 1 = not important; 2 = somewhat important; 3 = important; and 4 = very important. The scale on the personal influence instrument was 1 = not influential; 2 = somewhat influential, 3 = influential; and 4 = very influential. Over the three year period, results were fairly consistent among students regarding the sources of information for learning about information technology careers and who influences students about such career opportunities. The most important sources for learning about information technology careers were parents or guardians, Internet, other family members, teachers, and work experience. The most influential individuals or group of people on high school students' use of information technologies were parents or guardians, teachers, other family members, and friends.*

## Introduction/Theoretical Framework

Information Technology (IT) is a concept describing all aspects of managing and processing information. Most IT careers are based on computer technologies, the Internet, and networks that tie it all together. Information tools, such as personal computers and the Internet, are increasingly critical to economic success and personal advancement. However, a widening technological gap in America currently exists. This significant digital divide separating American information 'haves' and 'have nots' will further segregate America's IT workforce.

Individuals least likely to have access to such technologies, by default because of lesser opportunities for economic well being, are low-income Blacks or Hispanics in rural communities. In Mississippi, this is an alarming fact since one in four individuals in Mississippi lives at or below the poverty level, and nearly one in three children lives at or below the poverty

**Note:** This paper is based upon work supported by the National Science Foundation Information Technology Workforce Project, Project # 0089970. level (US Census Bureau, 1998). Yet, Mississippi has the research, industry base, and public/private institutions to support information technology clusters (Mississippi Economic Council, 2000). Jackson, the state capital, has been recognized as a telecommunications hub for not only the state, but also the world (Doty, 2000). Because these building blocks are present, the state can enhance the productivity of traditional industries and move towards a competitive advantage within the region (Mississippi Economic Council, 2000). Such gains would be more attractive at the national level and could entice information technology businesses to locate in rural areas of Mississippi.

If Mississippi is to develop a competitive advantage in relation to IT, public school systems must educate and train students about information technologies. The Governor's Task Force for Classroom Technology (Office of the Governor, 2001) established as its goal to have an Internet-accessible computer in every public classroom by the end of 2002. By achieving this goal, the educational experiences of students could be enhanced and the digital divide in Mississippi will be bridged.

If the United States is to remain competitive in the world marketplace, the foundation of information technology knowledge and skills is a necessity of the U.S. is to have a well-trained workforce (Kotrlik, Redmann, Harrison, & Handley, 2000). The Office of Technology Policy found a number of factors affecting the supply and quality of IT workers. These 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. The OTP report encouraged educators to provide K-12 students, especially middle school students, with information on science and technology careers, their rewards, and what education and training are necessary to pursue them (Meares & Sargent, 1999). At the heart of this encouragement should be a

basic understanding of IT and its connection to using computers in the workplace. Mississippi's Agricultural and Environmental Science and Technology (AEST) programs—a computer skills and IT based curricula—are fostering students' IT career path decisions as it relates to using information and computer technologies for today's food and fiber production. For Mississippi to focus on information technology careers and move towards a competitive advantage, potential factors affecting the future IT workforce need to be identified and addressed. What are the factors associated with the decision to enter an IT career path? Who influences this decision?

According to Fisher, Margolis and Miller (1997) most students, males and females, are introduced to computing by a parent and school is almost incidental. Andrews, Gahris, Reeder and Tizzano (2000) point out that parents or guardians are the number one influence on children's career choice. Likewise, Harkins (2000) proposed that the most influential role models for school children are their own parents. Whether by example or through their expectations for their children's futures, several authors (Ramos & Sanchez, 1995; Reisman & Banuelos, 1984) pointed out that parents exerted a powerful influence on their children's early educational and career aspirations. Because parents may be unaware of their influence in this area, they may need education about their role in the children's career development (Whitson & Sexton, 1998). Reisman and Banuelos (1984) suggested that because of this unawareness, school counselors might include home-based projects such as family trees highlighting family members' occupations or collages about family members' occupations and/or aspirations. Further, they advocated inviting parents to into school classrooms and encouraging parents to invite students into their work environments as effective means of capitalizing on parent's influence as role models.

Findings from research by Hall, Kelly, Hansen, and Gutwein (1996) and Way and Rossman (1996) suggested that career counselors and career educators should (a) shift the focus from the individual to the family system; (b) develop a new and richer view of parent involvement in schools; (c) help families become more proactive; and (d) consider ways of duplicating helpful types of family functioning in schools, especially for children whose families are not proactive.

Other possible sources for learning about careers and vocational planning have been the focus of recent studies. In one study, Mau (1995) found that middle school students of color were more likely to rely on peers than school counselors for information about and assistance with educational and vocational planning. Mau, Hitchcock, and Calvert (1998) concluded from data gathered in a follow-up study that students of color who do not plan to pursue postsecondary education might not receive adequate information about and encouragement from school counselors. Rosenbaum, Rafiullah Miller, and Scott Keri (1996) suggested that counselors may inadvertently even prevent students from receiving the advice and information they need to realistically prepare for their future.

### **Purpose/Objectives**

The purpose of this study was to ascertain the sources used by high school students enrolled in agricultural science, biology, or business courses to learn about information technology careers over a three year period. Furthermore, this study sought to identify the people that influenced high school students on their use of information technologies over the same period. Specific objectives guiding this study were to:

1. Determine the importance of sources for learning about information technology career.
2. Identify the people that influence students to use information technologies.

### **Methods/Procedures**

This study was conducted as a longitudinal trend study (Creswell, 2002; Gay & Airasian, 2003; Borg & Gall, 1989). According to Borg and Gall (1989), "In trend studies, a given general population is sampled at each data collection point. The same individuals are not surveyed, but each sample represents the same population" (p. 422).

The population for this study consisted of students enrolled in either Agricultural and Environmental Science and Technology (AEST) programs (N = 14) or Biology/Business programs (N = 14) from all geographical areas in a southern state. A census of all students from these 28 programs was used in the study each academic year. Schools were matched based on demographics, such as school size, ethnic makeup and school programs.

The researchers developed the instruments used in the study. Before the first year of data collection, twenty-four teacher consultants attended a workshop to develop the instruments to be used in the data collection process. After conducting a session on survey instrument development, university staff shared with teacher consultants the project objectives and sample questionnaires developed from a review of literature. Teacher consultants added and/or deleted items, recommended age-group appropriate wording, and revised the format of the instruments. Teacher consultants also recommended procedures for data collection and suggested placing the survey instruments on-line to expedite data collection as well as save money on printing instruments and postage. Since they would assist in data collection process, teacher consultants participated in Institutional Review Board (IRB) Human Subjects Research Training. Following each year of data collection, the instruments were reviewed and revised by the teacher consultants.

The section of the instrument used to collect data regarding the importance of sources for learning about information careers employed a 4-point Likert type scale (1 = not important; 2 = somewhat important; 3 = important; 4 = very important). A similar 4-point Likert type scale (1 = not influential, 2 = somewhat influential; 3 = influential, 4 = very influential) was used on the sub-section of the instrument to gather data on the persons who influenced students' use of information technology. University staff finalized the instruments and placed them on the web for teacher consultants to review and provide additional feedback before pilot testing. After receiving feedback the

instruments were pilot tested using state officer candidates attending the state FFA convention and re-administered at the state leadership conference. Test-retest reliability coefficients were .41 for the sub-section of the instrument used to gather data on the importance of sources for learning about information technology careers and .44 on the sub-section used to gather information on the people who influence the use of information technology. Even though reliability coefficients were 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.

The instruments were then printed and mailed to teachers and also placed on the web for the data collection. Each year teacher consultants were supplied with parental consent and student assent forms. During years one and two of the study, 17 of the 28 teachers had their students complete the instruments online with the remaining teachers having their students complete paper instruments. During year three, all schools completed traditional paper instruments. AEST teachers surveyed students enrolled in the Concepts of Agriscience Technology course and business and biology teachers surveyed introductory classes primarily made up of 9<sup>th</sup> and 10<sup>th</sup> graders. Since the instruments were administered to students on a specific day(s) designated by the researchers, only those students who were in class on those days completed the instruments. No follow-up measures were used to collect data from those students who were absent, so results cannot be generalized to all high school students enrolled in AEST and biology/business programs in Mississippi.

Data were summarized using descriptive statistics. Frequencies, percentages, means, and standard deviations were used to describe demographic characteristics and summarize responses provided by students regarding sources of information on information technology careers and personal influences about information technology careers.

## **Findings**

Results and findings in this paper are based on the responses provided by students who were in class on days the instruments were administered. During year one of the project, usable responses were provided by 753 students. Fifty one percent of those who responded during spring 2002 to the instrument were male. The majority (51 percent) were 9<sup>th</sup> graders and 34 percent were 10<sup>th</sup> graders. Another 10% were in the 11<sup>th</sup> grade with only 5% in the 12<sup>th</sup> grade. Caucasians comprised 54 percent on the participants while African Americans comprised 42 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 4 percent.

During year two of the project, usable responses were provided by 933 students. Fifty two percent of those who responded to the instrument in spring 2003 were male while 48 percent were female. The majority were 9<sup>th</sup> graders (59 percent) and 28 percent were 10<sup>th</sup> graders. Another 10 percent were in the 11<sup>th</sup> grade with only 3 percent in the 12<sup>th</sup> grade. Caucasians comprised 52 percent of the participants while African Americans

comprised 43 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 5 percent.

During year three of the project, usable responses were provided by 756 students. Fifty six percent of those who responded in spring 2004 were male while 44 percent were female. The majority were 9<sup>th</sup> graders (51 percent) and 32 percent were 10<sup>th</sup> graders. Another 11 percent were in the 11<sup>th</sup> grade with only 6 percent in the 12<sup>th</sup> grade. Caucasians comprised 62 percent of the participants while African Americans comprised 32 percent. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 6 percent.

### *Importance of Information Technology Career Sources*

Participants were presented with a list of 23 plausible sources for learning about information technology careers and asked how important each was for learning about such careers. Their responses are presented in Table 1. The top five sources identified in spring 2002 were “parents or guardians” ( $M = 3.42$ ), “Internet” ( $M = 3.14$ ), “other family members” ( $M = 3.13$ ), “teachers” ( $M = 3.13$ ), and “work experience” ( $M = 3.11$ ). The top five sources identified in spring 2003 were “parents or guardians” ( $M = 3.10$ ), “Internet” ( $M = 2.85$ ), “teachers” ( $M = 2.83$ ), “other family members” ( $M = 2.82$ ), and “work experience” ( $M = 2.77$ ). The top five sources identified in spring 2004 were “parents or guardians” ( $M = 2.92$ ), “other family members” ( $M = 2.73$ ), “Internet” ( $M = 2.68$ ), “teachers” ( $M = 2.65$ ), and “career day” ( $M = 2.62$ ).

The lowest rated five sources for learning about information technology careers during spring 2002 (see Table 1) were “magazines” ( $M = 2.50$ ), “newspapers” ( $M = 2.56$ ), “radio” ( $M = 2.62$ ), “school guidance counselors” ( $M = 2.63$ ), and “government publications” ( $M = 2.63$ ). The lowest rated five sources for learning about information technology careers during spring 2003 were “government publications” ( $M = 2.29$ ), “radio” ( $M = 2.30$ ), “magazines” ( $M = 2.30$ ), “newspapers” ( $M = 2.2$ ) and “local business leaders” ( $M = 2.39$ ). The lowest rated five sources for learning about information technology careers during spring 2004 were “government publications” ( $M = 2.18$ ), “magazines” ( $M = 2.25$ ), “local business leaders” ( $M = 2.27$ ), “newspapers” ( $M = 2.31$ ), and “radio” ( $M = 2.33$ ).

### *Personal Influence on the Use of Information Technologies*

Students were asked to rate 11 persons/categories of people based on how influential they were in the students’ use of information technologies. A summary of their responses is presented in Table 2. The top five persons indicated by students as having the most influence on their use of information technologies during spring 2002 were “parents or guardians” ( $M = 3.31$ ), “teachers” ( $M = 3.22$ ), “other family members” ( $M = 2.98$ ), “friends” ( $M = 2.87$ ), and “church leaders” ( $M = 2.78$ ). The top five persons indicated by students as having the most influence on their use of information technologies during spring 2003 school year were “parents or guardians” ( $M = 2.89$ ), “teachers” ( $M = 2.89$ ), “other family members” ( $M = 2.59$ ), “friends” ( $M = 2.54$ ),

Table 1

*Importance of Sources for Learning about Information Technology Careers*

	Year		
	Sp 2002	Sp 2003	Sp 2004
SOURCES FOR LEARNING ABOUT INFORMATION TECHNOLOGY CAREERS	f = 783	f = 933	f = 756
Peers or fellow classmates	2.73	2.49	2.41
Internet	3.14	2.85	2.68
Parents or guardians	3.42	3.10	2.92
Other family members	3.13	2.82	2.73
Newspapers	2.56	2.32	2.31
Magazines	2.50	2.30	2.25
Teachers	3.13	2.83	2.65
School library	2.90	2.63	2.47
Local business leaders	2.66	2.39	2.27
School guidance counselor	2.63	2.43	2.34
Government publications	2.63	2.29	2.18
Church leaders	2.91	2.46	2.34
Radio	2.62	2.30	2.33
Television	2.83	2.52	2.54
Friends	2.93	2.69	2.60
Field trips to businesses	2.98	2.63	2.55
School Career Center	2.98	2.67	2.54
Clubs and organizations	2.73	2.54	2.37
Work experience	3.11	2.77	2.56
Classroom activities	2.94	2.68	2.58
Career Day	2.97	2.68	2.62
Guest speakers	2.86	2.62	2.52
Movies/videos	2.75	2.52	2.52

*Note.* 1 = not important; 2 = somewhat important; 3 = important; 4 = very important

and “peers or fellow classmates” ( $M = 2.38$ ). The top five persons indicated by students as having the most influence on their use of information technologies during spring 2004 were “teachers” ( $M = 2.78$ ), “parents or guardians” ( $M = 2.76$ ), “other family members” ( $M = 2.52$ ), “friends” ( $M = 2.43$ ), “peers or fellow classmates” ( $M = 2.28$ ), and “school guidance counselor” ( $M = 2.28$ ).

Table 2

*Person(s) Who Influence the Use of Information Technologies*

PERSONAL INFLUENCES	Year		
	Sp 2002	Sp 2003	Sp 2004
	f = 783	f = 933	f = 756
Peers or fellow classmates	2.61	2.38	2.28
Parents or guardians	3.31	2.89	2.76
Other family members	2.98	2.59	2.52
Teachers	3.22	2.89	2.78
Local business leaders	2.55	2.27	2.23
School guidance counselor	2.57	2.28	2.28
Government leaders	2.57	2.16	2.08
Church leaders	2.78	2.28	2.18
Job supervisor	2.58	2.19	2.16
Friends	2.87	2.54	2.43
Celebrities	2.42	2.20	2.05

*Note.* 1 = not influential, 2 = somewhat influential; 3 = influential, 4 = very influential

### Conclusions/Discussion

A review of the literature clearly reveals that parents and guardians provide their children an important source for learning about careers (Andrews, Gahrns, Reeder & Tizzano, 2000; Ramos & Sanchez, 1995; Reisman & Banuelos, 1984; Trice & Tillapaugh, 1991). As shown in the findings of this research, this holds true for those careers in information technology. At the end of each academic year, parents and guardians were the most important source of learning about information technology careers in high school students. Because parents and guardians are an important influence on high school students' career choices, schools need to find more ways of involving parents in career education efforts. Suggestions made by Reisman and Banuelos (1984), Hall, Kelly, Hansen, and Gutwein (1996), and Way and Rossman (1996) should be explored. This concurs with the conclusions reached in a 1997 study by

Fisher, Margolis and Miller. Furthermore since the Internet is also an importance source of information for students to learn about information technology careers, schools need to ensure that appropriate rooms, such as career centers and the library, have Internet access for students to use to research possible career opportunities associated with information technologies..

Other family members, in addition to parents and guardians, are also important sources and influences in the career development of youth. Not only do they serve as role models, but children are also exposed to a wider variety of career opportunities as suggested by Reisman and Banuelos (1984). Teachers, especially those who teach agriculture courses, need to incorporate information on careers within each unit they teach. This has been done in the AEST program currently being taught in Mississippi secondary schools. Furthermore, supervised agricultural experience (SAE) programs must continue to be a part of the total secondary agriculture education program. While many of the students in this study were not old enough to work, there still are opportunities for them to learn about careers in information technologies. Even though students in this study are not old enough to work in IT occupations, they can gain supervised experience though “new” types of SAEs, particularly exploratory SAEs where students can job shadow individuals working in information technology careers to learn about the skills and education needed for such careers.

School guidance counselors are not significant sources for career information. This supports the conclusion drawn by Mau (1995). Maybe counselors do not see this as part of their role and it may not. It is suggested that more research be conducted on the role of school guidance counselors with regard to career education and planning.

Parents and guardians, as expected, were found each year to have the most influence on their children’s use of information technologies. This supports the conclusion drawn by Fisher, Margolis and Miller (1997). In addition to parents and guardians, those persons with whom the student comes in regular contact (teachers, other family members, friends, church leaders) were consistently rated as having the most influence on their use of information technologies. This again agrees with Mau (1995).

According to this study, parents and agriculture teachers are an important source of information in career decision making. It is important that they are aware of the many information technology career opportunities available in agriculture. Universities need to make future agriculture teachers aware of the career options through pre-service and in-service activities. Teachers need to be provided with instructional materials to teach their students about information technology careers related to agriculture. Additionally resource materials related to these careers should be made available to parents and those in high school career centers if the agricultural information technology jobs are to be filled not just by those with information technology expertise but also those well grounded in the agricultural field as well.

Even though guidance counselors received a higher rating during the third year of the study, they still have relatively little influence over students’ career choices in

information technology. A plausible reason why guidance counselors were not rated higher is that they are not in regular contact with students due to heavy workloads. Teachers should be encouraged to educate their counselors about information technology careers related to their respective academic disciplines.

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## THE USE AND DESIGN OF LABORATORY INSTRUCTION IN SECONDARY AGRISCIENCE CLASSROOMS

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### Abstract

*The purpose of this qualitative study was to examine the use of laboratory instruction in agricultural education classrooms. Interviews were conducted with four agricultural education teachers to determine the design process and assessment of laboratory activities. Additionally, benefits and challenges to the use of laboratory instruction were identified. The findings suggested that the teachers implemented a variety of laboratory activities. The teachers recognized multiple benefits including the active nature of the activities, an increase in cooperation and motivation among students, and improved subject matter retention. The challenges of laboratory instruction were increased preparation time, large student enrollments, lack of supplies and equipment, and inadequate funding. The teachers utilized multiple methods to assist in designing laboratory activities that commonly included written reports, participation grades, and performance evaluation for student assessment.*

## Introduction

In 1988, the National Research Council recommended that all students should have an understanding of basic science concepts. In response to this recommendation, at the National Conference on AgriScience and Emerging Technologies, strategies were identified to incorporate the teaching of science into high school agriculture programs. Also recognized was the need for developed materials to assist in the instruction of agricultural science. Lee (1994) stated that agriscience has expanded its purpose to provide students direct application of science education.

Buriak (1989) defined agriscience as, “Instruction in agriculture emphasizing the principles, concepts and laws of science and their mathematical relationship supporting, describing, and explaining agriculture” (p.18). Within the agriscience curriculum, agriscience laboratory activities are viewed as “learning experiences in which students interact with materials and/or models to observe and understand the nature of agriculture and its underlying biological, physical, and social science components” (Myers, 2005, p.14). These activities allow the learner to construct scientific knowledge, skills, and value from direct experience. This type of instruction is applicable to any agricultural program and allows for practical, guided experience for students to learn and test science concepts.

