Research Conference Proceedings
North Central Region

Research Conference Coordination
University of Minnesota – Twin Cities

Conference Host
Kansas State University
Manhattan, Kansas

October 10, 2010

Review Process for the
North Central Research Conference

The AAAE North Central members express their sincere gratitude to AAAE colleagues who served as reviewers for research papers submitted for the 2010 North Central Research Conference. A total of 16 research manuscripts were submitted. The AAAE Protocol Guidelines for Conference Paper Selection were used in the paper review and selection process. Twelve papers were selected for presentation at the 2010 North Central Conference.

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2010 North Central Research Conference

Sunday, October 10
8:00A.M. to 9:30A.M. – Research Session I

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Facilitator: George "Leland" Bunting, University of Illinois

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Motivation For Enrolling In School-Based Agricultural Education Expressed By College Freshmen Students

Stacy L French
University of Missouri

Robert M Torres
University of Arizona

Abstract

The purpose of this study was two-fold: 1) to describe the motivational factors of current college freshmen student, who as a high school students enrolled in school-based agricultural education, and 2) compare the motivational factors by selected characteristics of the freshmen students. The theoretical framework used as a basis for this study was McClelland's Acquired Needs Theory, suggesting that humans are motivated by a need for achievement, power and/or affiliation. A web-based questionnaire was distributed via email to current freshmen students in the college who identified FFA membership while in high school on their scholarship application (N = 127). A total of 53 (48.86%) completed the questionnaire. Overall, students reported achievement, power and affiliation as motivational factors. The results indicated that the motivational factors of achievement, power, and affiliation vary little in terms of home setting and courses taken in high school. However, in terms of sex female students displayed a higher need for power, than their male counterparts.

Introduction

The development of diverse markets in agriculture, food and natural resources require a diverse and highly trained workforce. School-based agricultural education programs are poised to address the workforce needs should there be sufficient student enrollments. Student enrollments have continued to be monitored and promoted at local, state and national levels. Student enrollment in school-based agricultural education not only the first step in creating an abundant workforce in the agriculture, food and natural resources industries, but a beginning step to attaining the vision of Agricultural Education. In Missouri, the vision of Agricultural Education is that, "All people value and understand the vital role of agriculture and natural resources in advancing personal and global well-being" (*Agricultural Education in Missouri* 2009 p.2).

School-based agricultural education programs are prevalent in many secondary schools in Missouri and around the United States. During the 2008-2009 school year, Missouri had a total of 316 secondary agriculture programs with 26,473 student enrollment (*Agricultural Education in Missouri,* 2009). While student enrollments have steadily increased in recent years, there are students who decide agricultural education is not for them. Several factors have been determined to negatively affect student enrollment of students in school-based agricultural education courses. Some of those factors education courses include increased high school graduation requirements, changing college entrance requirements, interpersonal reasons and school factors among others (Reis & Kahler 1997). Additionally, factors that influences enrollment included the future value

of agricultural education, the image of agricultural education, and the role of significant others (Hoover & Scanlon, 1991).

Beyond curricular and school factors, simple motivation issues contribute to students' decision to enroll in school-based agricultural education. Enrollment and retention motivators of a certain behavior, such an enrolling in school-based agricultural education, are important to identify in students. These motivators can be a predictor of certain behaviors (Turner & Herren, 1997). There are a plethora of reasons for students' choice to enroll in school-based agricultural education and affiliate with this specific group. To continue uncovering the reasons chose to enroll or not to enroll in school-based agricultural education, first the student motivation must be understood (Turner & Herren, 1997). Dyer, Breja, and Ball (2003) stated, "the retention of a diverse student population that includes high quality students continues to be one of the most important and complex problems facing secondary agricultural education programs today" (p. 87). Information gained from this study will aid in recruitment and retention of students by teacher understanding of the students' motivations.

Theoretical/Conceptual Framework

Motivation is a very broad construct used in educational research. Many different theories of human motivation exist in educational psychology research (Maslow, 1943; Staw, 1976; McClelland, 1985). Abraham Maslow (1943) determined a hierarchy of psychological needs for human motivation. This hierarchy is divided into two main categories of deficiency needs and growth needs. Deficiency needs include humans' physiological need, safety need, love need, and esteem need. Staw's (1976) sorted motivation by its source – intrinsic and extrinsic sources. Staw defined intrinsic motivation as the pleasure or value of the activity to the individual. It is the meaning and motivation the individual feels him/her self. Extrinsic motivation is the value an individual placed on the probability of completing a task, an end reward. Extrinsic motivation is an outside reward or incentive to complete a given task (Staw, 1976). McClelland's Acquired Needs Theory described three motivational needs; the need for achievement, the need for affiliation, and the need for power. Turner and Herren (1997) and Rohs and Anderson (2001) found McClelland's Motivational Theory may be a link to student motivation to enroll in school-based agricultural education, thus the motivation theory developed by McClelland (1985) was used for the theoretical framework of the study.

McClelland (1985) defined motivation as the *why* of a behavior, in contrast to the *what* and *how* of the specific behavior. He suggested either one, or a combination of the three needs provide motive to take action or behave in a certain manner. In terms of achievement, individuals perform better or are motivated more when there is the achievement incentive available. Achievement incentives are ones that an individual gets satisfaction from doing something better, or to show he/she is more capable. There is an intrinsic satisfaction in achieving for some individuals. These same people are distracted by external incentives and encouragement (McClelland). Individuals with a high achievement score tend to pay less attention to people around them, such as co-workers because of their need for individual achievement (Chusmir, 1989).

Individuals with a strong need for affiliation have certain characteristics. First, performance is increased on tasks when there is an affiliative incentive for subjects high in affiliation. Individuals high in affiliation learn these social relationships faster than others. They engage in more discussions and dialogue, and maintain connections with other people because of this motive. These interpersonal connections are extremely important to individuals with a higher need for affiliation (McClelland, 1985). These individuals tend to make more visits to friends, make more telephone calls and spend more time writing letters (Lansing & Heyns, 1959). People are what matter most individuals high in affiliation. These individuals prefer feedback on their working relationships rather than their task accomplishment in groups. They also prefer working with friends, over experts in the content area (McClelland, 1985).

The third motive is power. Individuals with a strong need for power have the characteristics of control and influence (McClelland, 1985). Individuals try to obtain and power and exercise authority in situations. These individuals strive to be in positions where they can exert influence on others. McClelland (1985) suggested there are two aspects of power; negative and positive (1985). The negative aspect comes from individuals wanting to dominate situations, and controlling others. The positive aspect of the power motive still deals with the ability to influence others, but not in the aggressive and dominating way most commonly associate with power (McClelland, 1985). This aspect of power also includes the persuasion and inspiration to help people attain goals and learn more about a specific topic.

Turner and Herren (1997) and Rohs and Anderson (2001) completed research on the motivation of students to enroll in school-based agricultural education courses. While there is an array of factors that encourage or discourage students to enroll in agricultural education courses, "agricultural educators need to understand the motivational need structure of their students" Turner & Herren, p.31).

Purpose and Research Objectives

Previous studies (Turner & Herren, 1997; Rohs & Anderson, 2001) provided valuable insight to the purpose and research objectives of this study. The purpose of this study was to describe the relationship between selected characteristics of college freshman formerly enrolled in school-based agricultural education courses and their motivation for enrolling in such courses.

This study was guided by the following research objectives:

1. Describe the selected characteristics (sex, home setting, & agriculture career path) of college freshmen.
2. Describe the motivational factors for enrolling in school-based agricultural education courses.
3. Compare students' motivational factors for enrolling in school-based agricultural education courses by selected characteristics (sex, home setting, & agriculture career path).