Dewey (1938) expressed how important experience is in the education process, “What he (the learner) has learned in the way of knowledge and skill in one situation becomes an instrument of understanding and dealing effectively with the situations which follow” (p. 44). Laboratory instruction can offer a way to structure experiential learning within the classroom. One of the principles of experiential education is that students actively engage in their own education and these experiences require personal initiative, enhance decision making, and develop individual accountability (Luckmann, 1996). This type of learning requires the use of basic science process and inquiry skills to solve problems and make decisions. In addition, it presents quality experiences, active engagement, and application of abstract concepts useful for comprehensive understanding.

This “hands-on” approach to teaching has traditionally been an agriculture teacher’s preferred method of teaching (Phipps & Osborne, 1988). However, many believe that agriculture teachers need to become more skilled at teaching students basic science process and inquiry skills through the use of science principles (Enderlin & Osborne, 1992). One method of merging student understanding of science principles with the hands-on style of agricultural education is through the use of laboratory classes and exercises. The amount of time engaged in hands-on active learning activities has been found to be a valid predictor of student science achievement (Phi Delta Kappa International, 2004). The use of laboratory instruction provides students the opportunity to make sense of abstract and complex scientific concepts through meaningful engagement with laboratory materials. This interaction encourages success among a variety of students. Johnson, Wardlow, and Franklin (1997) state, “science education can inform the agricultural education profession as it moves to a more science-based curriculum,

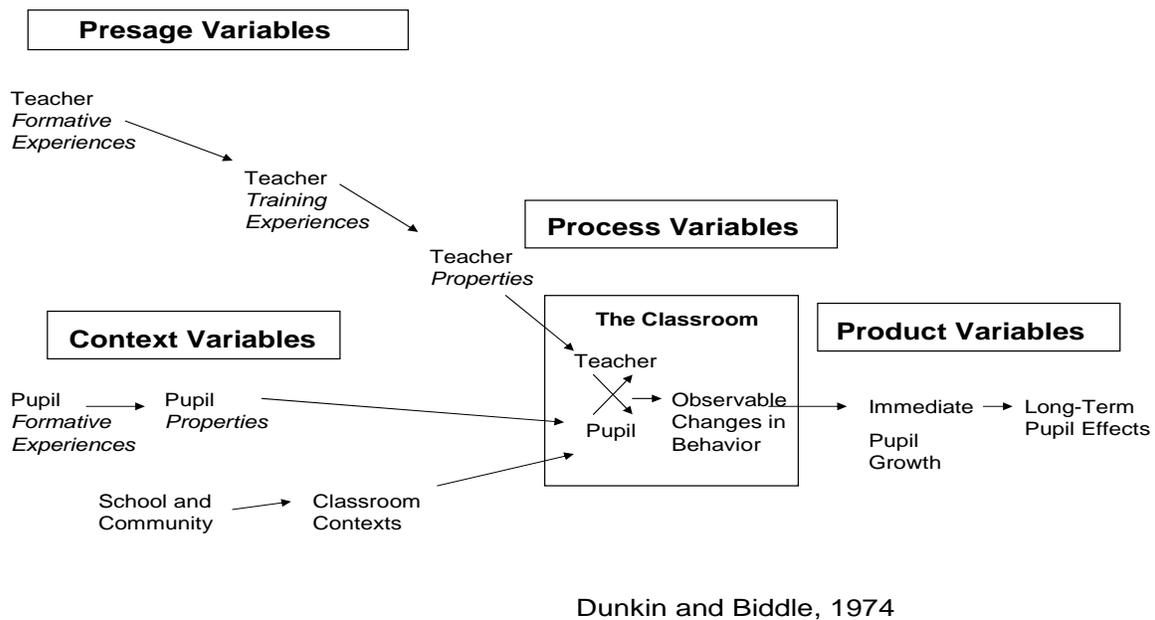
specific research involving agricultural education teachers and students is needed. It is only through such research that the effectiveness of instructional practices in agriscience can be evaluated” (p. 10).

The science education literature is quite clear on the teaching approach that should be employed in teaching scientific concepts in both the laboratory and the classroom. In the *National Science Education Standards* (National Academy of Science, 1996), inquiry based instruction is identified as being the key to improving student understanding of science. It could be reasoned that this teaching approach should also be employed by agriscience instructors attempting to achieve the same purpose. Teachers of agriculture have been found to possess the requisite science process skills necessary to teach integrated science in the agricultural education laboratory (Myers, Washburn, & Dyer, 2004). However, Myers (2004) found that many secondary agricultural education teachers were unfamiliar with the inquiry based instructional strategy. Baker, Lang, and Lawson (2002) note several problems that may arise in a hands-on learning environment such as the agriscience laboratory setting. They recognized the time and energy required for preparation, inadequate facilities, student immaturity, safety concerns, and management of materials and equipment as being major concerns of teachers implementing hands-on activities. According to Horton (1988), overcrowding is the number one safety concern cited by teachers.

The majority of research conducted in this area has examined the attitudes and perceptions of various groups within education and agricultural education regarding the integration of science into the agriculture curriculum (Myers, Washburn, & Dyer, 2004). Although these studies have been important, the time has come to build upon the critical foundation they have laid. This study attempted to look inside the agricultural education classroom/laboratory to examine what is actually occurring based on the perceptions of current agriculture teachers.

### **Theoretical Framework**

A prototypical model of teaching was suggested by Mitzel (1960). He proposed that teaching must take into account sets of variables: teachers and students, their interactions, and the product of those interactions. Dunkin and Biddle (1974) expanded on the Mitzel model to include four major variable types: presage, context, process, and product (see Figure 1). Presage variables, such as teacher formative experiences, teacher-training experiences, and teacher properties, concern the characteristics of teachers that may influence the teaching process. Context variables concern the conditions to which the teachers must adjust, and include characteristics of the environment about which teachers, school administrators, and teacher-educators can do very little. Process variables include the actual activities in which teachers and pupils engage in while classroom teaching is taking place. Product variables focus on the outcomes of teaching, specifically the changes that result in the students.



**Figure 1. Mitzel model of teaching**

This study attempted to identify the various factors that make up these variables in the agriscience education laboratory. By gaining a better understanding of these variables and their interaction, it is hoped that student achievement in science and agriculture can be improved.

### **Problem Statement**

If hands-on learning or a laboratory activity is a preferred and successful method of instruction, and many agriculture teachers are teaching scientific concepts in their courses, the question needs to be asked, “How are agriculture teachers using laboratory activities in their classrooms to promote the learning of agriscience principles?”

### **Purpose and Objectives**

The purpose of this study was to examine the use of laboratory instruction in agricultural education classrooms. The objectives of this study were to:

1. Identify the definition and use of laboratory instruction.
2. Determine benefits and challenges to the use of laboratory instruction in agricultural education classrooms.
3. Explain how laboratory activities are designed for use in the agricultural education program.
4. Describe the assessment techniques used for laboratory activities.

## **Methods and Procedures**

A qualitative approach was utilized to explore the use of laboratory instruction in agriscience classrooms. Interviewing allowed for the researchers to develop an understanding of the environment and use of laboratory instruction techniques in classroom settings (Seidman, 1998). The purposive sample for this study included four agriscience teachers in a southern state. Initially, using the state's agricultural teacher directory, a list was generated of potential teachers to contact regarding participation in the study. After consultation with an agricultural education faculty member from the state's land-grant institution, eight potential teacher participants were identified as having an effective lab component in their agricultural education program. Using electronic mail and the telephone, four randomly selected teachers were contacted prior to the State FFA Convention to solicit their cooperation and participation in the study. Upon agreement to participate, interview times and locations were arranged with the selected teachers.

The final sample was comprised of teachers with a range of teaching experience (1 - 20 years) from different regions around the state. Three of the teachers taught high school and one teacher taught middle school. All of the high schools were rural with a production oriented curriculum. The middle school was located in a suburb of a major metropolitan area in the state. Each of the interview participants had a production agriculture background and earned bachelor degrees in either agricultural education or agricultural science.

## **Method of Data Collection**

Semi-structured interviews were used to collect data for the study. The interview questions encouraged each teacher to identify benefits and challenges associated with the use of laboratory instruction and to describe how they implemented and assessed laboratory activities in the agriscience classroom. An interview guide was used to structure the interview process, but the researchers included probing questions for expansion and clarification of answers. A single interview lasting 20-25 minutes was conducted with each teacher. With the consent of the participants, each interview was audio-taped and transcribed at a later time. When completing the open coding process, a line-by-line method was used to identify common themes in the responses of the participants. To enhance the trustworthiness of the study, analyst triangulation was used (Patton, 1990). This type of triangulation was achieved through the use of two interviewers and the analysis of data and comparison of findings among multiple individuals.

## **Results**

### *Objective One*

Objective one sought to identify the definition and use of laboratory instruction in agricultural education classrooms. Participant definitions of laboratory instruction included hands-on activities and "instruction that consists of students engaged in

investigations where they work in groups, use equipment, and search for solutions to problems outside the realm of a textbook.” Some examples of laboratory activities that the teachers included in the classroom were: livestock reproduction labs, injection labs, insect dissection, palm transfer, agricultural mechanics, land laboratory activities, welding, and germination. All of the teachers stated that they tried to spend approximately 50% of their instructional time engaged in laboratory activities. However, in some courses the amount of time devoted to laboratory instruction was as high as 80%. One teacher stated, “I try to find a happy medium between the two. But, it varies throughout the year.”

### *Objective Two*

Objective two sought to determine benefits and challenges to the use of laboratory instruction in agricultural education classrooms. The most commonly discussed benefit referred to the active nature of laboratory instruction. Additionally, the teachers described the positive aspects of cooperation and socialization among students and an increase in the retention of subject matter when participating in laboratories. The teachers also recognized an increase in student motivation, “they are more motivated to learn because they are having fun while they are doing it” and credited laboratory instruction for improved student recruitment and retention, “they (students) know that they are not going to have to sit behind a desk everyday.”

The integration of laboratory activities was also identified as a recruitment tool. All participants agreed the laboratory nature of their courses attracted students to their programs. The teachers noted that by having quality laboratory activities, students were able to apply the information they gained in the classroom.

All participants identified similar challenges to teaching in the agricultural education laboratory setting. The following items were identified as common challenges to the use of laboratory instruction: extra amount of preparation and planning time required, inability to obtain necessary supplies and equipment, large student enrollment in classes, and lack of funds. One teacher described the challenge posed by sharing equipment with the science department,

as willing as they (the science department) are to share, it becomes a logistical issue of you’ve got to schedule it because that class is using them today and tomorrow and if you do not have it mapped out well when your lesson is weeks in advance then it is a challenge in getting those things when you need them.

With the increased use of laboratory instruction, student safety becomes even more important and challenging for the teacher. Safety concerns recognized by one teacher were, “whenever they are out of their seats the possibility of accidents is much greater like tripping, getting pushed, falling off a chair, breaking a test tube while their glasses are on their foreheads instead of on their eyes.”

### *Objective Three*

Objective three sought to explain how laboratory activities are designed for use in the agricultural education program. The teachers cited the use of previously developed laboratory curriculum, prior experience, common knowledge, and textbooks to assist in the development of laboratory activities. The lack of quality agriscience curriculum, including laboratory activities, was cited as a reason limiting the number of laboratory exercises incorporated into the teachers' courses. They noted that time was a limiting factor on their ability to adapt exercises found on the web or in science textbooks for use in their classes.

The participants' schools did not offer any opportunities for professional development related to laboratory instruction, "the only thing my school promotes at all is reading." The only source of relevant professional development was offered through university sponsored workshops. Also, the teachers received limited instruction on the incorporation of laboratory activities during their preservice teacher preparation. One teacher noted that during her preservice teacher program she had taken one laboratory instruction course.

### *Objective Four*

Objective four sought to describe the assessment techniques used for laboratory activities. According to the National Research Council (2001), assessment includes "making judgments about students' quality of work and designing the necessary steps for improvement" (p.7). The teachers cited the use of written reports, and performance and participation grades as the most frequent methods of assessment. One teacher recommended, "always collect a written product."

Subjective grading was also a common measure of student achievement. As one teacher stated, "It's subjective... Tests don't really tell the true story on several kids... We run a farm basically so it's not new and fun every time we go out", so subjective grading becomes a frequently used assessment technique for laboratory instruction.

## **Conclusions / Recommendations**

All participants tended to define laboratory instruction as any type of hands-on activity. They did provide some clarification in their definition, yet it still failed to fully embrace all aspects of the definitions found in the literature.

Laboratory instruction was reported to provide benefits to the total agricultural education program. Increases in student motivation and achievement were reported by all teachers involved in this study. Teachers also noted a positive relationship between the incorporation of laboratory activities and student recruitment and retention. This concurs with similar findings by Myers, Dyer, and Breja (2003).

The participants in this study confirmed the earlier findings of Baker, Lang, and Lawson (2002). Most lamented the lack of time, equipment, and prepared agriscience laboratory activities as the major challenges they faced in the use of laboratory instruction. It should also be noted that all teachers that were part of this study had a very positive relationship with school administrators and guidance counselors. None felt that they faced the challenge of being a “dumping ground” for difficult students.

A lack of prior preparation and experience may hinder the use of laboratory instruction in the classroom. During preservice preparation, only one of the four teachers received any type of preparation to assist them with the implementation of laboratory activities. With the transition to agriscience, laboratory instruction should be included in the teaching methods course. Not only should preservice students learn about laboratory instruction, but they should be given the opportunity to participate in laboratory activities. Additionally, preservice students could observe current teachers who have effectively implemented laboratory instruction into their program or facilitate a laboratory activity during one of their early field experiences.

The participants identified a lack of local professional development opportunities for laboratory instruction and an absence of necessary supplies and equipment. With the absence of such opportunities, agricultural education departments should design or collaborate with science educators to deliver teacher workshops. The most successful professional development activities are extended over time and actively involve teachers in the learning activities that they will incorporate in their classrooms (National Research Council, 2000). To enhance continuity, faculty members should develop a sequence of professional development workshops to extend over a period of several years. To address the problem of limited supplies, the workshop activities should include laboratory activities that can be completed using inexpensive and easily available supplies. Additionally, teachers should have the opportunity to participate in all the laboratory activities included in the workshops.

Hands-on experience available through laboratory instruction plays a central role in the learning process and educators should place more emphasis on this concept when developing curriculum. Active involvement with individual projects, group activities, and real life situations improves student motivation, behaviors, and understanding of abstract concepts and theories. Teachers should incorporate similar opportunities into their classes that require students to participate in these methods. These experiential activities are positively correlated with student achievement scores, enhancing leadership development skills, and teaching personal responsibilities (Cheek, Arrington, Carter, & Randell, 1990). By employing new strategies and teaching applications, agricultural educators can continually enhance their programs and positively impact student learning and growth.

Furthermore, more quality agriscience laboratory activities should be developed and disseminated to classroom teachers. Those involved in this study made it clear that if more fully developed activities were available, they would utilize those materials. It is

also possible that these materials exist, yet teachers are just unaware of how to access them. Further investigation is needed to address this curriculum availability/access issue.

Additional research is also needed to more completely understand the working definition of laboratory instruction held by current agriscience teachers. Moreover, and possibly more importantly, further investigation is needed to determine the actual amount, types, and quality of laboratory instruction taking place in agricultural education programs. More qualitative investigations should be conducted to gain a better understanding of current practice. Then based upon this foundational knowledge, experimental studies can be conducted to evaluate the effectiveness of various laboratory instruction techniques.

Agriscience offers a meaningful context for the application of science. The teacher is an essential element in this process. In order for successful laboratory instruction to occur within the classroom, the teacher must supervise, direct, and facilitate activities so science process skills and concepts can be developed. With appropriate teacher guidance, students can construct scientific knowledge in the context of agriculture.

As agricultural educators become more accountable for teaching science, they must change their teaching styles and allow students to engage in self discovery learning. Laboratory instruction in the agriculture classroom offers an appropriate, meaningful setting for students to develop these skills. Teachers must take advantage of laboratory activities and challenge students to have a hands-on/minds-on learning experience.

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## FACTORS INFLUENCING GIFTED AND TALENTED STUDENTS' COLLEGE DECISIONS

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**Thomas W. Broyles**, Virginia Tech

### *Abstract*

*The agricultural industry as a whole and educators in particular, face the challenge of attracting qualified candidates to pursue careers in agriculture. Gifted and talented students have the skills and knowledge to meet the employment needs of the industry. The purpose of this study was to determine the demographic makeup of the 2005 Virginia Governor's School for Agriculture (VGSA), the factors that influence the students' decision to pursue post-secondary education, and the factors that influence the students' choice of post-secondary institution. The findings showed that the 2005 VGSA students (N = 93) were primarily female (67%) and White (74%). The factors (n = 84) with the highest influence on the students' decision to pursue post-secondary education were their career goals, learning opportunities, self-motivation, earning potential, and their mothers. Factors most strongly influencing the students' choice of post-secondary institution were desired field of study, career goals, campus environment/atmosphere, the institution's reputation, and campus location.*

## **Introduction**

The agricultural industry is much different than it was 50 or even 20 years ago. Advances in science and technology have made production more efficient, requiring fewer workers. Nevertheless, a steady supply of well-trained and highly-educated professionals will be needed to meet the complex demands of modern American agriculture (Betts & Newcomb, 1986; Edwards, Leising, & Parr, 2002). Many careers in agriculture require knowledge and skills in science and math (Shelley-Tolbert, Conroy, & Dailey, 2000), offer high salaries, and appear in profitable sectors such as food processing and agricultural finance (National Research Council, 1988). Gifted and talented students potentially have the skills to meet the demands of the agricultural job market.

The agricultural industry is faced with the challenge of recruiting gifted and talented students to pursue higher education, which would in turn lead them to careers in agriculture. As the NRC's (1988) findings on agricultural education pointed out in the late 1980s, "Neither students nor Americans in general have a realistic view of agriculture's scope, career possibilities, or involvement with scientific progress and the use of sophisticated biological, chemical, mechanical, and electronic technologies" (NRC, 1988, p. 22). Researchers predict that approximately 52,000 jobs will be available annually in agriculture between the years 2005 and 2010, with only 49,300 qualified college graduates available to fill them (Goecker, Gilmore, Smith, & Smith, 2005).

Agricultural educators need to understand the process that gifted and talented students use to make important decisions, such as whether and where to pursue post-secondary education. This study sought to determine the factors that influenced these decisions by surveying students who completed the 2005 VGSA.

## **Theoretical Framework**

Researchers have conducted numerous studies on the college decision making process (Espinoza, Bradshaw, & Hausman, 2000). To describe the process, Hossler and Gallagher (1987) created a three-stage model: predisposition, search, and choice. During the predisposition stage, typically from grades seven through nine (Cabrera & La Nasa, 2000), students will decide whether or not to continue their formal education after high school (Hossler & Gallagher, 1987). Several factors influence students at this stage, including individual characteristics, the attitudes of significant others, and educational activities (Espinoza, et al. 2000). Parental traits, such as encouragement, socioeconomic status, and collegiate experiences, also play a prominent role, as do the students' ability, high school academic resources, and access to college information. Students at this time develop career and educational aspirations and may enroll in college-preparatory curricula (Cabrera & La Nasa, 2000).

In the second stage, search, usually between grades 10 and 12 (Cabrera & La Nasa, 2000), students start to consider specific colleges, universities, and vocational schools. Research has shown that students assess location and academic programs when

choosing their institution (Hossler & Gallagher, 1987). Occupational and educational aspirations, ability, parental encouragement, family socioeconomic status, and high school academic resources also influence students during the search stage (Cabrera & La Nasa, 2000). The outcome of this stage results in the students developing a narrowed list of prospective institutions with information on each (Cabrera & La Nasa, 2000).