Methods/Procedures

The research design of this non-experimental quantitative study was descriptive – correlational in nature (Ary, Jacobs & Razavieh, 2006). The population of this study was all of

the college freshmen students who indicated FFA membership while in high school on their college scholarship application form. The frame for this study was obtained from the Academic Programs Office within the college. The frame was scrutinized for frame and selection error. Nineteen subjects were identified as being no longer enrolled at the University at the time of the study. The frame was also evaluated for duplicated or omissions of student names that could lead to possible selection error. As a result of the scrutinizing efforts, the final count was 108 freshmen students. Because of the relatively small number, no sampling techniques were exercised.

To collect data for the study, a web-based questionnaire instrument was developed by the researcher. Similar studies conducted by Rohs and Anderson (2001), Turner and Herren (1997), Reis and Kahler (1997), Sutphin and Newsom-Stewart (1995), and Marshall, Herring, and Briers (1992) guided the development of the questionnaire. The questionnaire was comprised of two parts. The first part sought to determine the factors that motivated students to enroll and complete school-based agricultural education courses. Ten statements focused on each of the three motivational factors (achievement, power, and affiliation). A five-point Likert scale (1 = Strongly Disagree, 2 = Disagree, 3 = Neither Agree nor Disagree, 4 = Agree, and 5 = Strongly Agree) was developed as a response choice to each statement. The second part of the questionnaire sought to collect selected student characteristics (sex, home setting, & agriculture career pathway).

To establish validity of the questionnaire, it was reviewed by a panel of experts (n = 6) including Agricultural Education faculty, and graduate and undergraduate students. Revisions were made based upon feedback from the first review, and underwent a second review. To determine reliability of the questionnaire, a pilot test using 25 students who were college sophomores who were also FFA members while in high school. A Cronbach's alpha was used to estimate the reliability of each motivation construct. The alpha for the motive of achievement was .86; the alpha for affiliation was .65; and the alpha for power was .91. Overall, a Cronbach's alpha for motivation was .91. No efforts were taken to estimate the reliability for section two of the questionnaire as student characteristics are said to be relatively static.

Implementation of the web survey was guided by Dillman (2009). Dillman suggested sending an initial contact e-mail to subjects with a link to the web-based questionnaire in the body of the message. Hosted Survey™ was used as the service provider for this study. E-mails sent to subjects were personalized to increase response rate (Dillman, 2009). E-mails to subjects were sent from a University e-mail address to decrease the chance of the e-mail being flagged as spam. The subject line also referred to an invitation to participate in the study, and listed the study title.

The initial contact letter was e-mailed to the 108 students in the study. The e-mail message explained the purpose of the study, and provided a link to the web questionnaire. Follow up e-mail reminders were sent to students who had not responded. In total, five points of contact were made, resulting in 53 student responses, for a 49% response rate. No efforts were taken to address non-response error, thus the results of this study apply to college freshmen who responded. Data collected from the respondents were downloaded from the Hosted Survey™ software in a .txt document and then imported into a Microsoft Excel spreadsheet. Variable

labels were added to the spreadsheet; spreadsheets were then imported into the SPSS software for analysis. Basic measure of central tendencies and variability were used to describe the data. Cohen's d was utilizes to compare the mean scores of each variable of interest. Effect sizes were calculated and interpreted according to Thalheimer & Cook's (2003).

Findings/Results

The first research objective sought to describe selected characteristics of college freshmen who were formerly enrolled in school-based agricultural education courses. Tables 1 and 2 display the frequencies and percentages of the selected student characteristics.

A total of 41 (77.36%) students were female, while the remaining 12 (22.64%) were male. In terms of home setting, the greatest percentage of students 64.15% (*n* – 34) were from a farm setting; nine (16.98%) students reported being from a rural setting; and 15.09 % (*n* = 8) reported being from a small town. The smallest percentage of students, 3.77% (*n* = 2), reported being from a city (see Table 1).