Choice, the final stage, begins when students submit applications to institutions, usually during grades 11 and 12. Factors that influence a student's final decision include the institutions' academic reputations, costs, and locations (Hossler & Gallagher, 1987). Parental encouragement and socioeconomic status continue to influence the students' decisions, along with occupational and educational aspirations and ability (Cabrera & La Nasa, 2000). Students are aware of college expenses, financial aid, institutional attributes, and admission standards (Cabrera & La Nasa, 2000). This stage concludes with a commitment marked by pre-registration, attendance, and financial aid application for the desired institution (Cabrera & La Nasa, 2000).

Parents have been found to have the most influence on educational and career decisions (Esters & Bowen, 2005; Esters, 2005; Broekemier & Seshadri, 1999; Fisher & Griggs, 1995; Houser & Yoder, 1992; Kotrlik & Harrison, 1989). Specifically, alumni from urban secondary agricultural-education programs who went on to complete higher education indicated in a survey by Esters (2005) that parents and/or guardians were the strongest influence on their decision to pursue post-secondary education. Furthermore, mothers had more influence than fathers (Esters, 2005). Broekemier and Seshadri (1999) also found that parents, followed by high school friends, had the most influence on students' college choices.

Specifically regarding gifted and talented students, Houser and Yoder (1992) found that summer enrichment programs, parents, representatives of a profession, and high school teachers had the strongest influence in determining college major, and students weigh personal interests, happiness, abilities and skills, and career interests most heavily. (Houser & Yoder, 1992). Houser and Yoder (1992) used a population similar to this study: gifted and talented students attending a summer enrichment program for agriculture. Cannon (2005) found that gifted and talented students' choices of college, field of study, and career were influenced by the summer enrichment program for agriculture in which they participated. Galotti and Mark (1994) argued that high-ability students structure the decision-making process in a more complex and thorough way than other students. Note that Galotti and Mack were referring to high-ability students, not the gifted and talented. Galotti and Mack (1994) used academic achievement in characterizing students as high-ability. Gifted and talented students are defined as "those identified by professional and qualified persons, who by virtue of outstanding abilities are capable of high performance" (Marland, 1972, p. 2). Academic ability is not the only characteristic used to determine if a child is gifted or talented (Cannon, 2005).

### **Purpose and Objectives**

The purpose of this study was to identify the factors that influenced the college

choice of gifted and talented students in the late search stage or early choice stage of the decision-making process. This study was guided by research conducted by Esters (2005) and Esters and Bowen (2005). Those studies attempted to determine the factors which influenced college and career choices by urban agricultural education students. Comparisons were made by the researchers based on gender (Esters, 2005; Esters & Bowen, 2005). Specific objectives for this study were to determine:

1. The demographic profile of the gifted and talented students in this study;
2. The factors that influence students' decision to pursue post-secondary education with a comparison of those factors by gender and ethnicity; and
3. The factors that influence students' choice of post-secondary institution with a comparison of those factors by gender and ethnicity.

### **Methods and Procedures**

A review of relevant literature from related studies (Esters, 2005; Esters & Bowen, 2005; Hodges & Barbuto, 2002; Houser & Yoder, 1992) was conducted before developing the instrument, and a panel of students and faculty of the Virginia Tech Department of Agricultural and Extension Education reviewed the instrument during its development. The students who completed the 2005 VGSA, a summer residential program for gifted and talented students from Virginia hosted by the Virginia Tech College of Agriculture and Life Sciences, constituted the population (N = 93) for this study.

The researchers used the 94 students who began the VGSA as a focus group to develop the final instrument. During the first week of the VGSA, an email was sent to all students, asking them to identify their immediate plans upon graduation from high school. Sixty-seven students (71%) responded, with 62 indicating that they planned to attend college. Subsequently, the researchers sent an email to those who had indicated that they would attend college and asked them to identify the factors that influenced their decision to attend college and their selection of a specific college or university. Table 1 displays the 23 factors students claimed influenced their decision to attend college. Table 2 displays the 32 factors students identified that influenced their choice of institution of higher learning.

Table 1

*Student Responses of Factors that Influence the Decision to Attend College*

Factor	# of Responses	Factor	# of Responses
Parents	14	HS Accomplishments	2
Career Goals	10	Love of Learning	2
Earning Potential	6	Peers	2
Self-Motivation	5	Entrance Requirements	1
Desire for Higher Ed	3	Father	1
Learning Opportunities	3	Friends	1
Life Opportunities	3	Guidance Counselors	1
Teachers	3	Desire for New Experience	1
Family	2	Peer Pressure	1
Field of Study	2	Desire for Recognition	1
Finances	2	Siblings	1

Table 2

*Student Responses of Factors that Influence Choice of Higher Education Institution*

Factor	# of Responses	Factor	# of Responses
Field of Study	18	Facilities	2
Environment/Atmosphere	11	Guidance Counselors	2
Location	11	Athletic Team	2
Relatives	8	University Ranking	1
Campus Visit	7	Summer Programs	1
Friends	6	Society	1
College Reputation	6	College Resources	1
Parents	6	Graduate Studies	1
Finances	5	College Fairs	1
Career Goals	3	School Website	1
Entrance Requirements	3	Boyfriend	1
Teachers	3	Books	1
Siblings	3	Internet Sites	1
University Faculty	3	Food	1
Peers	2	Size	1

The responses to the second email were used to develop the final instrument, which consisted of two parts. The first asked students to rate the influence each factor had on their decision to pursue higher education on a Likert-type scale. The 23 factors identified by the students were narrowed to 15 for the instrument. A five-point Likert-type scale was used, with one being no influence and five being very high influence. A Cronbach's Alpha of .83 was established for this portion of the instrument. The second part asked the students to rate the influence each factor had on their choice of institution on a Likert-type scale. The 33 factors identified by the students were narrowed to 23 for the instrument. A five-point Likert-type scale was used, with one being no influence and five being very high influence. A Cronbach's Alpha of .92 was established for this part of

the instrument. The instrument was given to 93 students during the final week of the VGSA (Note: one student left the program before the final week). Eighty-four students (90%) completed and returned the instrument. The Statistical Package for the Social Sciences (SPSS 13.0 Student Version for Windows) was used to code and analyze data. Descriptive statistics, including frequencies, means, and standard deviations, were used for data analysis.

## Findings

*Research Objective One:* The demographic profile of the gifted and talented students in this study.

The researchers used data provided by the Virginia Department of Education to analyze the demographics of the population. Sixty-two females (67%) and 31 males (33%) completed the program, 69 (74%) being White and 24 (26%) Non-White. (Asian and Black students constituted the Non-Whites.). Of the students who completed the instrument, 54 were females (64%) and 30 were males (36%); 62 (74%) White and 22 (26%) Non-White.

*Research Objective Two:* The factors that influence students' decision to pursue post-secondary education.

Table 3 shows data on the influence of different factors on the choice to pursue post-secondary education. The students indicated that career goals had the strongest influence ( $M = 4.64$ ). Other factors with high influence were learning opportunities ( $M = 4.58$ ), self-motivation ( $M = 4.54$ ), earnings potential ( $M = 4.45$ ), mothers ( $M = 4.35$ ), field of study ( $M = 4.24$ ), fathers ( $M = 4.24$ ), and recognition ( $M = 4.04$ ). Mothers received a higher mean score than fathers, and other relatives ( $M = 3.22$ ) had a slightly higher score than siblings ( $M = 3.19$ ). As for educational professionals, teachers ( $M = 3.90$ ) scored higher than guidance counselors ( $M = 3.29$ ). It is also interesting to note that friends ( $M = 3.65$ ) received a higher score than siblings, other relatives, and guidance counselors.

When the data were analyzed by gender, career goals, earning potential, self-motivation, and learning opportunities were the top four factors for both males and females. Both male and female students rated mothers ( $M = 4.40$  for males and  $M = 4.31$  for females) as having a slightly higher influence than fathers ( $M = 4.37$  for males and  $M = 4.17$ ). With the exception of learning opportunities and friends, male students had higher mean scores for all factors that influenced the decision to attend a post-secondary institution.

Table 3

*Factors Influencing Student Decision to Attend Post-Secondary Education by Gender*

Factors	Overall n=84			Males n=30			Females n=54		
	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>
Career Goals	1	4.64	0.69	1	4.70	0.79	2	4.61	0.63
Learning Opportunities	2	4.58	0.70	4	4.40	0.89	1	4.68	0.55
Self-Motivation	3	4.54	0.74	3	4.57	0.63	3	4.52	0.79
Earning Potential	4	4.45	0.86	2	4.63	0.89	4	4.35	0.83
Mother	5	4.35	1.00	4	4.40	0.97	5	4.31	1.02
Father	6	4.24	1.07	7	4.37	1.00	6	4.17	1.11
Field of Study	6	4.24	0.82	4	4.40	0.67	7	4.15	0.89
Recognition	8	4.04	1.11	8	4.30	1.06	8	3.89	1.13
Teachers	9	3.90	0.93	9	4.10	0.99	9	3.80	0.88
High School Accomplishments	10	3.87	1.21	9	4.10	1.09	10	3.74	1.23
Finances	11	3.69	1.30	11	3.87	1.31	12	3.59	1.30
Friends	12	3.65	1.28	13	3.52	1.33	11	3.72	1.23
Guidance Counselors	13	3.29	1.34	12	3.57	1.48	13	3.13	1.24
Relatives	14	3.22	1.52	14	3.38	1.61	13	3.13	1.48
Siblings	15	3.19	1.64	15	3.28	1.67	13	3.13	1.63

*Note.* Scale: 1=No Influence, 2=Very Low, 3=Low, 4=High, and 5=Very High.

White students and Non-White students both ranked career goals as the factor with the most influence, as shown in Table 4, which presents data by race/ethnicity. White students ranked learning opportunities and earning potential second ( $M = 4.59$ ), self-motivation fourth ( $M = 4.55$ ), and mothers fifth ( $M = 4.26$ ). Non-Whites ranked mothers second ( $M = 4.59$ ), learning opportunities third ( $M = 4.55$ ), self-motivation fourth ( $M = 4.50$ ), and earning potential fifth ( $M = 4.45$ ). Whites ( $M = 3.72$ ) ranked friends higher than did Non-Whites ( $M = 3.45$ ), whereas Non-Whites ( $M = 3.59$ ) rated relatives higher than Whites ( $M = 3.08$ ).

Table 4  
*Factors Influencing VGSA Student Decisions to Attend Post-Secondary Education by Race/Ethnicity*

Factors	Overall n=84			White n=62			Non-White n=22		
	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>
Career Goals	1	4.64	0.69	1	4.65	0.75	1	4.64	0.49
Learning Opportunities	2	4.58	0.70	2	4.59	0.69	3	4.55	0.74
Self Motivation	3	4.54	0.74	4	4.55	0.76	4	4.50	0.67
Earning Potential	4	4.45	0.86	2	4.59	0.69	5	4.45	0.67
Mother	5	4.35	1.00	5	4.26	1.02	2	4.59	0.91
Father	6	4.24	1.07	7	4.19	1.02	6	4.36	1.22
Field of Study	6	4.24	0.82	6	4.24	0.82	8	4.23	0.83
Recognition	8	4.04	1.11	8	3.95	1.08	7	4.27	1.20
Teachers	9	3.90	0.93	10	3.82	0.97	9	4.14	0.77
High School									
Accomplishments	10	3.87	1.21	9	3.89	1.23	11	3.82	1.18
Financial	11	3.69	1.30	12	3.54	1.26	10	4.09	1.34
Friends	12	3.65	1.28	11	3.72	1.28	13	3.45	1.30
Guidance									
Counselors	13	3.29	1.34	13	3.27	1.30	15	3.32	1.49
Relatives	14	3.22	1.52	15	3.08	1.55	12	3.59	1.40
Siblings	15	3.19	1.64	14	3.13	1.61	14	3.33	1.74

*Note.* Scale: 1=No Influence, 2=Very Low, 3=Low, 4=High, and 5=Very High.

*Research Objective Three:* The factors that influence students' choice of post-secondary institution.

Data on factors influencing the VGSA students' choice of post-secondary institution by gender are displayed in Table 5. Field of study ranked highest overall ( $M = 4.56$ ), for males ( $M = 4.48$ ), and for females ( $M = 4.61$ ). Career goals was second overall ( $M = 4.49$ ), and for males ( $M = 4.45$ ) and females ( $M = 4.52$ ). Campus environment/atmosphere ( $M = 4.44$ ), the institution's reputation ( $M = 4.41$ ), and location ( $M = 4.32$ ) rounded out the top five. It should be noted that parents were in the middle of the pack, with male students rating fathers ( $M = 3.79$ ) slightly higher than mothers ( $M = 3.76$ ); and female students rating mothers ( $M = 3.56$ ) slightly higher than fathers ( $M = 3.46$ ). Significant others ( $M = 2.46$ ) received the lowest score.

Table 5

*Factors Influencing VGSA Students' Choice of Institution of Higher Learning by Gender*

Factors	Overall n=84			Male n=30			Female n=54		
	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>
Field of Study	1	4.56	0.67	1	4.48	0.74	1	4.61	0.63
Career Goals	2	4.49	0.68	2	4.45	0.74	2	4.52	0.65
Campus Environment/Atmosphere	3	4.44	0.67	3	4.36	0.73	3	4.49	0.64
Institution's Reputation	4	4.41	0.69	4	4.28	0.75	3	4.49	0.64
Location	5	4.32	0.70	6	4.14	0.58	5	4.42	0.75
Campus Visit	6	4.19	0.81	5	4.21	0.72	6	4.17	0.81
University Facilities	7	4.01	0.92	7	4.11	0.83	8	3.96	0.97
Entrance Requirements	8	4.00	0.89	8	3.97	0.94	7	4.02	0.87
Finances	9	3.85	1.21	13	3.72	1.25	9	3.92	1.20
HS Teachers	10	3.71	1.12	9	3.93	1.03	11	3.60	1.16
University Faculty	11	3.70	1.16	14	3.64	1.25	10	3.73	1.12
Graduate Programs	12	3.64	1.25	10	3.83	1.17	13	3.53	1.29
Mother	13	3.63	1.29	12	3.76	1.21	12	3.56	1.33
Father	14	3.58	1.31	11	3.79	1.26	15	3.46	1.34
Summer Programs	15	3.50	1.26	15	3.46	1.43	14	3.52	1.18
Friends/Peers	16	3.35	1.18	16	3.24	1.06	16	3.41	1.25
Websites	17	2.98	1.34	17	3.14	1.43	17	2.88	1.29
Other Relatives	18	2.90	1.51	18	3.10	1.50	20	2.78	1.53
Siblings	19	2.88	1.60	19	3.00	1.56	19	2.82	1.64
Guidance Counselors	20	2.84	1.32	19	3.00	1.41	22	2.75	1.28
Athletic Teams	21	2.83	1.36	21	2.93	1.31	21	2.76	1.39
University Marketing	21	2.81	1.36	22	2.76	1.41	18	2.85	1.35
Significant Other	22	2.46	1.43	23	2.55	1.45	23	2.40	1.43

*Note.* Scale: 1=No Influence, 2=Very Low, 3=Low, 4=High, and 5=Very High.

Table 6 contains data concerning the factors influencing the VGSA students' choice of post-secondary education by race/ethnicity. Field of study had the most influence on both White ( $M = 4.53$ ) and Non-White students ( $M = 4.64$ ). Career goals ranked second for White ( $M = 4.49$ ) and Non-White students ( $M = 4.50$ ). Campus environment/atmosphere ( $M = 4.46$ ), institutional reputation ( $M = 4.41$ ), and location ( $M = 4.36$ ) were listed third, fourth, and fifth respectively by White students. Non-White students ranked campus environment/atmosphere and institutional reputation ( $M = 4.41$ ) third and entrance requirements ( $M = 4.27$ ) fifth. It is interesting to note that Non-White students rated entrance requirements, father, and mother higher than did White students.

Table 6  
*Factors Influencing VGSA Student Choice of Institution of Higher Learning by Race/Ethnicity*

Factors	Overall n=84			White n=62			Non-White n=22		
	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>	Rank	<i>M</i>	<i>SD</i>
Field of Study	1	4.56	0.67	1	4.53	0.68	1	4.64	0.66
Career Goals	2	4.49	0.68	2	4.49	0.68	2	4.50	0.67
Campus									
Environment/Atmosphere	3	4.44	0.67	3	4.46	0.71	3	4.41	0.59
Institution's Reputation	4	4.41	0.69	4	4.41	0.68	3	4.41	0.73
Location	5	4.32	0.70	5	4.36	0.69	6	4.22	0.75
Campus Visit	6	4.19	0.81	6	4.19	0.84	7	4.18	0.73
University Facilities	7	4.01	0.92	7	4.07	0.90	11	3.86	0.99
Entrance Requirements	8	4.00	0.89	8	3.90	0.94	5	4.27	0.70
Financial	9	3.85	1.21	9	3.78	1.14	9	4.05	1.40
Teachers	10	3.71	1.12	11	3.68	1.18	12	3.82	0.96
HS University Faculty	11	3.70	1.16	10	3.69	1.25	13	3.73	0.94
Graduate Programs	12	3.64	1.25	12	3.64	1.22	14	3.64	1.33
Mother	13	3.63	1.29	14	3.42	1.33	7	4.18	1.01
Father	14	3.58	1.31	15	3.41	1.31	9	4.05	1.21
Summer Programs	15	3.50	1.26	13	3.59	1.26	16	3.27	1.28
Friends/Peers	16	3.35	1.18	16	3.29	1.15	15	3.50	1.26
Websites	17	2.98	1.34	19	2.88	1.31	18	3.22	1.41
Other Relatives	18	2.90	1.51	22	2.74	1.51	17	3.32	1.49
Siblings	19	2.88	1.60	19	2.88	1.60	20	2.90	1.64
Guidance Counselors	20	2.84	1.32	18	2.89	1.32	21	2.68	1.36
Athletic Teams	21	2.83	1.36	17	2.91	1.35	22	2.59	1.37
University Marketing	21	2.81	1.36	21	2.78	1.37	19	2.91	1.38
Significant Other	23	2.46	1.43	23	2.46	1.44	23	2.45	1.44

*Note.* Scale: 1=No Influence, 2=Very Low, 3=Low, 4=High, and 5=Very High.

### Conclusions

The following conclusions are based on the findings of this study and apply only to the population of the study. That population was the students who completed the 2005 VGSA, and the population of this study is unlike those cited from previous research. The majority of the students who attended the 2005 VGSA were White females. This supports findings from previous studies of the VGSA (Cannon, 2005; Duncan & Broyles, 2004).

The students who comprised the population of this study were entering either the 11<sup>th</sup> or 12<sup>th</sup> grade of high school in the succeeding school year. It can be inferred from previous research that the population of this study had completed the predisposition phase of the college selection process (Hossler & Gallagher, 1987; Cabrera & La Nasa, 2000).

It can be inferred, then, that some were in the search stage, while others were in the choice phase (Hossler & Gallagher, 1987; Cabrera & La Nasa, 2000). Career goals, learning opportunities, self-motivation, and earning potential had the strongest influence on their decisions to seek post-secondary education. This does not support other findings that parents, and in particular mothers, had the most influence on that choice (Esters & Bowen, 2005; Esters, 2005; Broekemier & Seshadri, 1999; Fisher & Griggs, 1995; Houser & Yoder, 1992; Kotlik & Harrison, 1989). However, the findings show that parents do strongly affect the decision-making process. It must be noted that the population of this study was unlike the populations cited in the guiding studies.

The students indicated that the most important factors in selecting a college or university were chosen field of study, career goals, campus environment/atmosphere, and campus location. These findings partially support Houser and Yoder (1992), who found that career interests were important in the selection of a college or university. Other factors, such as parents and summer programs, which Houser and Yoder (1992) argued had strong influence, were not as powerful with this population.

### **Implications/Discussion**

The students of the 2005 VGSA indicated that career goals and future educational opportunities had the most influence on their decisions to attend a post-secondary school. Realizing that agricultural education prepares students for careers in the industry, and given the importance of career-related factors for gifted and talented students, school systems could institute a curriculum that exposes those students to diverse agricultural careers. This supports Esters and Brown's conclusions (2005) from their study of former urban agricultural-education students. Studies forecast a shortage of qualified college graduates to fill positions in the industry through the year 2010 (Goecker, Gilmore, Smith, & Smith, 2005), and those well paying, challenging jobs await gifted and talented students.

Many gifted and talented students do not have the opportunity to enroll in agricultural education. Agricultural educators and the industry could continue to improve the curriculum so that more schools can provide courses in agriculture. Gifted and talented students should have more opportunities, particularly during the predisposition stage, to expose them to agricultural careers. One possibility would be to offer an agricultural program to gifted and talented students earlier in their academic careers.

Although parents did not influence students as much as career-related factors did, they remain instrumental in their children's college decisions. It is important that agricultural educators provide parents with information about the many careers in the industry. Teachers have the opportunity to influence students' decisions by familiarizing them with career opportunities in the agricultural industry.

The findings also showed the importance of career goals and desired field of study in the choice of college or university. Agricultural educators and knowledgeable guidance counselors can provide information on universities with agricultural programs

that help gifted and talented students meet their career goals. It is also important for colleges of agriculture to market fields of study that help these students reach their goals. Colleges and universities can also tout their campus environments, reputations, and locations to gifted and talented students.

### **Recommendations**

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

1. Gifted and talented students should be exposed to the diverse careers in the agricultural industry during the predisposition stage of the college choice process;
2. Opportunities should be extended to gifted and talented students who do not attend the VGSA or have the chance to enroll in agricultural education programs.

The following are recommendations for further research:

1. Research should be conducted on other Governor's Schools for Agriculture or similar schools to compare the results from the 2005 VGSA;
2. Research should be conducted on other gifted and talented programs to determine whether generalizations exist for the college-decision-making process;
3. Follow-up research should be conducted on VGSA students to discover which institutions and fields of study the students pursue; and
4. Further research should be conducted to determine the impact of the VGSA on the college-decision-making process;

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# LEADERSHIP CONTEXT AND ROLE OF RURAL FFA MEMBERS IN THE SOUTHERN REGION

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## Abstract

*Numerous studies have examined the degree to which youth have acquired particular leadership skills or the level within the organization at which the members have participated in leadership activities. This study sought to describe and map the context of leadership activities and role with adult-youth interaction of rural FFA members in the southern region. With regard to the role of youth in their leadership activities, FFA members indicated they agreed their role in leadership activities included being partners, resources, recipients and objects. Rural southern FFA members examined FFA activities focusing on leadership development within the context of self, community, groups and others. When mapping their FFA leadership experiences, respondents indicated the greatest agreement was in role of youth-adult role as partners within the context of others. Respondents tended to be white males, high school freshmen with one year in FFA. In addition, few held a chapter office. Future research should include greater analysis of the youth/adult role and context of leadership activities specifically relating to the educational level and years of experience in FFA.*

## Introduction

Over the past several decades, a number of studies have attempted to characterize the leadership skills and behaviors of various youth organizations. These studies have tended to examine either the degree to which youth have acquired particular leadership life skills or the level within the organization at which the members have participated in leadership activities. Little attention has been paid to either the conceptual role that the young person plays in the day-to-day functioning of society or the context in which the leadership behaviors are performed. Research has suggested that the most effective leadership development programs engage young people in meaningful ways as they work as partners with adults in addressing real world situations.

### *Role of Youth in Society*

Lofquist (1989) developed what he termed a *spectrum of attitudes* that adults may hold regarding the role of young people in society. The left side of his continuum (Figure 1.) represents an attitude where young people are viewed as *objects*, being told what to do because the adult *knows what's best* for the youth. As *recipients*, young people participate in learning experiences that adults see as *being good for them*. However, the real contributions of young people are seen as being deferred until some later date and learning experiences are seen as practice for later life. When youth are viewed as *resources*, actions of young people have present value to the community and there is an attitude of respect focusing on building self-esteem and being productive. The Innovation Center for Community and Youth Development (2001) later added a characterization of youth as *partners* to Lofquist's original continuum. As partners, youth share leadership and decision-making roles with adults.



Figure 1. A Spectrum of Adult Attitudes toward Youth (Lofquist, 1989).

The view adults take toward young people tends to shape the nature of the leadership programs they design. In some programs, leadership is taught through formal routines that emphasize command and compliance. The leader is *in charge* and followers are objects to be directed. In other programs, youth run club meetings and organize events as practice for more significant roles in the community later in life. In these instances youth are recipients of programs designed by well-meaning adults. When programs involve young people as resources, youth grow, gaining knowledge, skills and building self-esteem from their involvement in service learning activities such as food drives and community clean-up campaigns while performing needed functions within their community. More recently, youth have been engaged as full partners with adults in making decisions and taking actions aimed at producing sustainable and vibrant communities.

### *Context of Leadership Activity*

Ayres (1987) identified four key developmental phases through which individuals engaged in a leadership curriculum should progress (Figure 2). First individuals must develop an expanded knowledge of self: that is who they are, what they believe, and how they function. Next, they move toward mastering skills necessary to work effectively with others. In the next phase, individuals refine their skills working with groups or organizations. The final phase focuses on leadership within the context of communities, systems, and society. As the arena in which leadership is being practiced continues to broaden, individuals must use knowledge and skills learned at previous levels to be effective in the new context.

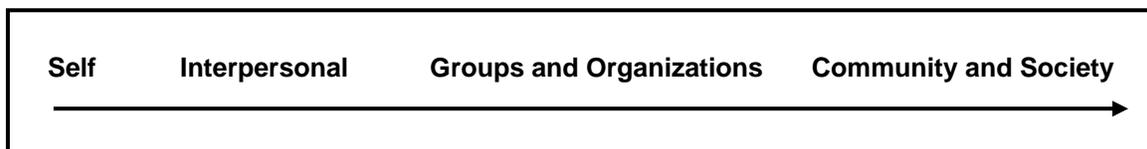


Figure 2. Context of Leadership Activity (Ayres, 1987).

Similarly, Austin (1996) offered a leadership model which focused on developing knowledge and skills first at the individual level, emphasizing that “before we can contribute to a larger effort, it is imperative that we understand ourselves” (p. 118). However, in this model group development included knowledge and skills related to interpersonal communication and interactions, as well as, the ability to participate in and understand group development, working together to achieve goals, and dealing with conflict. The third level in this model of leadership development focuses on community, recognizing that the ultimate goal of individual and group development is to serve the common good beyond the individual or organization.

### *Leadership Development in Agricultural Education (FFA)*

One of agricultural education’s goals is leadership development. This foundation is shown through the organization’s mission statement, “The National FFA Organization is dedicated to making a positive difference in the lives of students by developing their potential for premier leadership, personal growth and career success through agricultural education” (The National FFA Organization, 2005a). Additionally, service to others and to the community is a key component of FFA, and is reflected in its motto, “Learning to Do, Doing to Learn, Earning to Live, Living to Serve” (The National FFA Organization, 2005b).

Precepts for developing leadership through secondary agricultural education were established and referred to as the 16 Precepts of National FFA Essential Learnings (Figure 3). As a result, through this initial work and funding from USDA and John Deere Company, a leadership curriculum was developed named, *LifeKnowledge*.

*LifeKnowledge* is founded on the leadership theory of four phases (Figure 3). This framework is closely related to the theory of Ayres (1987) in examining the context of leadership activities.



Figure 3. National FFA Essential Learnings of the *LifeKnowledge* Leadership Curriculum.

### Theoretical/Conceptual Framework

The theoretical/conceptual framework is based on the leadership theories of Ayres (1987) and Lofquist (1989). Ayres (1987) identified four key developmental phases through which individuals engaged in a leadership curriculum should progress: self, interpersonal, groups and community. Lofquist (1989) developed what he termed a *spectrum of attitudes* that adults may hold regarding the role of young people in society: youth as objects, recipients, resources and partners.

This study is rooted in the connections with leadership developmental phases with the context of leadership activities (Ayres, 1987) and the spectrum of attitudes adults hold of member role in these leadership activities (Lofquist, 1989). Specifically, researchers established a new leadership theory examining member role in leadership activities (Lofquist, 1989) while addressing the leadership phases and context of activities (Ayres, 1987) as shown in a conceptual map focusing on youth development (Figure 4). Youth organizations conduct leadership activities across the continuum and members are viewed by adults in each area, therefore youth organizations have activities focusing within each cell of the matrix. As the cell moves up and to the right, greater leadership takes place (Peiter Horstmeier & Nall, in press).

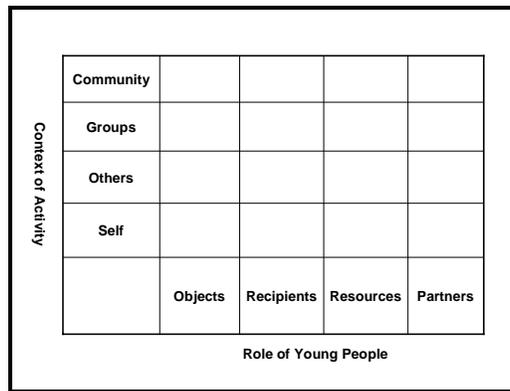


Figure 4. Conceptual Map of Member Leadership Role and Context of Leadership Activities (Peiter Horstmeier & Nall, in press).

### Purpose and Objectives

Many studies have examined the context of leadership activities, specifically with the National FFA Organization. However, few if any studies have examined how members' leadership role interacts within the context of each specific leadership activities. The overall purpose of this study is to describe and map the leadership activities and adult-youth interactions of rural students who are current southern region members of the National FFA Organization.

Specific objectives of the study include:

- 1) Examine demographics of rural FFA members in the southern region.
- 2) Describe the context in which FFA leadership activities are performed.
- 3) Describe the role of rural FFA members in those activities.
- 4) Plot the intersection of role and context.

### Procedures

The target population for this descriptive study was members of the National FFA Organization located in the Southern region. Specially, rural youth were identified. For the purposes of this study, *rural schools* were defined as those serving a geographic region containing no city or town larger than ten thousand residents.

A multi-stage cluster sampling technique was implemented to draw a representative sample of active FFA members from across the southern region. In the first stage, three states were randomly selected from the National FFA Organization's Southern Region. In the second stage of the sampling procedure, state FFA advisors randomly selected four schools, each containing FFA chapters which serve rural areas. Of these twelve schools, a total of nine FFA chapters (75%) responded, resulting in 392 members ( $N=392$ ) completing the instruments. Non-response error was examined and no differences were detected between early and late respondents.

### Development of Instrument

A researcher developed instrument was created for the purpose of collecting data regarding youth participation in leadership activities. The context of youth activities were identified by developing statements which reflect the potential roles FFA members engage in as they develop leadership skills moving from personal development to interpersonal development to organizational and group development to ultimately engaging in community and societal leadership (Ayres, 1987).

Roles of rural youth in adult-youth relationships through FFA leadership activities were also examined. Questions were developed which reflected the role in which FFA members were engaged through leadership activities which viewed them as objects, recipients, resources, and/or partners (Lofquist, 1989).

In 2004, researchers created a matrix integrating the context of leadership development in relationship to the roles of youth in the context of FFA leadership activities at the local, state, and national levels. Four questions were developed for each cell of the matrix. A total of sixty-four questions were developed in this instrument, corresponding to the sixteen quadrants of the role-context matrix (Figure 5). Statements examining demographic data were also included with the instrument.

Context of Activity	Community	13	14	15	16
	Groups	9	10	11	12
	Others	5	6	7	8
	Self	1	2	3	4
		Objects	Recipients	Resources	Partners
Role of Young People					

Figure 5. Member Role-Context of Leadership Activities Matrix (Peiter Horstmeier & Nall, in press).

Each question began with the statement, *In my FFA Chapter...* and through responses Southern Region FFA members measured their current state of leadership activities. Responses were measured using a four point Likert-type scale. The points on the scale were: *1 = Strongly Disagree, 2 = Disagree, 3 = Agree, 4 = Strongly Agree*. For example, a cell 1 statement representing Self and Others was *In my FFA Chapter...New members must participate in initiation activities*. In contrast, cell 16 represents

Community and Partners. A specific statement in this cell read *In my FFA Chapter...Members work side by side with local citizens in planning, conducting and evaluating meaningful community projects*. Four statements were developed for each cell in the role-context matrix describing FFA leadership activities in the paired levels in the role-context matrix.

Validity and reliability of this instrument were established. Content and face validity of the instrument were established using a panel of experts. These experts were in the field of leadership development, current agricultural education teachers serving on the National Association of Agricultural Educators (NAAE) Board of Directors, extension staff, agricultural education pre-service teachers, and former FFA members.

The instrument was pilot tested with FFA members from a southern state not included in the random sample. Reliability was established using Chronbach's Alpha and was reported for each construct. Scores included: Objects ( $\alpha = .71$ ), Recipients ( $\alpha = .85$ ), Resources ( $\alpha = .88$ ), Partners ( $\alpha = .86$ ), Self ( $\alpha = .72$ ), Interpersonal ( $\alpha = .88$ ), Groups ( $\alpha = .88$ ), and Community ( $\alpha = .88$ ).

After receiving approval from the Human Subjects Review Board, researchers received a waiver of consent. Permission was granted by the FFA advisor and school administrator for their students to participate in the study. Dillman (2000) research design method was incorporated; therefore 12 FFA chapter advisors were notified of the opportunity to participate prior to the first mailing. Follow-up contacts were made with non-respondent FFA chapters. Ultimately, nine FFA chapters agreed to participate in the study, leading to a response rate of 75%. Survey instruments were mailed to the chapter advisors and each advisor administered the survey instrument to all FFA members in their chapter. Researchers received 392 completed survey instruments. Research data were analyzed using SPSS 10.0. Early and late respondents were compared, with no differences being found. Descriptive statistics of frequencies, percentages, means, and standard deviations were given for each objective.

## Findings

The first objective examined the personal characteristics of rural FFA members in the Southern Region (Table1). Over half of the respondents were male (60.1%). Of those who reported ethnicity, over two-thirds (86.0%) were Caucasian. Nine percent (9.3%) of respondents were African American, and (2.6%) reported their ethnicity as Hispanic. Approximately one percent were Asian (1.3%) and 0.8% of the respondents indicated their ethnicity as other.

In terms of level of education, over one-third of the respondents were high school freshman (33.7%). Approximately one-fourth (23.7%) of the respondents were juniors (23.7%), 22.7 % were sophomores, 15.6% reported being seniors, and 4.3% of the respondents were in Middle School.

Almost four of 10 members (39.5%) were first year members of FFA, and 18.1% were second year members. Seventy-one agricultural education students have been FFA

members for three years (18.6%), over one-tenth (12.8%) have been members for four years, and 4.2% have been FFA members for 5 years. Finally, 6.8% of the respondents reported being an FFA member for six years. In terms of leadership positions in the FFA, only 20.9% of the respondents reported serving as a chapter officer.

Table 1

*Personal Characteristics of Rural Members in the Southern FFA Region*

Personal Characteristics	<i>f</i>	%
Gender ( <i>n</i> =388)		
Male	233	60.1
Female	155	39.9
Ethnicity ( <i>n</i> =392)		
White, Non-Hispanic	332	86.0
Black, Non-Hispanic	36	9.3
Hispanic	10	2.6
Asian	5	1.3
Other	3	0.8
Grade in School ( <i>n</i> =392)		
Middle School	17	4.3
Freshman	132	33.7
Sophomore	89	22.7
Junior	93	23.7
Senior	61	15.6
Years in FFA ( <i>n</i> =382)		
1	151	39.5
2	69	18.1
3	71	18.6
4	49	12.8
5	16	4.2
6	26	6.8
Chapter Officer ( <i>n</i> =392)		
Yes	82	20.9
No	310	79.1

The second objective described the context (Self, Interpersonal, Groups, Community) in which leadership activities are performed (Table 2). Rural FFA members in the southern region viewed leadership activities focusing on personal development (self) as the greatest ( $M=3.04$ ) context in which leadership activities are performed.

Members viewed activities resulting in Community/Society Development as the second highest. Leadership activities resulting in skills related to group development ( $M=2.97$ ) followed. Interpersonal development ( $M=2.94$ ) was perceived as an area of least involvement ( $M=2.98$ ).

Table 2

*Context in which FFA Leadership Activities are Performed*

	<i>M</i> ( <i>n</i> =392)	<i>SD</i> ( <i>n</i> =392)
Self	3.04	.518
Others	2.94	.529
Groups	2.97	.525
Community	2.98	.581

*1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree*

The third objective described the role of youth (Objects, Recipients, Resources, Partners) in leadership activities (Table 2). Rural FFA members in the southern region viewed themselves as partners ( $M=3.04$ ) to a greater degree than any of the other roles. However, following very closely, youth saw their role as resources ( $M=3.03$ ) in leadership activities. Southern region FFA members viewed their role in leadership activities as recipients ( $M=2.93$ ) and objects ( $M=2.91$ ) less than they viewed their role as partners and resources.

Table 3

*Describe the Role of FFA Members in Leadership Activities*

	<i>M</i> ( <i>n</i> =392)	<i>SD</i> ( <i>n</i> =392)
Objects	2.91	.510
Recipients	2.93	.507
Resources	3.03	.545
Partners	3.04	.557

*1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree*

The final objective was to analyze the intersection of role and context to the leadership activities. Table 4 and Figure 6 show how FFA members in the southern region perceived their role in leadership activities (Objects, Recipients, Resources, Partners) related to the context (Self, Others, Groups, Communities). When members

responded to survey statements regarding the role and context of their leadership involvement, they indicated the greatest agreement in the cell relating to involvement as a partner in the context of working with others ( $M=3.09$ ) (Others and Partners role-context). Youth perceived their role and context equally as resources and self ( $M=3.08$ ) and partners and self ( $M=3.08$ ). This indicated that in the resources and self role-context matrix, members viewed activities which focused on personal development (self) in the context of being resources or partners.

Context of Activity	Community	2.92	2.92	2.06	2.98
	Groups	2.90	2.94	3.00	2.04
	Others	2.91	2.78	2.96	3.09
	Self	2.90	3.06	3.08	3.08
		Objects	Recipients	Resources	Partners
Role of Young People					

*1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree*

Figure 6. Matrix Showing Intersection of Member Role and Leadership Context (Peiter Horstmeier & Nall, in press).

Table 4

*Means of Member Role and Context for FFA Leadership Activities*

	<i>M</i> ( <i>n</i> =392)	<i>SD</i> ( <i>n</i> =392)
Objects and Self	2.90	.610
Objects and Others	2.91	.627
Objects and Groups	2.90	.660
Objects and Community	2.92	.650
Recipients and Self	3.06	.620
Recipients and Others	2.78	.676
Recipients and Groups	2.94	.599
Recipients and Community	2.92	.666
Resources and Self	3.08	.630
Resources and Others	2.96	.599
Resources and Groups	3.00	.684
Resources and Community	2.06	.664
Partners and Self	3.08	.607
Partners and Others	3.09	.653
Partners and Groups	2.04	.670
Partners and Community	2.98	.656

*1=Strongly Disagree, 2=Disagree, 3=Agree, 4=Strongly Agree*

Rural southern FFA members displayed least agreement in two areas. The first included members' role as a resource in the context of community ( $M=2.06$ ). FFA members' also indicated the least agreement was their role as partners in the context of group development ( $M=2.04$ ).