Table 1
Sex and Home Setting of Former School-based Agricultural Education Students (n = 53)

Characteristic	*f*	%
Sex		
Female	41	77.36
Male	12	22.64
Home Setting		
Farm	34	64.15
Rural	9	16.98
Small Town	8	15.09
City	2	3.77

In regard to career pathway courses, students who completed introductory courses, Agriculture Science I and Agriculture Science II (*n* = 46; 86.79%), courses in the Agriculture Business and Management Systems career pathway (*n* = 31; 58.49%), courses in the Agricultural Mechanics and Technology Systems career pathway (*n* = 18; 33.96%), courses in the Plant Science/Horticulture Systems career pathway (*n* = 40; 75.47%), courses in the Food Science Systems career pathway (*n* = 7; 13.20%), courses in the Natural Resources Conservation Systems career pathway (*n* = 12; 22.64%), and courses in the Animal Science Systems career pathway (*n* = 30; 56.60%) (see Table 2).

Table 2
Career Pathways of Former School-based Agricultural Education Students (n = 53)

Career Pathway	*f*	%
Introductory	46	86.79
Plant Science/Horticulture Systems	40	75.47
Agriculture Business and Management Systems	31	58.59
Animal Science Systems	30	56.60
Agricultural Mechanics and Technology Systems	18	33.96
Natural Resources Conservation Systems	12	22.64
Food Science Systems	7	13.20

The second research objective sought to describe freshmen students' level of motivation for enrolling in school-based agricultural education courses. Motivational factors addressed included: achievement, power, and affiliation using a 5-point Likert scale. Table 3 displays the level of agreement for overall motivation to enroll in school-based agricultural education courses (M = 4.28; SD = .19) and independent motives (achievement, power and affiliation). Students, on average agreed that achievement (4.55; SD = .53), power (4.25; SD = .41), and affiliation (4.05, SD = .21) were motives for enrolling in school-based agricultural education courses.

Table 3
Level of Agreement for Motivational Constructs Expressed by Former School-based Agricultural Education Students (n = 53)

Construct	*M*	*SD*
Overall Motivation	4.28	.19
Achievement	4.55	.53
Power	4.25	.41
Affiliation	4.05	.21

Note. Scale coded: 1.00 – 1.50 = Strongly Disagree, 1.51 – 2.50 = Disagree, 2.51 – 3.50 = Neither Agree/Disagree, 3.51 – 4.50 = Agree, 4.51 – 5.00 = Strongly Agree

Research objective three sought to compare the level of agreement of each of the three constructs of motivation by CAFNR freshmen students' sex, home setting, and career pathway courses they completed. To compare level of agreement by students' sex, means and standard deviations for each of the three motivation constructs are provided in Table 4. Cohen's d was used to compare the means values to determine the effect size reported. Effect sizes were calculated and interpreted using Thalheimer and Cook's (2003) descriptors. A huge effect size was found for the power motive (Cohen's d = 1.78). A very large effect size was found for the

overall motivation of respondents (Cohen's d = 1.43). A medium effect size was found for the achievement motive (Cohen's d = 0.66).Finally, a negligible effect size was found for the affiliation motive (Cohen's d = 0.05).

Table 4
Comparison of Students' Motivational Motives by Sex of CAFNR Freshmen Students

	Female (n = 41)		Male (n = 12)		
Motive	*M*	*SD*	*M*	*SD*	Cohen's *d*
Power	4.39	.29	3.77	.53	1.78[d]
Overall Motivation	4.35	.13	4.06	.37	1.43[c]
Achievement	4.60	.15	4.36	.75	0.66[b]
Affiliation	4.04	.22	4.05	.20	0.05[a]

Note. Scale coded: 1.00 – 1.50 = Strongly Disagree, 1.51 – 2.50 = Disagree, 2.51 – 3.50 = Neither Agree/Disagree, 3.51 – 4.50 = Agree, 4.51 – 5.00 = Strongly Agree
Thalheimer & Cook's (2003) descriptors for describing relative size of Cohen's d: [a] = negligible, [b] = medium, [c] = very large, [d] = huge.