### **Conclusions/Recommendations/Implications**

Respondents tended to be white males, high school freshmen with one year in FFA. In addition, few held a chapter office. It is recommended to analyze each demographic area, specifically by gender, grade level, years of membership in FFA, and FFA officer involvement. Furthermore, the role and context of leadership development through FFA leadership activities with upper classmen and experienced FFA leaders should be examined. Are we currently focusing on a few, select group of students, or all FFA members? Do officers view their leadership experiences (role and context) differently than other members? Do those students with just one or two years of experiences view their role and the context of leadership development the same?

Respondents indicate that their FFA activities provide them the opportunity to move through various leadership roles. In the southern region, rural FFA members view their greatest role with leadership activities was with youth/adult partnerships in their community. Members also agreed that in leadership activities they have a role as resource and recipient. The least role members view themselves as the role of an object.

Rural FFA members in the southern region believe leadership activities they are provided in the context of experiences in all areas: self, groups, others and community. However, rural FFA members in the southern region view opportunities focusing on self development as the greatest. Leadership activities in the context of community are also prevalent with southern rural FFA members. These FFA members have the least experience with leadership activities as it relates to community.

Respondents indicated the strongest agreement in being treated as partners, when examining FFA leadership development in the terms of role of youth and context of the leadership activities. However, the greatest agreement was in a partnership that focused on developing self. Similarly, members greatly viewed their role as a recipient and resource in the context of self development. As we looked at developing leadership knowledge and skills moving from self to interpersonal development to group development and ultimately to community/society development, the means decreased at each level. This indicates less opportunity for involvement in leadership activities focusing on developing skills at a higher level.

It is recommended that rural FFA chapters in the southern region continue to organize activities around the conceptual framework identified in this study. Ultimately, FFA chapters should design activities to engage youth as objects, recipients, resources, and partners in an age-appropriate manner. Similarly leadership development activities should help young people gain skills in the context that help them better understand self,

interact with others, function effectively in groups, and provide leadership within the community.

However, the benefits of engaging young people as partners in addressing real community issues and concerns are increasingly well documented. When young people exercise leadership in real community contexts, their activities have more meaning and young people feel a stronger bond to the community in which they live. Furthermore, when leadership development activities have real consequences, they are not seen as just practice for future community roles. Community-based leadership experiences include service learning, action research, youth organizing and youth serving on community boards. It is recommended that rural FFA members in the southern region utilize their chapter Program of Activities (POA) to further enhance their chapter leadership activities that partnership with community organizations and its leaders. Chapter FFA advisors in the southern region must also become more aware of members' role for community partnership and its benefit for developing leadership.

Future plans include continuation of this study in several ways. First, it is recommended the perception of FFA advisors in the southern region be investigated. Through gaining advisors' viewpoints, the members' role and the context of the chapter leadership activities can be further investigated.

In addition, replication of this study should also occur. This study should be replicated with all members, not only those in rural areas. This data would provide Agricultural Education leaders information for all members in FFA. Additionally, replication of this study could provide comparative analysis specific to each particular demographic (rural, urban, etc).

Furthermore, replication of this study would allow national, state and chapter leaders to examine the role and context of the FFA leadership activities of each level over time. Specifically, this data will allow examination of leadership development as the *LifeKnowledge* curriculum is infused into the academic agricultural education classroom.

It is recommended to conduct focus groups with chapter leaders to further define and clarify the degree of involvement in their roles and the context of the activities. This qualitative data could further explore implications to this study. Additionally, scenarios should be infused to describe leadership situations comparing the context and roles. Ranking of these scenarios will provide additional validation to the FFA members' leadership activities at the chapter level as they relate to role and context.

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## **LEADERSHIP EXPECTATIONS OF COUNTY FARM BUREAU BOARD MEMBERS**

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*The objective of this study was to measure the extent to which county Farm Bureau members practice the leadership expectations held by state Farm Bureau leaders and the level of importance they assign to those skills. This study examined the expectations that the Florida Farm Bureau Federation has of its local leaders who are members of county boards and the level of importance and proficiency that those board members place on these skills. A sample of county board members from the Florida Farm Bureau Federation, a voluntary agricultural organization, were given an instrument to measure the importance and their proficiency of 66 leadership practices in four competency areas, which were: leadership, political process, effective boards, and knowledge of Farm Bureau. This study found “gaps” between importance and proficiency, with this data, the Florida Farm Bureau Federation can tailor a leadership development program to meet the needs of the Farm Bureau organization and its members.*

## Introduction

Those involved in agriculture in the United States and the State of Florida realize the need for people to step forth and provide a strong and educated voice to lead agriculture, and bring the needs and issues of the rural community to the forefront at the community, state, national and international levels. A reasonable choice to provide this voice for rural communities and provide individuals to participate in the leadership process are members of Farm Bureau. Farm Bureau reflects the future of agriculture and rural communities in its membership, the younger members who are embarking on their careers and looking towards leadership positions in the future (P. Cockrell, personal communication, September 10, 2002).

For those that do accept leadership positions within the Farm Bureau organization, will they be effective and provide strong leadership? Florida Farm Bureau realizes the need to provide leadership training for its members, but what training should it offer? McCaslin (1993) theorized that sustainable rural development has been and will be realized only through programs, which focus on active involvement of human resources rather than a passive approach. Florida Farm Bureau is taking this proactive approach, realizing the need for leadership development and wanting to take the next step in designing a leadership-training program for its county board members.

A focus group consisting of county Farm Bureau presidents agreed that training for county board members should be improved, with one participant going on to state that it is “the very weakest link” in his county Farm Bureau’s program (Florida Farm Bureau Public Relations Division [FFBPRD], 1998). Findings from a study of those who went through a leadership development program found that those who participated felt more confident about promoting causes, were able to motivate others better, made more informed decisions on public issues, were better able to work with people and lead a group, and deal with local leaders better (Rohs & Langone, 1993). If the Florida Farm Bureau Federation (FFBF) were to offer such a leadership-training program to its county Farm Bureau board members, the expectations are that participants would have similar experiences and results.

Organizations can play a significant role by nurturing future leaders. They can provide the education and training necessary for the advancement of leadership among their members (Foster, 2000). Pernick (2001) states:

There are two advantages of building leadership talent within an organization. First, the next generation of leaders is groomed by the organization and can instill the culture and agenda of the organization. Secondly, the organization has greater control over the supply of leaders with the necessary skills, which makes implementation of the organization’s agenda easier and quicker. (p. 429)

Leadership development resides in the context of a community or organization and must answer the question, “leadership for what?” (Foster, 2000). This study will attempt to provide a basis for the “what” for the FFBF. It will provide research that will

allow the state organization to customize a leadership development program for its membership with the expectations that after members go through this training they will have the leadership background necessary to become effective leaders not only in the Farm Bureau organization, but in their homes, businesses, and communities. The effects of a leadership development program for Farm Bureau members could be far reaching, but before those effects can be felt, desired leadership practices must be identified, existing behavior in current leaders must be determined, and “gaps” between desired practices and existing behavior must be identified.

### **Theoretical/Conceptual Framework**

Farm Bureau is

An independent, non-governmental, voluntary organization governed by and representing farm and ranch families united for the purpose of analyzing their problems and formulating action to achieve educational improvement, economic opportunity and social advancement and, thereby, to promote the national well being. Farm Bureau is local, county, state, national, and international in its scope and influence and is non-partisan, non-sectarian and non-secret in character (AFBF, 2003, para. 2).

The strength of Farm Bureau from the county to the national level begins at the grassroots with individual members who decide to become active and take on leadership roles in the organization. Farm Bureaus across the country are voluntary organizations, which rely on their membership to provide leadership on local, county, state and national boards and committees.

Developing a sense of identification with the organization is of high importance to grassroots organizations. The development of group cohesion, team building, and increasing perceived social support may prove effective in enhancing the identification and further strengthening the favorability of members’ attitudes (Hinkle, Fox-Cardamone, Haseleu, Brown, & Irwin, 1996). The development of a social identity serves to sustain membership in a grassroots organization. This social identity serves as a motivator for participating in a group. Individuals strive to maintain their self-esteem by committing to a group, participating in its activities, identifying with its behaviors, and adopting its symbols (Pratkanis & Turner, 1996). Bettencourt (1996) states, “grassroots efforts may succeed if they capitalize on initiating grassroots involvement by helping potential volunteers to become identified with the grassroots organization and on maintaining activism by encouraging cohesion and commitment among the members of their group” (p. 209).

A lack of leadership in grassroots organizations may have dire consequences on the success of the group and the attempt to achieve change. To reduce chances of failure, grassroots organizations need to foster the leadership skills of their members (Bettencourt, 1996). An organization’s strength is a direct result of the strength of the leaders of the organization. Organizational leaders must be active in their organization,

generate productive activity, and must encourage and command changes in the organization (Maxwell, 1995). The survival of institutions depends on the capacity of “leaders to develop and maintain organizational cultures that foster and sustain autonomy and independence while strengthening the ability of individuals to care for and commit to the organization and the larger community” (Scott, 2000, p. 13).

Leaders in organizations have many roles that they fill. Duke (1998) stated that individuals are seen to occupy roles which represent sets of expectations and these roles are a function of social context and individual understanding. An assumption about human nature supports this “role theory” is that humans are capable of self-reflection and evaluation. Inquiry in sociological research must focus on understanding how people define situations, determine what is expected of them, and select courses of action. Role expectations become an important source of information for the study of organizations.

Organizational leaders will need to be able know the roles they play and to be able to read the larger environment at various levels to know which level to focus attention on so their organization can negotiate change successfully. Not-for-profit organizations need leaders who can engage in the process of “systems thinking.” This is leadership that can understand the bigger picture without being pulled into tunnel vision or allow quick fixes of problems (Scott, 2000).

Staples (1984) notes, “The person who acts alone has very little power. When people join together and organize, they increase their ability to get things done. The goal is to strengthen their collective capacities to bring about social change” (p. 1). “Organizations with the broadest base of participation usually develop the best leaders and, in turn, those leaders help increase membership involvement. Existing leaders and organizers have the responsibility for expanding the leadership core and motivating, teaching, and supporting the new people who emerge” (Staples, 1984, p. 129). An organization’s choice not to innovate or change with the times is the largest reason for its decline. Organizational performance is measured by its development of its people, its standing, innovation, and its productivity. Changes in population structure and population dynamics are important trends to watch in the future of organizations, as these trends will cause an organization to evolve. The populations that comprise the memberships of organizations are changing and no longer remain as constant as they once did (Drucker, 2001).

Northouse (1997) defines leadership as, “a process whereby an individual influences a group of individuals to achieve a common goal” (p. 3). At the core of leadership are the ideas that leadership is a process, it involves influence, it occurs within a group and it involves the attainment of a goal by the group (Northouse, 1997). An important impediment to achieving leadership effectiveness is a lack of leadership skill. Skill is needed because the role of the leader is both complex and simple. Simple, because effectively functioning groups have a natural synergy that gives them momentum and complex because the relationships with group members are dynamic and constantly changing, depending on the situation, goals, and the environment (Hersey, Blanchard & Johnson, 1996).

One of the fastest ways to build leaders in an organization is to train them. Leadership development programs that aid in the assurance of an adequate supply of effective leaders are a vital and continuing need in communities and organizations across the U.S. (Rohs & Langone, 1993). Leadership development builds the capacity of local leaders and citizens. This means enhancing the potential of individuals to solve problems. It is done by engaging citizens and organizations to identify needs, resources, and opportunities (Hustedde & Woodward, 1996).

A major responsibility of an organization is to cultivate leadership skills and pass on that knowledge to the next generation of leaders. Because of retirement, many organizations are facing a high turnover rate, which means that the leaders of tomorrow could look, and think a lot differently, about their commitment and role within the organization (Eisinger, 2002). Eisinger (2002) continues by stating, “once associations identify future volunteer leaders, they must offer specific training programs” (p.14). Much of this training needs to be directed towards those volunteers who are serving on organizational boards as they sometimes lack the necessary skills to be effective board members.

Many non-profits have a functioning board. Those that serve on the boards have a personal commitment to the organization’s cause. Most board members should have a deep knowledge and understanding about the organization. The key to making the board effective is organizing the work of the board (Drucker, 2001). The board of an organization should reflect the makeup of the membership, which includes people of different backgrounds, ethnicities, ages, and interest. If the board has been homogeneous in the past, it needs to broaden its horizons and welcome new ideas that emerge from interactions among different groups (Eisinger, 2002).

Tweeten (2002) states, “dynamic, visionary boards are absolutely critical to the future of nonprofit, service delivery organizations” (p. 1). Twenty-first century boards are facing inevitable changes as a result of dramatic and continuing societal changes. These changes include the way people learn, the way they view authority, philanthropy, and non-profit organizations, and the way they live, work, and play with emphasis on self-development, independence, flexibility, rapidly moving technology, and family (Tweeten, 2002).

There are several ways organizations will have to change to remain viable and effective in the future. Organizations need to realize that there are other ways for the meaningful involvement of people in their organizations other than on their boards. Boards will need to be more resourceful and their membership more diverse to reflect the population they represent accurately. Board members will have to be team players, with the ability to work effectively in a group. Board members will need to make intense commitments to their board responsibilities. This commitment may result in board members cycling in and out appropriately, depending on their available time to be fully engaged as they serve on the board. Commitments may be shorter, but more concentrated (Tweeten, 2002).

A study by Bright (2001) on the commitment of board members suggested that individuals believe that commitment among board members is essential to the effective functioning of boards. When board members served primarily because they had an emotional attachment to the organization, the board experienced higher performance, though passions and personal experiences individuals bring to the cause often obscure objective thinking and may thwart the success of the organization. Research has suggested that ideal board members are personally affected by the problem(s) the organization focuses on. It has also shown that board members who care, but have some distance from the issue are best because they are able to make difficult decisions for the good of the organization as a whole, based on facts, not emotions (Bright, 2001).

The more citizens participate in organizations and their communities, the more they learn to trust others; the greater the trust of others, and the more likely they are to participate. Social capital is the reciprocal relationship between civic participation and interpersonal trust. Brehm and Rahn (1997) believe that, “civic engagement and generalized trust, and the dynamic that sustains them, have important consequences for the polity, specifically, citizens’ confidence in political institutions” (p. 1003). According to Garkovich (1984), associations and organizations, “provide the locus in which individual interests are articulated and translated into action goals, and humans and other resources are mobilized for goal accomplishment” (p. 199).

Whether volunteering on an organizational board or for the organization in general, it is important that the group has common goals. Hersey et al. (1996) state “research has consistently shown that group productivity is highest in those groups in which techniques are used that simultaneously further the attainment of group goals and bring fulfillment of the needs of individual group members” (p. 363).

The goals of an organization help shape the organizational leaders as do the context, norms and values of the organization and determine the effectiveness of a group. Two conditions that face all organizations and their leaders are external adoption and internal integration. External adaptation is the idea that all organizations fit a context; the survival of the organization is contingent on the organization’s ability to address the needs and expectations of its environment. Internal integration is the assurance that all members of the organization value and pursue the goals of the organization (Duke, 1998).

Effective groups are those in which the needs of the group are harmonious with the needs of the individuals. Individual needs may be different for each group member. The key to individual needs satisfaction is that those needs are dependent upon the accomplishment of the group goals. The degree to which individual need satisfaction is achieved differentiates those effective groups from ineffective ones (Hersey et al., 1996).

The shifting demographic trends may make it necessary for organizations to modify their approach to volunteerism and how leadership opportunities are structured. Differing leadership styles need to be considered. Keeping the interest levels high in volunteers is not achieved by increasing their responsibilities, instead, they need to feel like they have ownership in the association (Eisinger, 2002).

Those who volunteer are less interested in serving in long-term commitments and in a designated role for the entire year, and are more willing to work on one project and see it through to completion. Organizations are learning that the more you give board members to do, the more they tend not to return (Eisinger, 2002). Washbush (1998) states, “personal motivation, self-assessment, diagnostic skills coupled with vision, and the ability to communicate are fundamentally important to one who aspires to have an impact in the organization” (p. 251).

Sorcher and Brant (2002) state, “homogenous groups often run more smoothly, but they lack the synergistic power of a diverse team of people with talents, skills, and characteristics that complement one another” (p. 80). Exceptional leaders are willing to take risks by picking people who are not like them and who may have different leadership styles.

There are several trends that need to be addressed by nonprofit boards: (1) limited availability of board members, (2) lack of preparation of board members, (3) lack of recruitment strategies, (4) board members who are on too many boards, and (5) board members who do not understand their roles (Tweeten, 2002). Many organizations do not have procedures in place to identify or recruit potential leaders. Potential leaders are sometimes assessed based on hearsay, observations, and insufficient information. The process of identifying these future leaders is not simple or straightforward as leadership is a complex, multifaceted capability (Sorcher & Brant, 2002).

Organizations need to consider these trends as many organizations are struggling with a shortage in leadership, though in these organizations, there may be a lot of leadership talent that goes unused. Leaders tend to favor other potential leaders with backgrounds, experiences, and characteristics that are similar to their own. Often promising potential leaders are overlooked because of differences in gender, race, or cultural, academic, socioeconomic, or geographical background (Sorcher & Brant, 2002).

Leaders are managers of group dynamics. They are a key component to the effectiveness of any group. Effective leaders will recognize the variations among individual members in their abilities and willingness to do a job and assign work roles accordingly. Effective leaders are sensitive to the natural cycle of commitment to long-term projects and provide the necessary support to sustain commitment over prolonged periods (Garkovich, 1984). Organizations need to retain their volunteers to remain effective and viable into the future.

A major responsibility of an organization is to cultivate leadership skills and pass on that knowledge to the next generation of leaders. Eisinger (2002) states, “once associations identify future volunteer leaders, they must offer specific training programs” (p.14). Much of this training needs to be directed towards those volunteers who are serving on organizational boards as they sometimes lack the necessary skills to be effective board members.

## **Purpose/Objective**

Organizations can play a significant role by nurturing future leaders. They can provide the education and training necessary for the advancement of leadership among its members (Foster, 2000). The effects of a leadership development program for Farm Bureau members could be far reaching, but before those effects can be felt, desired leadership practices needed to be identified, existing behavior in current leaders needed to be determined, and “gaps” between desired practices and existing behavior needed to be identified.

The objective of this study was to measure the extent to which county Farm Bureau members practice the leadership expectations held by state Farm Bureau leaders and the level of importance they assign to those skills. This study examined these expectations that the FFBF has of its local leaders who are members of county board and the level of importance and proficiency that board members place on these skills. With the data this study provided, the FFBF can tailor a leadership development program to meet the needs of Farm Bureau and Farm Bureau members.

## **Methods/Procedures**

The research design of this study was a two-part assessment of the Florida Farm Bureau and its membership using qualitative research methods. The two parts of this study included: (1) a qualitative long interview of members of the state leadership of the FFBF. This interview was the first part of the study and provided the foundation for the leadership competency instrument given to county farm bureau board members. Interview questions included their expectations of desired leadership practices and behaviors of local board members and their expectations of what county farm bureau boards should accomplish and (2) a qualitative survey instrument was developed by the researcher, based upon findings from the qualitative interviews and given to a random sample of members of local Farm Bureau boards. This instrument had a list of 66 leadership practices divided into four competency areas, each respondent rated their perceived importance and proficiency of each.

This instrument was pilot tested with a group of county board members who were not included in the final sample. Participants were asked to rate the importance of each competency to the success of a county board using a Likert scale ranging from 1 (low importance) to 7 (high importance). In addition, how proficient they felt they were, was also rated on the same Likert scale. A conceptual model for this part of the study depicting the relationship between the competencies found in the first part of the study and what makes a successful board member is presented in Figure 1. This model represents that being a successful board member is a function of competencies in the four theme areas.

This instrument was comprised of four competency sections: (1) 15 leadership questions, (2) 20 political process questions, (3) 15 effective board questions, and (4) 16

knowledge of Farm Bureau questions. The mean and standard deviation was calculated for the importance and proficiency of each competency section.

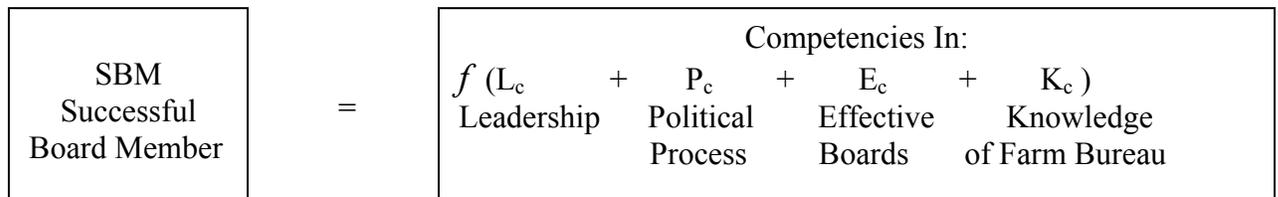


Figure 1. *Competencies Necessary for Successful Board Members.*

The responses from the long interviews underwent content analysis and four major theme areas emerged from the analysis of the interview transcripts and audiotapes. These areas were: leadership, political process, effective boards, and knowledge of Farm Bureau. These were all areas that the state leadership determined county Farm Bureau board members should possess skills in. Questions on the interview questionnaire were not separated into these four areas, but the responses given by interview participants were easily categorized into these four theme areas.

The population for this study was composed of members of local county Farm Bureau boards. A random sample of 280 county board members out of a total of 666 county Farm Bureau board members of the Florida Farm Bureau was sent a researcher-designed questionnaire. Using a table provided by Salant and Dillman (1994), the researcher chose a 50/50 split with a  $\pm 5\%$  sampling error, thus a sample of 280 individuals was chosen.

The basic survey procedure outlined in Salant and Dillman (1994) was used for data collection. This survey procedure was comprised of four separate mailings. The first was a personalized, advance notice letter, which was mailed to all members of the sample. This letter explained to the individuals that they were selected for the survey and that they will be receiving a questionnaire. The second mailing was sent a week later. It included a personalized cover letter, which explained the survey, their rights as survey subjects, a survey instrument, and a stamped return envelope. Exactly six days after the second mailing, a postcard was sent to each participant thanking those who had sent back their survey and requesting a response from those who had not yet responded. Three weeks after the second mailing, a third mailing was sent out to all those who had not responded. It included a personalized letter again explaining the importance of their returning the survey, a replacement survey, and another stamped return envelope.

This procedure was used to produce an acceptable response rate so as to try to avoid nonresponse error. The response rate for the qualitative interview was 100% and 46% for county board members. As Ary, Jacobs, and Razavieh (1996) state “using information only from those who choose to respond can introduce error, because the respondents represent a self-selected group that may not represent the views of the entire sample or population” (p. 460). Research has shown that respondents differ from

nonrespondents and the extent of this difference should be determined. For this study, early and late respondents were compared as late respondents are similar to those who do not respond at all (Ary, Jacobs, & Razavieh, 1996). Those who responded to the survey early (after the first survey was sent to them) were compared to those who responded late (after the follow-up survey was sent). Differences were examined in the responses of these groups to determine if there were any significant differences between the responses, the differences examined include survey responses and demographic information. There were no significant differences found in the surveys of the early and late respondents, which indicates that it was an unbiased sample of recipients.

This instrument was developed using the Borich needs assessment model, which assessed the respondents' perceptions about the importance of each item or competency and their proficiency (or ability) to apply this skill or knowledge. By analyzing the perceived importance and proficiency about a particular topic, individuals will learn the actual need for further education or programming efforts (Waters & Haskell, 1989).

A Likert-type scale from one to seven was located on the side of each competency, on the left survey participants were asked to rank how important they believed it was for an ideal county Farm Bureau board member to possess the following abilities or competencies with 1=low and 7=high. On the right side, respondents were asked how proficient they believed they were at each ability or competency with 1=low and 7=high.

### Results/Findings

The importance and proficiency mean scores for each competency were compared. The comparisons for the leadership section can be found in Table 1. As would be expected the proficiency scores are less than the importance scores, which would indicate that respondents feel the competencies are important for ideal county board members to possess, but do not feel as proficient as the importance scores in these competencies. The greatest gap (0.8) is found in the competency "use effective communication skills in media interviews," which would indicate that respondents feel it is important, but they do not feel proficient in this skill area.

Table 1. *Leadership Competencies – Comparisons of Importance and Proficiencies*

	Mean Importance	Mean Proficiency	Gaps
Use effective communication skills in media interviews	5.6	4.8	0.8
Use effective communication skills in writing letters	5.5	4.8	0.7
Demonstrate ability to conduct an orderly meeting	5.9	5.4	0.5
Use effective communication skills in working with groups	5.7	5.2	0.5
Choose individuals to serve the organization who are respected in their communities	5.9	5.5	0.4
Demonstrate success in leadership capacities	5.4	5.0	0.4

Table 1. *Continued*

	Mean Importance	Mean Proficiency	Gaps
Identify how committees are utilized in the Farm Bureau organization	5.3	4.9	0.4
Practice progressiveness (not do things the way they have always been done)	5.7	5.4	0.3
Choose individuals to serve who are recognized as leaders by their peers	5.6	5.3	0.3
Recognize different types of leadership	5.3	5.0	0.3
Demonstrate ability to use email and the internet	4.8	4.5	0.3
Identify potential leaders	5.4	5.2	0.2
Demonstrate ability to use conflict resolution practices	5.2	5.0	0.2
Recognize personality differences (as indicated by personality tests such as the Myers Briggs)	4.7	4.7	0
<b>Total Mean</b>	<b>5.4</b>	<b>5.0</b>	<b>0.4</b>
<b>Cronbach's Alpha</b>	<b>0.97</b>		

*Note.* Means are derived from a Likert-type scale with 1=low and 7=high.

Several competencies in the political process section had large gaps between the importance and proficiency scores. As with the previous section, all the mean proficiency scores in this section were less than the mean importance scores. Four competencies had a gap greater (>1.00) than 1.00, these were: “identify the political structure in Washington, D.C.” (MI=5.1, MP=4.1), “develop relationships with elected officials on the county level” (MI=5.7, MP=4.7), “develop relationships with elected officials on the national level” (MI=5.2, MP=3.9), “identify the importance of regulatory agencies” (MI=6.1, MP=4.9), and “participate in state government meetings impacting agriculture” (MI=5.5, MP=4.3). Table 2 shows the results of this data.

Table 2. Political Process Competencies – Comparisons of Importance and Proficiencies

	Mean Importance	Mean Proficiency	Gaps
Develop relationships with elected officials on the national level	5.2	3.9	1.3
Participate in state government meetings impacting agriculture	5.5	4.3	1.2
Develop relationships with elected officials on the state level	5.7	4.7	1.0
Identify the political structure in Washington, D.C.	5.1	4.1	1.0
Participate in county government meetings impacting agriculture	5.8	4.9	0.9
Determine how policy decisions made in Washington, D.C. impact Farm Bureau	5.2	4.3	0.9
Choose ways to be more politically active	5.5	4.7	0.8

Table 2. *Continued*

	Mean Importance	Mean Proficiency	Gaps
Identify the political structure in Tallahassee	5.4	4.6	0.8
Develop relationships with elected officials on the county level	5.9	5.2	0.7
Explain agricultural issues on the county level	5.8	5.1	0.7
Analyze policy development on issues that affect Farm Bureau on the county level	5.7	5.0	0.7
Demonstrate ability to be involved in local government	5.5	4.8	0.7
Determine how policy decisions are made in Tallahassee impact Farm Bureau	5.5	4.8	0.7
Demonstrate ability to formulate policy	5.2	4.5	0.7
Support Farm Bureau legislative activities	5.8	5.2	0.6
Identify the importance of regulatory agencies	5.5	4.9	0.6
Demonstrate knowledge of the political process	5.5	5.0	0.5
<b>Total Mean</b>	<b>5.5</b>	<b>4.7</b>	<b>0.8</b>
<b>Cronbach's Alpha</b>	<b>0.98</b>		

*Note.* Means are derived from a Liker-type scale with 1=low and 7=high.

The scores in the effective board section had a narrower range between the two means (MI=6.1, MP=5.9), which indicated that the mean scores of the importance competencies were only slightly higher than the mean scores of the proficiency competencies. Only two, “participate in Farm Bureau sponsored programs” (MI=5.7, MP=5.3) and “represent Farm Bureau to others in the community” (MI=6.1, MP=5.7) had a gap of 0.4, which would indicate that respondents feel it is important, but feel they are not as proficient in this area. The results of the comparison of the means for importance and proficiency are presented in Table 3.

As with the three previous sections, the overall mean scores of importance were greater than the overall mean scores of proficiency in the knowledge of Farm Bureau section, found in Table 4. One competency had a wider gap than the other 14 competencies in this section. “Demonstrate a knowledge of the AFBF” (MI=5.2, MP=4.2), which would indicate that respondents felt it important, but also felt they were not as proficient in this skill area.

Table 3. *Effective Board Competencies – Comparisons of Importance and Proficiencies*

	Mean Importance	Mean Proficiency	Gaps
Participate in Farm Bureau sponsored programs	5.7	5.3	0.4
Represent Farm Bureau to others in the community	6.1	5.7	0.4
Attend board meetings	6.3	6.1	0.3

Table 3. *Continued*

	Mean Importance	Mean Proficiency	Gaps
Demonstrate ability to work together for the benefit of the whole Farm Bureau organization	6.2	5.9	0.3
Demonstrate ability to work together to solve problems	6.2	6.0	0.2
Support the organization	6.2	6.0	0.2
Demonstrate ability to work together to develop the goals necessary to achieve the vision of the organization	6.1	5.9	0.2
Identify with the business structure in the community	5.8	5.6	0.2
Pay attention to proceedings at meetings	6.3	6.2	0.1
Employ mutual respect for all board members	6.2	6.1	0.1
Support board decisions	6.2	6.1	0.1
Up-hold the bylaws of the organization	6.2	6.1	0.1
Support the county president	6.1	6.0	0.1
Evaluate materials involving issues	5.9	5.8	0.1
Demonstrate interest in serving on the county Farm Bureau board	5.9	5.9	0
<b>Total Mean</b>	<b>6.1</b>	<b>5.9</b>	<b>0.2</b>
<b>Cronbach's Alpha</b>	<b>0.895</b>		

*Note.* Means are derived from a Likert-type scale with 1=low and 7=high

Table 4. *Knowledge of Farm Bureau Competencies – Comparisons of Importance and Proficiencies*

	Mean Importance	Mean Proficiency	Gaps
Demonstrate a knowledge of the American Farm Bureau Federation	5.2	4.2	1.0
Participate in media and farm tours	5.7	4.8	0.9
Demonstrate a knowledge of the Florida Farm Bureau Federation	5.5	4.7	0.8
Demonstrate ability to look at future needs of the Farm Bureau organization	5.7	5.0	0.7
Identify the role of county Farm Bureaus to advise the state organization on policy issues	5.7	5.0	0.7
Encourage Farm Bureau members to take on additional responsibilities	5.6	4.9	0.7
Differentiate between the structure and organization of Farm Bureau to other organizations who develop policy	5.4	4.7	0.7
Participate in events that promote agricultural education	6.0	5.4	0.6
Identify how powerful grassroots organizations can be	5.7	5.1	0.6
Determine how to be a progressive member of the organization	5.6	5.0	0.6

Table 4. *Continued*

	Mean Importance	Mean Proficiency	Gaps
Identify the role of county Farm Bureaus to serve as a spring board for ideas	5.6	5.0	0.6
Identify the organizational structure of Farm Bureau	5.5	5.0	0.5
Identify the history of Farm Bureau	4.9	4.4	0.5
Participate in events that promote Farm Bureau	5.9	6.3	0.4
Identify your role within the Farm Bureau organization	5.6	5.2	0.4
Define grassroots organizations	5.5	5.1	0.4
<b>Total Mean</b>	<b>5.6</b>	<b>4.9</b>	<b>0.7</b>
<b>Cronbach's Alpha</b>	<b>0.98</b>		

*Note.* Means are derived from a Likert-type scale with 1=low and 7=high.

### CONCLUSIONS/RECOMMENDATIONS/IMPLICATIONS

This study provides valuable information to the FFBF on the leadership expectations of county Farm Bureau board members. The generalizability of the conclusions and recommendations proposed in this study extends to the FFBF and the county Farm Bureaus in Florida. The information provided in this study could be useful to other Farm Bureau organizations in the United States as they are organizations who are composed of the same types of individuals and are organizationally structured the same. Information may also be useful for other grassroots agricultural organizations.

Findings from this study can be applied to the Florida Farm Bureau population, even with response rates that could be perceived low in some research communities. To defend this return rate, Hager, Wilson, Pollak, and Rooney (2003) determined that surveys of organizations typically receive substantially lower return rates, with a return rate of 15% reaching a level of acceptability for organizational surveys. In a study by Green and Hutchinson (1997) on the *Effects of Population Type on Mail Survey Response Rates and on the Efficacy of Response Enhancers*, the authors found that the response rate for those involved in agriculture was 30%, while the general public had a return rate of 35%. For the population who participated in this study, the response rate was 46% for county board members.

It could be theorized that county board members returned a greater percentage of surveys because they had more of a vested interest in the organization and believed that results from this study would benefit their county organizations. As one county board member stated on their returned survey, "I appreciate the progressive attitude of Florida Farm Bureau and the realization that we must seek input from all stake holders if we are to serve the industry and maintain a resource for industry leaders."

Early and late respondents of both quantitative survey instruments were compared to determine if there were differences between those who responded early and late to the surveys as late responders are often similar to nonrespondents (Ary, Jacobs & Razavieh,

1996). There were no significant differences found between the early and the late respondents in this study.

Conclusions from this section are based on the differences between the level of importance assigned to competencies and the level of proficiency (or if they are practicing these skills). For the first section on leadership competencies, the mean of the importance scores is only slightly more than the mean of the proficiency scores ( $M_{\text{Importance}}=5.4$ ,  $M_{\text{Proficiency}}=5.0$ ), which indicates that board members feel they are as proficient in the competency as they deem it important. A proficiency level of 5.0 would still indicate that there is a learning curve and members would benefit from additional training in these competency areas, especially those with the lowest proficiency scores. Proficiency scores were also low in communication skills (working with the media, writing letters, working with groups) which also indicates that additional training would be beneficial in these areas as county Farm Bureau members are supposed to be the spokespeople for Farm Bureau on the county level.

The proficiency scores for the political process section were the lowest for the four theme areas ( $M_{\text{Proficiency}}=4.7$ ). None of the competencies was higher than 5.1 and one ranked 3.9, a score that would reflect a very low proficiency level. This area is crucial for Farm Bureau as it is a policy development organization and its members need to be comfortable and knowledgeable about the policy development process. Farm Bureau needs to do more work in this area and educate county Farm Bureau board members in policy development and the political process.

The mean scores for the effective boards section were extremely close ( $M_{\text{Importance}}=6.1$ ,  $M_{\text{Proficiency}}=6.0$ ) and relatively high, an indication that county board members felt the competencies were important and that they were proficient in each. Results of this section are questionable as several state officials noted that members of county boards were not working together effectively, which cause the board to not be as successful as it could be. Even one county board member stated that meetings “were more poorly run and poorly lead committees or board meetings I have served on.” One reason for the high scores in this area could be that those board members who completed the survey belonged to the more effective county Farm Bureau organizations, an indication of this would be that members are willing to take the time to complete the survey which means that they have a vested interest in the board and a desire to make it even better.

The final section of competencies, those that dealt with knowledge of Farm Bureau ranked fairly low in the proficiency area as well ( $M_{\text{Proficiency}}=4.9$ ). Results from this section showed a low proficiency in identifying the history of Farm Bureau, knowledge of the FFBF and the AFBF, and the ability to distinguish how the policy development process differs in Farm Bureau from other organizations (top down versus grassroots).

The survival of institutions depends on the capacity of “leaders to develop and maintain organizational cultures that foster and sustain autonomy and independence

while strengthening the ability of individuals to care for and commit to the organization and the larger community” (Scott, 2000, p. 13). In order to care for and commit to the organization, Farm Bureau members need to understand why Farm Bureau was formed, how it is organized and how they, as county board members fit into the organization. Basic knowledge of the history of Farm Bureau, the structure of Farm Bureau on the local, state, and national level, and grassroots organizations is needed for county board members.

This study identified the needs of Florida Farm bureau members in regards to potential leadership training that could be provided by the Florida Farm Bureau Federation. From the four theme areas, there were many competencies that had gaps between importance and knowledge and should be included in leadership programming. This training should be provided to current and incoming county Farm Bureau board members.

This study could be the starting point for additional leadership research within the FFBF. Results from the qualitative questionnaire given to state leaders of the FFBF indicated that county board members needed specific leadership skills and abilities to be effective board members. If leadership programming was developed and made available to county board members, an experimental research design could be implemented to determine board members’ leadership skills before they participated in such a program and after program completion.

County Farm Bureau board members ranked themselves fairly high in proficiency for all the competencies in the “Effective Board” theme area. The state leadership would probably disagree with their high perceived proficiencies in this area as the lack of proficiencies were determined in the interviews. Additional research is necessary to assess the proficiencies of board members in regards to items listed in this theme area.

The leadership styles of county board members could be another area of research as this study did not attempt to discover what types of leaders county Farm Bureau members were and it would be an interesting and insightful study due to the age ranges of board members.

Another deficit in the literature is current research on agricultural organizations. With the number of agricultural organizations in the United States, it would seem that there would be studies on these organizations such as organizational composition, leadership, changes in agriculture, changes in membership (diversity), policy development, etc. A study could be conducted comparing the FFBF with other state agricultural organizations in regards to their membership characteristics, their perceived power and influence in policy making, the policy development process, and the leadership styles of the individual leaders of both organizations, just to identify a few.