Table 5 depicts the students' level of agreement by their reported home setting. For the achievement motive, students from a farm home setting reported a mean of 4.56 (SD = .45). Students from a rural home setting (non-farm) reported a mean of 4.66 (SD = .35). Students from a small town reported a mean level of agreement for achievement of 4.38 (SD = .99). Students reporting to have lived in a city while in high school reported a mean of 4.60 (SD = .14) for achievement.

Students from a farm home setting reported a mean of 4.17 level of agreement, with a standard deviation of .60. Students from a rural setting reported a mean of 4.42 with a standard deviation of .57. Students from a small town reported a mean of 4.33 with a standard deviation of .95 for the power motive. Students residing in the city during high school reported a mean of 4.65 for power (SD = .07).

For affiliation, students from a farm setting reported a mean of 4.05 (SD =.41). Rural students reported a mean of 3.99 with a standard deviation of .43 for the motive of affiliation. Students from a small town reported a mean of 4.15 (SD = .44) for affiliation. Students from a city reported a mean of 3.80 with a standard deviation of .26 for the motive of affiliation.

For overall motivation, students from a farm setting reported a mean level of agreement of 4.26 (SD = .41). Students from a rural setting reported a mean level of agreement of 4.36 (SD = .29). Students from a small town reported a mean level of agreement of 4.28 with the standard deviation being .74. The mean level of agreement for individuals residing in a city during high school was 4.35 for overall motivation (SD = .26).

Table 5

Comparison of Students' Motives by Home Setting on College Freshmen

	Farm (n = 34)		Rural (n = 9)		Small Town (n = 8)		City (n = 2)	
Motive	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Achievement	4.56	.45	4.66	.35	4.38	.99	4.60	.14
Power	4.17	.60	4.42	.57	4.33	.95	4.65	.07
Affiliation	4.05	.47	3.99	.43	4.15	.44	3.80	.70
Overall Motivation	4.26	.41	4.36	.29	4.28	.74	4.35	.26

Note. Scale coded: 1.00 – 1.50 = Strongly Disagree, 1.51 – 2.50 = Disagree, 2.51 – 3.50 = Neither Agree/Disagree, 3.51 – 4.50 = Agree, 4.51 – 5.00 = Strongly Agree

Table 6 exhibits the mean and standard deviation for the motives of achievement, power, affiliation and overall motivation in regards to the career pathway courses completed in school-based agricultural education. Students in introductory course work and all six career pathways strongly agreed with the achievement motive. All students agreed with the power and affiliation motive, as well as overall motivation by the three motives.

Table 6

Comparison of Students' Motives by Career Pathway Courses Completed in School-based Agricultural Education

		Achievement		Power		Affiliation		Overall Motivation	
Pathway	*f*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Intro Courses	46	4.53	.56	4.28	.64	4.05	.43	4.29	.45
Ag Business	31	4.51	.61	4.28	.71	4.05	.37	4.29	.49
Ag Mechanics	18	4.61	.75	4.23	.71	4.01	.40	4.28	.53
Plant Science	40	4.55	.58	4.24	.68	4.01	.44	4.27	.48
Food Science	7	4.67	.41	4.07	.48	4.07	.33	4.27	.30
Natural Resources	12	4.58	.42	4.20	.66	4.08	.38	4.29	.40
Animal Science	30	4.60	.62	4.23	.69	4.02	.42	4.28	.47

Note. Scale coded: 1.00 – 1.50 = Strongly Disagree, 1.51 – 2.50 = Disagree, 2.51 – 3.50 = Neither Agree/Disagree, 3.51 – 4.50 = Agree, 4.51 – 5.00 = Strongly Agree

Conclusions

The findings reflect several significant differences; however these differences were in some cases very close on the five point Likert scale ranging from strongly disagrees to strongly agree.