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## ASSESSMENT OF REFERENCES TO AGRICULTURE IN A MIDDLE GRADE SCIENCE TEXTBOOK

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### Abstract

*The central purpose of this study was to assess the degree of bias toward agriculture within a middle grade science textbook, Glencoe Science Integrated Series: Level Blue Teacher Wraparound Edition (National Geographic Society, 2003). Literary formats used to reference agriculture within the text were also assessed.*

*A content analysis was used to identify all references to agriculture within the textbook. All references were categorized according to the agricultural literacy areas as defined by Frick, Birkenholz, and Machtmes (1995). Subsequently, all text references were then analyzed for bias using the Lowry-Hayakawa news bias categories. Text references were coded as reports, inferences, judgments, and others and were assigned a numerical score based on the assigned code. This allowed an overall bias score of the textbook, in regard to text references to agriculture, to be established.*

*A total of 265 references to agriculture were found within the textbook. Of these, 151 were text, 82 were pictures/diagrams, ten were unit background information, eight were student activities, eight were assessment components, and six were auxiliary materials. An overall bias score of 1.13 was determined.*

*It was concluded that within the examined textbook, science students are exposed to agriculture on average once every three pages. Written text, pictures and diagrams are the most common formats used to reference agriculture. The agricultural references tend to focus on plants, processing agricultural products, and agriculture's effect on the environment. Text references were mostly reports in nature. The textbook is generally unbiased in its portrayal of agricultural concepts.*

## **Introduction**

The United States has the lowest per capita food cost of any country in the world (National Research Council, 1988). However, American consumers have little knowledge about the production of the food products that are consumed everyday (National Research Council). To compound the issue, Hamlin (1962) noted that these same consumers will eventually help create the policies that control the production of food products. Without agricultural knowledge, uneducated decisions will be made which will affect food production, or the decision making power will be placed in the control of a select group of policy makers promoting the agendas of a small class of producers (Wright, 1992).

## **Theoretical Framework**

The American society is agriculturally ignorant (Terry & Lawver, 1995). This is not a new idea. When discussing early American settlers, Bricker (1914) noted that American farmers exhausted the soil and lacked the skills needed to feed the population. Harris (1993) pointed out "As agriculture became more efficient it became less important for everyone to understand how to raise crops and livestock" (p. 12). Furthermore, Sorenson (1987) concluded that as the typical American becomes more urban he or she is less likely to have any direct contact with farming or farmers. Douglass (1985) substantiated this when it was stated that the American population has been ninety percent non-farm for over thirty years. Swan and Donaldson (1970) noted "Rank and file Americans do not see farming as one of their most successful industries, which is assuredly is, and oddly they do not consider the unique abundance provided by farms to be a blessing" (p.283).

Pope (1990) argued that "the real need for an agriculturally literate society is knowledge of the impact the industry, as a whole, has upon our daily lives" (p. 23). Mawby (1984, as cited in Harris, 1993) noted that many negative decisions affecting food production can be trace to the policy makers' lack of understanding of agriculture. Brown and Coffey (1992) specified that people need a high level of agricultural literacy as it is "imperative that consumers and government policy-makers alike understand the role of science in agriculture so that they may utilize scientific facts rather than emotions in making decisions concerning food" (p. 169). Lichte and Birkenholz (1993) noted an increased trend in the public's interest in agriculture and food issues. However, according to Lichte and Birkenholz, the public's beliefs, attitudes, and actions are often misinformed or mis-guided. Frick, Birkenholz, and Machtmes (1995) explained "The notion of agricultural literacy, since its inception, has been based on the premise that every person should possess a minimum level of knowledge of the industry which produces and markets food needed for human survival" (p. 44).

According to the National Research Council (1988), students should receive some systematic instruction about agriculture. However, a very small percentage of students are actually enrolled in "traditional agriculture courses." Therefore, to reinforce Hamlin's (1962) argument, agricultural policy and nutritional choices will be made by individuals who have never had instruction about agriculture. What can be done to change this lack

of agricultural knowledge? Law and Pepple (1990) argued that agricultural concepts should be integrated into core area subjects including science, mathematics, social studies, and language arts. Russell, McCracken, & Miller (1990), also suggested that agricultural concepts could be infused into core subjects such as mathematics, reading, science, and social science.

Altbach (1991) noted that textbooks are not only used as a resource by teachers, but have become the curriculum on which educators heavily rely. Therefore, the use of textbooks is an excellent way to provide context to integrate agricultural concepts into other educational subject areas. Textbook publishers employ a variety of literary formats to provide education about and examples of content area concepts (Deighton, 1971). These same formats can be used to incorporate agricultural concepts into existing textbooks.

It has been documented that agriculture is not immune to bias (Terry, Dunsford & Lacewell, 1996; Whitaker & Dyer, 1998; Whitaker & Dyer, 2000). These researchers also noted that the news media is often negatively biased in its portrayal of agriculture. Furthermore, it has been noted that bias toward various ideas, religions, and populations exists in textbooks (Vitz, 1986). But, does bias exist toward agriculture in textbooks? Through extensive literature review, no research was found that examined the previous question. This lack of data does not diminish the value of the question. On the contrary, it begs for data to be gathered to determine if the information about agriculture disseminated through textbooks is portrayed in an objective manner.

In summary, studies have revealed that, American society has a sub-standard knowledge about agricultural concepts. Furthermore, negative bias exists toward agriculture in the public sector. Therefore, to ensure the general public's knowledge of agriculture is adequate and objective, incorporating agricultural concepts in core area textbooks can be an effective format to improve these deficiencies.

### **Purpose and Objectives**

The purpose of this study was to assess the agricultural references made in a selected middle school science textbook and determine if there is any bias towards agriculture in those references. Objectives of this study were to: (1) identify each instance where agriculture is referenced in a selected textbook used for science instruction in the middle grades; (2) assess the literary formats used in each reference to agriculture in the textbook; (3) categorize the references to agriculture according to category of agricultural literacy; (4) determine what bias, if any, exists in the references to agriculture in the textbook.

### **Procedures**

The research design utilized in this study was content analysis. Content analysis can be applied to examine any piece of writing or occurrence of recorded communication.

Additionally, content analysis can be used to detect the existence of propaganda and to identify the intentions, focus or communication trends of an individual (Berelson, 1952). The science textbook used for this study was *Glencoe Science Integrated Series: Level Blue Teacher Wraparound Edition* (National Geographic Society, 2003) published by Glencoe/McGraw-Hill. The following procedure was used to select this textbook. First, utilizing the Internet, companies that wrote and produced a general science textbook for middle grade students were identified. Glencoe/McGraw-Hill, Holt, Rinehart and Winston, Pearson Education, and Thompson/Wadsworth met the previous criteria. Finally, Pearson Education and Holt, Rinehart and Winston were eliminated as these companies incorporated a textbook series model as a middle school science text option. Through personal contact with Thompson/Wadsworth publishing company (Beeman, personal communication April 27, 2004) the researcher determined that the market share between the pair of textbooks was inferior to that of the Glencoe/McGraw-Hill textbook. A reserve copy of the text was requested from Glencoe/McGraw-Hill. Michael Oster, science education representative at Glencoe/McGraw-Hill, was contacted to determine the market share of the *Glencoe Science Integrated Series: Level Blue* textbook. According to Oster (personal communication, April 27, 2004) it is used by 24% of all middle school science students in the United States.

Data regarding text bias were collected using the Hayakawa-Lowry method (Lowry, 1971). S. I. Hayakawa developed a system to categorize incidences of based upon a trichotomy of sentences discussed in *Language in Thought and Action* (Hayakawa, 1978). Hayakawa defined the three basic categories of sentences as reports, inferences and judgments (1978). "Reports adhere to the following rules: first, they are verifiable; second; they exclude as far as possible, inferences, judgments, and the used of 'loaded' words" (Hayakawa, 1978, p.23). According to Hayakawa (1978), an inference "is a statement about the unknown based on the known" in which a writer or speaker "draws inference from some set of observable data" (p. 24) Hayakawa (1978) defined judgments as "expressions of the writer's approval or disapproval of the occurrences, person, or objects he is describing" (p. 25).

While conducting a content analysis of television news during the Richard Nixon presidency, Dennis Lowry (1971) expanded on Hayakawa's work. His work developed into the Hayakawa-Lowry News Bias Categories (Lowry, 1971). Later, Lowry (1985) developed more specific definitions of reports, inferences, and judgments. He wrote, "Reports sentences are factual and verifiable ... Inference sentences are subjective and are not immediately verifiable," and, "Judgment sentences contain expressions of the writer's or speaker's favorable or unfavorable opinions about whatever is being described" (Lowry, 1985, p. 573).

The Hayakawa-Lowry news bias categories are:

1. Report sentence/attributed;
2. Report sentence/unattributed;
3. Inference sentence/labeled;
4. Inference sentence/unlabeled;
5. Judgment sentence/attributed/favorable;
6. Judgment sentence/attributed/unfavorable;

7. Judgment sentence/unattributed/favorable;
8. Judgment sentence/unattributed/unfavorable; and
9. All other sentences.

(Lowry, 1985, p. 574)

Establishing validity and reliability for this study were done using traditional content analysis methods. Reliability for this study was established using the aid of check-coders. Check-coders are individuals, in addition to the researcher, who read, identified, and classified instances of agricultural references (Babbie, 2002). Two check-coders assisted the researcher to identify and classify all agricultural references.

The check-coders for this study were not randomly selected. They were selected based on various criteria. Check-coder one was a female journalism student. She was chosen to ensure that a female perspective was represented in the study. Furthermore, check-coder one was selected because she did not have an agricultural background, contributing to objectivity in data collection. Additionally, her background ensured a journalistic approach when examining the textbook.

Check-coder two was a female nursing student. She, like check-coder one, was selected to provide female representation in the study. Since objectivity toward agriculture was emphasized, check-coder two was selected because she was reared in a metropolitan area with minimal agricultural experiences. Finally, due to her course of study, check-coder two was able to provide a science perspective when analyzing the textbook.

The primary researcher was a graduate student in agricultural education. He had three years of agricultural education teaching experience. He provided a male perspective with extensive agricultural experiences.

To establish construct validity of the Hayakawa-Lowry news bias categories, Lowry (1985) used a two-part study conducted at Liberty University and Ohio University. "The assumptions underlying the Hayakawa-Lowry category system were twice put to the test, and a group of subjects ranging from college freshmen to Ph.D. professors...for the most part evaluated the news stories and sentences as predicted" (Lowry, 1985, p. 580). "Thus, the results strongly suggest that the differences measured by researchers in content analysis studies are differences that do indeed make a meaningful difference to news consumers" (Lowry, 1985, p. 580).

While conducting a content analysis of *Glencoe Science Integrated Series: Level Blue* (National Geographic Society, 2003) textbook, a frequency count was taken of all references made to agricultural topics. The agricultural literacy topic areas were defined by Frick, Birkenholz, and Machtmes (1995). The categories include: (a) Societal and Global Significance of Agriculture, (b) Public Policy in Agriculture, (c) Agriculture's Relationship with the Environment and Natural Resources, (d) Plant Science, (e) Animal Science, (f) Processing of Agricultural Products, and (g) Marketing and Distribution of Agricultural Products (Frick, Birkenholz, & Machtmes). In addition to being coded

according to agricultural literacy topic area, references were categorized according to their literary format. The literary formats used in the textbook included pictures/diagrams, text, student activities, assessment components, auxiliary materials (transparencies), and unit background information for teachers. To achieve Objective 4, each text reference was coded using the Hayakawa-Lowry news bias categories.

Two “check-coders,” in addition to the researcher, coded the textbook to ensure coder reliability. Prior to coding the textbook, the check-coders were trained by the researcher. The check-coders were educated about the agricultural literacy categories and what topics were included in each. Second, the literary formats that existed within the textbook were described and examples from other textbooks were used to give the check-coders experience identifying them. Finally, the check-coders were trained to code text references using a modified version of the coding manual developed by Lowry. The researcher and each assistant coded all references. The two initial coding sets were compared and all discrepancies were noted. The check-coders and researcher reviewed the discrepancies until a consensus was reached on the code assigned to each reference.

To determine a mean score (level of objectivity) for each reference, the researcher valued all report sentences as “1,” all inferences as “2,” and all judgment sentences as “3.” Therefore, according to Hayakawa’s procedures, the higher the mean, the less objective the textbook (more biased). The sentences were grouped according to their assigned agricultural literacy category and an objectivity mean was calculated for each. The resulting frequencies and corresponding percentages were used to determine the level of bias in order to meet objective 4.

## **Findings**

*Objective 1: Identify each instance where agriculture is referenced in a selected textbook used for science instruction in the middle grades.*

The analysis for Objective 1 resulted in a frequency count in which 265 agricultural references were identified within the 770 pages of the textbook.

*Objective 2: Assess the literary formats used in each reference to agriculture in the textbook.*

Of the 265 agricultural references, over 85% were labeled either as text references (57.0%) or as a picture diagram (31.0%). These data are illustrated in Table 1.

Table 1  
*Instances of Agricultural References by Literary Format*

Literary Format	Frequency	Percent
Text	151	57.0
Picture/Diagram	82	31.0
Unit background information	10	4.0
Student activity	8	3.0
Assessment component	8	3.0
Auxiliary material	6	2.0
Total of all references to agriculture	265	100.0

*Objective 3: Categorize the references to agriculture according to category of agricultural literacy.*

The categories for Objective 3 were defined by Frick, Birkenholz, and Machtmes (1995a). Of the 265 references over 75% were classified as plant science (28.7%), processing of agricultural products (27.2%), and agriculture's relationship with the environment and natural resources (21.5%). These data are illustrated in Table 2.

Table 2  
*Frequency of Agricultural References According to Agricultural Literacy Categories*

Agricultural Literacy Category	Frequency	Percent
Plant science	76	28.7
Processing of agricultural products	72	27.2
Agriculture's relationship with the environment and natural resources	57	21.5
Societal and global significance of agriculture	38	14.3
Animal science	21	7.9
Marketing and distribution of agricultural products	1	0.4
Public policy in agriculture	0	0.0
Total of all agricultural references	265	100.0

Table 3 provides further details regarding Objective 3. Found in Table 3 are each agricultural literacy category and the number of agricultural references within each literary format.

Table 3

*Literary Format of Agricultural References according to Agricultural Literacy Category*

Literacy Category	Text	Picture/ Diagram	Unit Background	Student Activity	Assessment Component	Auxiliary Material	Total
Global	31	2	2	1	1	1	38
Public	0	0	0	0	0	0	0
Environment	42	10	3	2	0	0	57
Plant	40	24	4	4	2	2	76
Animal	12	5	0	0	2	2	21
Processing	25	41	1	1	3	1	72
Marketing	1	0	0	0	0	0	1
Total	151	82	10	8	8	6	265

*Objective 4: Determine what bias, if any, exists in the references to agriculture in the textbook.*

Table 4 presents data regarding the objectivity level of the text within each agricultural literacy category. Within the textbook 151 sentences pertaining to agriculture were identified. One hundred thirty were reports, 19 were inferences, and two were others, thus, an objectivity level of 1.13 was reached. This data appears in Table 4.

Table 4

*Objectivity Levels of Text References*

Agricultural Literacy Category	Frequency of Sentences in Each Hayakawa Bias Category				Total	Objectivity Level (Mean)*
	Report	Inference	Judgment	Other		
Global	17	14	0	0	31	1.77
Public	0	0	0	0	0	0.00
Relationship	42	0	0	0	42	1.00
Plant	37	1	0	2	40	1.03
Animal	10	2	0	0	12	1.17
Processing	23	2	0	0	25	1.08
Marketing	1	0	0	0	1	1.00
Total	130	19	0	2	151	1.13

\*Note: 1=report; 2=inference; 3=judgment.

### Conclusions and Recommendations

Since prediction was not the central focus of this investigation, the results should not be extended beyond the study case. Examination, analysis, and interpretation of the findings provided the opportunity for the authors to draw several conclusions. Due to the number

of references found, students using the textbook are exposed to agricultural concepts approximately once every three pages. Written text, pictures, and diagrams are the most common formats used to reference agriculture. These formats made up 88% of all references within the textbook. Furthermore, written text is the most common way to incorporate references to agriculture's relationship with the environment. Generally, the agricultural references tend to focus on plants, processing agricultural products, and agriculture's effect on the environment, as they made up 70% of the references within the textbook.

This particular textbook is not an effective medium to reference public policy in agriculture concepts. In addition, including agricultural examples may simply not be appropriate in every topic area within the textbook, such as public policy.

The agricultural text references were mostly report style in nature. Reports made up 86% of all text references. As compared to studies that focused on agricultural bias in the news media, the textbook is generally unbiased in its portrayal of agricultural concepts.

As a result of the data analysis and conclusions several recommendations for agricultural education were made. First, agricultural educators should contribute to the development of science text books to ensure that accurate and appropriate references to agriculture are included. Agricultural references should be presented in a greater variety of formats including auxiliary materials, student activities, and assessment components. Incorporation of agricultural concepts with critical thinking skills and more open-ended assessment questions should be included in the textbook. Furthermore agricultural concepts, such as animal and plant production practices, should be used more frequently as examples to illustrate scientific theories and laws. Perspectives of agriculturists should be included in chapters focusing on biodiversity and conservation of natural resources.

In addition to recommendations for agricultural education, recommendations for further research were based on the findings and conclusions. A replication of this study using other middle grade science textbooks should be conducted so that all texts can be compared. In order to compare how other academic areas portray agriculture a replication of this study should be conducted using textbooks from other core education areas such as social science, mathematics, and English/literature. To determine if students understand agriculture after utilizing core area textbooks research should be conducted to investigate the relationships between agricultural references in textbooks and students' knowledge and perceptions of agriculture.

During the course of this study it was found, by the researcher and check-coders, to be difficult to assign various agricultural references to the appropriate category. As a result of this study it is apparent that one or more categories should be added to list of categories of agricultural literacy most recently proposed by Frick, Birkenholz, and Machtmes (1995), specifically food science and technology. Therefore a reevaluation of the categories of agricultural literacy proposed by Frick, Birkenholz and Machtmes is in order.

## Discussion

Textbooks are utilized by teachers and students everyday. In some cases textbooks have become the very curriculum that teachers rely upon (Altbach, 1991). With this heavy usage students are exposed to various the thoughts, ideas, and beliefs of the textbook publisher. It has been documented (Terry, Dunsford & Lacewell, 1996; Whitaker & Dyer, 1998; Whitaker & Dyer, 2000) that news reports are negatively biased toward agriculture. However, until now, it was not known if textbooks were biased toward or against agriculture. Furthermore, outside of agriculture education textbooks, it was not known if students were even exposed to agricultural concepts in core area subject textbooks. Although this study cannot be generalized to all middle grade science textbooks, the findings suggest that the examined textbook does expose students to a variety of agricultural concepts and that agriculture is portrayed in a generally unbiased tone.

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**ATTITUDES OF SECONDARY AGRICULTURAL SCIENCE  
AND BIOLOGY/BUSINESS STUDENTS TOWARD INFORMATION  
TECHNOLOGY: A LONGITUDINAL TREND STUDY**

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Abstract

*The purpose of this study was to determine the attitudes of secondary students enrolled in Agricultural and Environmental Science and Technology (AEST) programs and biology/business programs in Mississippi toward information technology over a three year period (2002-2004) after completion of their respective high school courses. The population for the study was secondary students enrolled in 14 Agricultural and Environmental Science and Technology (AEST) programs and 14 Biology/Business programs from all geographical areas of Mississippi. Students indicate their level of agreement to 23 statements regarding their attitudes towards information technology. Each year, students had favorable attitudes toward information technologies. Information technology careers are exciting for everyone, including females and minorities. One does not need strong math skills or computer programming skills to be engaged in an IT career. Actively learning through the use of information technologies can help improve communication skills and develop marketable job skills. However, student more recently completing agriculture and biology/business courses tend to agree more that information technology careers are boring and are less exciting to pursue, yet more strongly agreed that females should pursue information technology jobs. Teachers guiding AEST programs must be adequately prepared and skilled in the use of information technologies if such programs are to be successful. Appropriate professional development opportunities should be provided to AEST teachers to keep them abreast of information technologies and their applications to agriculture. AEST programs should also develop career awareness opportunities for their students to promote information technology careers in agriculture.*

**Note:** This paper is based upon work supported by the National Science Foundation Information Technology Workforce Project, Project # 0089970. applications range from record keeping, to making management decisions about fertilizer and pesticide applications, to determining livestock breeding programs, to using Global Positioning Systems (GPS) and Global Information Systems (GIS).