Selected characteristics (sex, home setting, and career pathway) of the sample were described. Over 75 % of the college freshmen students who responded to the study were female. Nearly 65 % of the students reported living on a farm while they were enrolled in high school. The typical freshmen student is a female from a farm that was enrolled in Agricultural Science I, Agricultural Science II, and other courses in an Agricultural Career Pathway.

Students from a farm, small town, or city indicated a higher need for achievement, than students from a rural, non-farm setting. Students from a city indicated a need for the power motive, than students from a farm setting, rural setting, or small town setting. All students indicated a high need for affiliation and the overall construct of motivation.

Students across all career pathways in Missouri agricultural education had a high need for the motive of achievement. Students across all career pathways in Missouri also possessed a need for the motive of power, the motive of affiliation, and the overall all construct of motivation using these three motives.

Female students display a higher need for power than do males. Both male and female students indicated agreement with the achievement motive, the affiliation motive and the overall construct of motivation using these three motives.

Students from a farm, small town, or city indicated a higher need for the motive of achievement, than students from a rural, non-farm setting. Students from a city indicated a need for the power motive, than students from a farm setting, rural setting, or small town setting. All students indicated a high need for affiliation and the overall construct of motivation. In conclusion, all students, no matter their sex, home setting, or career pathway, are motivated by achievement, affiliation and power.

Recommendations

The data suggests all students are motivated by the three motives (achievement, affiliation, and power) suggested by McClelland. Secondary agriculture instructors need to be aware of these motivators, but should not discount other factors that may provide motivation to students to enroll in agricultural education courses.

Student motivation is an important factor when looking at student enrollment and retention in school-based agricultural education programs. It is essential for agriculture

instructors to have an awareness of student motivational factors that are affecting enrollment in their agriculture courses. Furthermore, it is imperative that secondary agriculture instructors utilize the motivational factors which affect enrollment to promote enrollment in their respective agricultural education program.

Agriculture instructors should be aware of the motivational needs of their students. To motivate a student driven by achievement to enroll in agricultural education coursework, teachers should provide opportunities to students that will be an attainable challenge. There are a number of opportunities in agricultural education to promote students with a high need for achievement such as, award programs, career development events, and classroom activities. Agriculture instructors should also provide students opportunities to learn more about agriculture, as this is an important aspect to the achievement motive. Having a positive future in agricultural careers is also an important point to make to students when recruiting.

Teachers should also make future students aware of the opportunities of group work, working within teams, and other opportunities to reach students with a high need for affiliation. Students with a high need for affiliation need to see the teamwork of officer teams, or the group dynamic of the FFA chapter or agriculture classes. Being a part of the FFA chapter is important to students motivated by affiliation. It is also important for the students to know the agriculture instructor is committed to the agricultural education program. Furthermore, the agriculture instructor must show an interest in students' learning to appeal to students motivated by affiliation.

Opportunities such as becoming officers in the FFA chapter and chairperson of committees should be addressed as some of the many ways to motivate students with a higher need for power. Agriculture instructors should showcase opportunities students will have to be involved in the decision making in the FFA chapter. Leadership skills that will be useful later in life should also be presented to future students who may be motivated by the power motive. The main aspect agriculture instructors should promote to motive future students with a need for power should be opportunities to influence and hold leadership positions.

Agriculture instructors need to incorporate the three motives suggested by McClelland into their recruitment strategies. To motivate a student with a high need for affiliation, the teacher should promote activities that allow the student to set and achieve attainable goals. To motivate a student with a higher need for power, the teacher should promote leadership opportunities, and opportunities for the student to influence the program or the FFA chapter. Students with a higher need for affiliation are motivated to enroll because of group or team activities. The agriculture instructor should promote activities that involve working with teams or groups to motivate these students.