## Introduction

Information Technology (IT) describes all aspects of managing and processing information. 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. The IT workforce is not just computer engineers and programmers, but individuals with a high skill level in information technologies. These careers require computer fluency - being able to interpret the information that technology makes available, understanding design concepts, and being a lifelong learner of technology that covers a wide range of subjects and careers other than computer science. Many IT workers design, develop, support and/or manage the IT systems found in careers related to agriculture. These

Individuals least likely access to technology are minorities living in rural communities. In Mississippi, 25% of the citizens live at or below the poverty level and nearly one in three children lives at or below the poverty level (US Census Bureau, 1998). However, the state has the research and IT industry base, and public/private institutions to support information technology clusters (Mississippi Economic Council, 2000). Jackson, the state capital, has been recognized as a telecommunications hub for not only the state, but also the world (Doty, 2000). As a result, Mississippi can enhance the productivity of traditional industries and move toward a more competitive advantage within the region (Mississippi Economic Council, 2000). Such gains would be more attractive at the national level and could entice information technology businesses to locate in rural areas of Mississippi. However, if Mississippi is to develop a competitive advantage in relation to information technology, public school systems must educate and prepare students about information technologies.

Mississippi has a diverse and vitally agriculture industry making it a “major player” on the national and international scene. This fact, along with Mississippi’s information technology research and industry base, provided the impetus for the State Department of Education to transform traditional “agriculture programs” into contemporary Agricultural and Environmental Science and Technology (AEST) programs with the latest agricultural science knowledge base and technological advancements during the late 1990s.

AEST introduces students to new technologies and instructional areas leading to careers in related industries. The curriculum is designed to start students with a broad knowledge base in agricultural production, food processing, plant genetics, environmental stewardship, and international trade. Subject matter areas are supported by a variety of information technologies required for accessing and analyzing information and solving problems. 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 related 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 Mississippi, urban and rural, and have a significant percentage of females and minority students enrolled.

From an educational standpoint, information technologies have an effect on how people learn, what people know, and where people obtain knowledge and information (National Science Foundation, 2000). IT influences the creation of scientifically derived knowledge, how children learn in school, lifelong learning by adults, and the storage of a society's cumulative knowledge. IT can bring new information and types of instruction into the classroom, it can provide students with new tools for finding and manipulating information, and it can provide resources that are not available in a particular geographical area. All of this is dependent on the attitude individuals have toward information technologies and their impact on society.

### **Theoretical Framework**

In the innovation-decision process individuals pass through a series of five stages when deciding whether or not to adopt a new product or innovation (Rogers, 1995). In the second stage individuals are to form an attitude toward the innovation. Fishbein and Ajzen (1975) refer to an attitude as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object. An individual should already have knowledge and exposure to the innovation's existence. From that stage, individuals must be persuaded to form either a favorable or unfavorable attitude toward the innovation. In developing this attitude, individuals may mentally apply the new idea to their present or future situation before deciding whether or not to accept the innovation (Rogers, 1995). In this vicarious situation, individuals must think hypothetically and project the future to assist them with forward planning regarding the innovation. While the innovation may have a degree of uncertainty, individuals seeking to adopt a new innovation will want to know that their thinking is on the right track in comparison to their peers.

The main outcome should be the adoption or rejection of the innovation as long it is consistent with the attitude held (Rogers, 1995). This may not always be the case. While the formation of a favorable or unfavorable attitude may not lead to adoption or rejection respectively, the tendency is for attitudes and actions to become more consistent over time. Attitudes may also not be converted into action because communication channels used to help adopters make their decision are not utilized effectively.

Though the literature is void with respect of attitudes towards information technologies, numerous studies report attitudes towards computers and technology careers, which are a vital component of the information technology picture. Having an understanding of students' knowledge and attitudes are necessary and prerequisite to effective teaching about technology (Bame, Dugger, deVries, & McBee, 1993).

However, it may be difficult for students to express their attitude towards technology because they may have neither an accurate nor a complete knowledge of such technology.

Secondary school students have mixed attitudes towards certain aspects of information technology. Houtz and Gupta (2001) found that 38 % of Nebraska high school students had little or no interest in pursuing an information technology career. Sixty two percent had at least some interest in an IT career although only 9 % indicated they were very interested. In a study by Bame, Dugger, deVries, and McBee (1993), 60 % of males thought they would chose a technological profession while 66 % of females said they would not seek a technological career.

Males are more interested in pursuing an IT or technology career than their female peers (Houtz & Gupta, 2001; Ratt & deVries, 1985) even though girls believe that technological fields are appropriate for both genders (Ratt & deVries, 1985). Furthermore, males also felt more confident in their ability to acquire the necessary technology skills (Houtz & Gupta, 2001). Brunner and Bennett (1987) and Ratt and deVries (1985) found that young women often feel they are not suited for technological careers because they are not whole-heartedly “for” technology.

Canada and Brusca (1991) discovered males expressed more interest in computers, less anxiety about mastering computers, a stronger belief that computer skills lead to respect from parents and peers, and a stronger belief that women cannot be as skilled with computers as men. Females with computer programming experience expressed similar levels of computer interest, self-confidence, and beliefs in gaining respect from computer mastery. Females also disagreed with the belief that women cannot be as skilled with computers as men. Attitudinal differences disappeared when both males and females had at least one class in computer programming.

Students who have enrolled in technology education programs and encountered a positive educational experience have developed favorable attitudes toward technology and the pursuit of technological careers (Ratt & deVries, 1985). Such results did occur in the Bosser, Palmer, and Daugherty (1998) for students who enrolled in a nine-week technology education course. It is hoped that AEST programs can have the same impact on the students who enroll in such courses to prepare individuals with the knowledge and skills to pursue careers in the information technology workforce.

In agricultural education, the literature is void of studies about the use and attitudes of computers by high school students. Numerous studies exist examining uses skills needed by and attitudes of computers at university settings by college students and faculty members or by secondary agriculture teachers. Monk, Davis, Peasley, Hillman, and Yarbrough (1996) recommended in their report that university students should be comfortable with computer and information technologies so they can develop new computer skills throughout their careers, implying computer skills and information technology skills are directly related to career success. A study by Kotrlik, Redmann, Harrison, and Handley (2000) focused on information technology professional development opportunities of Louisiana agriscience teachers and found that while teachers value information technology, they places less reliance on information

technology training offered in university settings. Furthermore, these teachers, while having computers in their classrooms, really do not have all of the latest information technologies available, especially multimedia devices and electronic mail.

### **Purpose and Objectives**

The purpose of this study was to determine the attitudes of secondary students enrolled in Agricultural and Environmental Science and Technology (AEST) programs and biology/business programs in Mississippi toward information technology over a three year period (2002-2004) after completing high school agriculture, biology, or business courses. The data were examined to identify trends which may have developed in the population of high school students enrolled in AEST programs and biology/business programs regarding their attitudes towards information technology.

### **Methods and Procedures**

This study was conducted as a longitudinal trend study (Creswell, 2002; Gay & Airasian, 2003; Borg & Gall, 1989). According to Borg and Gall (1989), "In trend studies, a given general population is sampled at each data collection point. The same individuals are not surveyed, but each sample represents the same population" (p. 422).

The population for this study consisted of students enrolled in either one of the 14 Agricultural and Environmental Science and Technology (AEST) programs or one of the 14 Biology/Business programs selected to be included in the study. Programs selected represented all geographical areas in Mississippi. A census of all students from these 28 programs was used in the study each academic year. Schools were matched based on demographics, such as school size, ethnic makeup, and school programs.

The researchers developed the instruments used in the study. Before the first year of data collection, twenty-four teacher consultants attended a workshop to develop the instruments to be used in the data collection process. After conducting a session on survey instrument development, university staff shared with teacher consultants the project objectives and sample questionnaires developed from a review of literature. Teacher consultants added and/or deleted items, recommended age-group appropriate wording, and revised the format of the instruments. Teacher consultants also recommended procedures for data collection and suggested consideration be given to placing the survey instruments on-line to expedite data collection as well as save money on printing instruments and postage. Since they would assist in data collection process, teacher consultants participated in Institutional Review Board (IRB) Human Subjects Research Training. Following each year of data collection, the instruments were reviewed and revised by the teacher consultants.

The part of the questionnaire used to collect data on students' attitudes toward information technology consisted of 23 statements. Students rated the 23 statements on a Likert-type scale (1 = *strongly disagree*; 2 = *disagree*; 3 = *agree*; 4 = *strongly agree*) to identify their attitude towards information technology. University staff finalized the instruments and placed them on the web for teacher consultants to review and provide

additional feedback before pilot testing. After receiving feedback the instruments were pilot tested using state officer candidates attending the state FFA convention and re-administered at the state leadership conference. A test-retest reliability coefficient measuring .59 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.

This part of the questionnaire was slightly modified in spring 2002 to delete one statement and break another statement into two separate statements. The modified instrument was used during the second and third years of data collection and the data is presented accordingly in this paper.

Each year the instruments were then printed and mailed to teachers or also placed on the web for the data collection. Each year teacher consultants were supplied with parental consent and student assent forms. During years one and two of the study, 17 of the 28 teachers had their students complete the instruments online with the remaining teachers having their students complete paper instruments. During year three, all schools completed traditional paper instrument. AEST teachers surveyed students enrolled in the Concepts of Agriscience Technology courses and business and biology teachers surveyed introductory classes primarily made up of 9<sup>th</sup> and 10<sup>th</sup> graders. Since the instruments were administered to students on a specific day(s) designated by the researchers, only those students who were in class on those days completed the instruments. No follow-up measures were used to collect data from those students who were absent, so results cannot be generalized to all high school students enrolled in AEST and biology/business programs in this state.

Data were summarized using descriptive statistics. Frequencies, percentages, means, and standard deviations were used to describe demographic characteristics and attitudes towards information technology.

## **Findings**

Results and findings in this paper are based on the responses provided by students who were in class on days the instruments were administered. During year one of the project, usable responses were provided by 762 students. Fifty two percent of those who responded in spring 2002 were male while 48% were female. The majority were 9<sup>th</sup> graders (53%) and 32% were 10<sup>th</sup> graders. Another 10% were in the 11<sup>th</sup> grade with only 5% in the 12<sup>th</sup> grade. Caucasians comprised 55% of the participants while African Americans comprised 42%. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 3%.

During year two of the project, usable responses were provided by 932 students. Fifty two percent of those who responded in spring 2003 were male while 48% were female. The majority were 9<sup>th</sup> graders (59%) and 28% were 10<sup>th</sup> graders. Another 10% were in the 11<sup>th</sup> grade with only 3% in the 12<sup>th</sup> grade. Caucasians comprised 52% of the participants while African Americans comprised 43%. Hispanic Americans, Asian

Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 5%.

During year three of the project, usable responses were provided by 756 students. Fifty six percent of those who responded in spring 2004 were male while 44% were female. The majority were 9<sup>th</sup> graders (51%) and 32% were 10<sup>th</sup> graders. Another 11% were in the 11<sup>th</sup> grade with only 6% in the 12<sup>th</sup> grade. Caucasians comprised 62% of the participants while African Americans comprised 32%. Hispanic Americans, Asian Americans, and individuals reporting to be of mixed ethnicity comprised the remaining 6%.

### *Attitudes Towards Information Technology*

Respondents indicated how much they agreed or disagreed with a list of 23 Likert-type statements (1 = *strongly disagree*; 2 = *disagree*; 3 = *agree*; 4 = *strongly agree*) regarding their attitudes toward information technology. Their responses are presented in Table 1. The highest rated statement in spring 2002 was “My information technology skills are adequate for me to complete my schoolwork” ( $M = 3.06$ ) followed by “E-mail programs are important as a means of communication” ( $M = 3.02$ ), “My parents think computers and information technologies are important subjects to learn” ( $M = 2.99$ ), and “Completing my schoolwork with information technologies is easier than using paper and pencil” ( $M = 2.98$ ). The lowest rated statements in spring 2002 were “I think information technology careers are just for males” ( $M = 1.48$ ),

Table 1

*High School Students' Attitudes Toward Information Technology*

Statements Regarding Information Technology	Year		
	Sp 2002	Sp 2003	Sp 2004
	<i>f</i> = 762	<i>f</i> = 932	<i>f</i> = 756
My information technology skills are adequate for me to complete my schoolwork.	3.06	3.04	2.98
I think information technology careers are just for males.	1.48	1.56	1.62
Completing my schoolwork with information technologies is easier than using paper and pencil.	2.98	2.91	2.84
Ethnic minorities could be very successful in an information technology career.	2.82	2.87	2.74
My community depends on information technology to conduct business daily.	2.81	2.80	2.71
I received enough instruction about the Internet before completing class assignments.	2.80	2.84	2.68
An information technology career means working only with a computer.	2.11	2.06	2.10
If more people used e-mail, our world could save valuable resources.	2.68	2.58	2.58
Information technology careers are boring.	1.99	2.07	2.20
It is important to have Internet access at home.	2.94	3.09	2.94
Information technology careers are only available to people with really good math skills.	1.88	1.99	1.99
As a result of using information technologies, my communication skills have gotten better. <sup>a</sup>	2.86	2.65	2.50
E-mail programs are important as a means of communication.	3.02	3.00	2.84

Table continued

Table 1 (continued)

Statements Regarding Information Technology	Sp 2002 <i>f</i> = 762	Sp 2003 <i>f</i> = 932	Sp 2004 <i>f</i> = 756
Careers in the information technology field sound exciting.	2.83	2.73	2.66
It is important to have Internet access available at school.	2.92	3.28	3.18
I would like to find a job that allows me to use information technology on a daily basis.	2.76	2.72	2.63
My parents think computers and information technologies are important subjects to learn.	2.99	2.90	2.80
Information technology jobs do not mean you have to be a computer programmer.	2.94	2.92	2.76
Using information technologies helps me develop marketable job skills.	2.84	2.81	2.69
Learning with information technologies is more enjoyable than learning through traditional classroom instruction.	2.91	2.87	2.68
I dislike working with information technologies.	1.93	2.06	2.07
Females should look for information technology jobs.	2.85	3.25	3.15
<i>Note:</i> 1.00 – 1.49 = <i>Strongly Disagree</i> , 1.50 – 2.49 = <i>Disagree</i> , 2.50 – 3.49 = <i>Agree</i> , 3.50 – 4.00 = <i>Strongly Agree</i>			

“Information technology careers are only available to people with really good math skills” ( $M = 1.88$ ), “I dislike working with information technologies” ( $M = 1.93$ ), and “Information technology careers are boring” ( $M = 1.99$ ).

The highest rated statement in spring 2003 was “It is important to have Internet access available at school” ( $M = 3.28$ ) followed by “Females can be successful in an information technology job” ( $M = 3.25$ ), “It is important to have Internet access from home” ( $M = 3.09$ ), and “My information technology skills are adequate for me to complete my schoolwork” ( $M = 3.04$ ). The lowest rated statements in spring 2003 were “I think information technology careers are just for males” ( $M = 1.56$ ), “Information technology careers are only available to people with really good math skills” ( $M = 1.99$ ), “I dislike working with information technologies” ( $M = 2.06$ ), and “An information technology career means working only with a computer” ( $M = 2.06$ ).

The highest rated statement in spring 2004 was “It is important to have Internet access available at school” ( $M = 3.18$ ) followed by “Females can be successful in an information technology job” ( $M = 3.15$ ), “My information technology skills are adequate for me to complete my schoolwork” ( $M = 2.98$ ), and “It is important to have Internet access from home” ( $M = 2.94$ ). The lowest rated statements in spring 2004 were “I think information technology careers are just for males” ( $M = 1.62$ ), “Information technology careers are only available to people with really good math skills” ( $M = 1.99$ ), “I dislike working with information technologies” ( $M = 2.07$ ), and “An information technology career means working only with a computer” ( $M = 2.10$ ).

### **Conclusions and Recommendations**

Overall, students agree with a majority of the statements regarding their attitudes toward information technologies. Students agreed that it was easier to complete their schoolwork using information technologies, that minorities and females should look for and could be successful in information technology careers, and that their communication skills (both written and verbal) have gotten better through the daily use of information technologies. Students have no problem securing Internet access, either at home or at school, and believe such access is important to have in the respective locations. Students also agreed that e-mail is an important communication tool. While students are comfortable with using information technologies, they generally believe IT careers are exciting and not boring, are not solely for males, and are not only for people with good math skills or computer programming skills. Students would like to find a job that requires the use of information technologies.

When analyzing the mean scores on the statements over the three-year time period, attitudes of high school students toward information technology remained fairly stable. One positive conclusion from this study is that high school students during the third year of the study more strongly agreed that females should look for information technology jobs than their peers indicated two years earlier. The researchers would like to ascertain why more students today believe this, thus warranting additional research in this area.

Two statements which concern the researchers are “Information technology careers are boring” and “Careers in the information technology field sound exciting.” While students generally disagreed that information technology careers are boring and agreed that information technology careers sounded exciting, the differences in the levels of agreement changed each year. Based on the mean scores, the researchers can conclude that high school students today have less favorable attitudes towards information technology careers than did their peers two years earlier. With information technology playing a more important role in the lives of individuals today and with information technologies becoming more commonplace in society, could the novelty be wearing off with high school students using information technologies just like have existed for years? In reviewing Rogers (1995) work, this is true with the innovation-decision process. Further research should be developed to address this issue.

Findings from this study are congruent with those from Canada and Brusca (1991) and Ratt and deVries (1985) that females can be just as skilled and successful as males in information technology careers. While Canada and Brusca (1991) found that males had more interest in and less anxiety about computers, this study supports the perception that females need to strongly consider pursuing information technology careers because such careers are not only for male students. The bigger question to be answered is would females students who participated in this study consider such opportunities in the information technology workforce. Further research is needed to determine if females would seek information technology careers.

While Houtz and Gubta (2001) found that high school students had little or no interest in pursuing an information technology career, this study found that students agreed that they want to find a job that allows them to use information technologies on a daily basis, even though fewer statements are in agreement today than their peers two years earlier. Furthermore, more students in this study believed females should seek information technology jobs, a difference of opinion in what Bame, et. al. found when females said they would not seek information technology careers. AEST teachers should identify businesses within their communities that require the use of information technologies on a daily basis and plan instructional activities geared at preparing students for job opportunities within the local community.

Remembering what Bame, et. al. say about understanding the attitudes of students as a prerequisite to effective teaching, what can agricultural educational professionals do to further promote IT careers in agriculture? Secondary agriculture teachers must be comfortable with the use of information technologies, as stated by Kotrlik, et. al. (2000). These teachers will be the individuals who will help secondary school students develop basic information technology skills needed to progress in agricultural careers, supporting the research by Monk, et. al. (1996) that students need to be comfortable with computer and information technology skills. Research should be conducted to determine teachers’ skill levels and comfort with using information technologies and appropriate professional development opportunities should be developed to equip these teachers with the requisite skills needed to use and demonstrate information technologies with their students.

Parental and community input should be utilized when planning educational experiences for students to help them gain exposure to IT careers and the technologies available within the community. This can mean developing career awareness opportunities through career days or job shadowing experiences through a student's supervised agricultural experience program. Particularly, females and minorities employed in IT careers should be involved in such projects as we try to increase the number of females and minorities employed in the information technology workforce.

To lay the foundation for preparing students with favorable attitudes toward information technology, the agricultural education profession needs to understand the impact of information technology in agriculture. Research should be conducted to determine specific applications of information technology in agriculture. Furthermore, once these applications are identified, professional development workshops should be conducted for agricultural education teachers to help them understand and practice information technology applications in the state.

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