Because of the slight difference in the level of agreement of the motivational factor of power between male and female students, agriculture educators should keep this in mind and provide opportunities that will motivate the students to enroll in school-based agricultural education. Female students are more motivated by power, and agriculture instructors should illustrate opportunities for power in agricultural education courses. Female students will be more motivated by the opportunity to have leadership roles and be involved in decision making than males will be.

Male and female students did not differ in their level of agreement on the constructs of achievement and affiliation. Both male and female students should be provided opportunities that will tap into these motivational factors. Students will be motivated to enroll in school-based agricultural education if they understand the opportunity for achievement. Activities that will appeal to students motivated by the achievement motive include; Career Development Events, award programs, and future career opportunities. For the affiliation motive, one of the many opportunities would be to work in teams on assignments. One aspect of school-based agricultural education that appeals to student motivated by the affiliative motive is being a part of the FFA chapter. This can be accomplished through chapter activities, such as BBQs, trips and meetings. It can also be accomplished through items that build chapter identity, such as chapter t-shirts, official dress, and teams.

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Frequency of Coaching Behaviors Used by Agriculture Teacher In Relation to The State-Level Floriculture Career Development Event Team Rank

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The purpose of this study was to describe the relationship between the coaching behaviors used by agriculture teachers and the rank of their State Floriculture Career Development Event team. A coaching behavior instrument was developed based upon Coach John Wooden's Pyramid of Success™. The coaching behavior instrument was delivered to teachers via email. The frequency of use was determined for the coaching behavior. The top five most frequently used coaching behaviors were: friendship, confidence, enthusiasm, team spirit, and cooperation. The relationship between each coaching behavior and the rank of the Floriculture Career Development Event teams was also described. It was determined there was a positive association between team rank and 14 of the 15 behaviors.

Introduction

Agricultural education and FFA programs have a rich history of competition through agricultural activities. Historically, these competitions were created and promoted to test the students' knowledge of the specific agriculture industry the contests represented (White, Mack, Downs, & Fouts, 1939). Today, teachers utilize Career Development Events (formerly referenced as "contests") as ways for students to apply different agriculture knowledge and skills. According to the National FFA Organization's Career Development Event Handbook (2006), "National career development events should reflect instruction that currently takes place in the entire agricultural education program, including classroom instructions, laboratory instructions, individualized instruction, and/or supervised agricultural experience" (p. 1). Career development events have covered many different areas of agricultural education. Within each event was a specific purpose and objectives, which, students would demonstrate when they participated in the contest.

Besides reflecting on classroom instruction, career development events focused on building career aspirations related to different areas of agriculture. As stated by the National FFA Organization, in their Career Development Event article, "The events are designed to help prepare students for careers in agriculture (National FFA Organization, 2006, p. 1). According to Connors & Mundt (2001):

> Career Development Events are an excellent bridge between what the students learn in the classroom or laboratory, the skills they have learned as part of the SAE program, and the competition and recognition available through the FFA. This bridge builds the transition into career success. (p. 7)

Through these competitions students not only gained knowledge and learned about agriculture careers, they could also receive many rewards and recognition through their successes.

Because of the awards and recognitions students and teachers can potentially receive, much effort is placed on student and team success. According to Beekley and Moody (2002), "From these events, students are able to use their knowledge and gain a further understanding of the agriculture curriculum, with the extrinsic motivation of winning awards" (p. 16). As an outgrowth of the curriculum, students learn much of the technical content for each career development event from formal classroom instruction. However, when preparing teams of four individuals to compete, the agriculture teacher transitions his/her role into one of a coaching role. The transition of this role is, in part, due to the change of learning environment. Agriculture teachers no longer confine the learning process to the classroom, nor is the learning confined to the length of the classroom period. Rather, the coaching of career development event teams is dependent on what the agriculture teacher determines to be of value in preparing successful teams. The frequency of the coaching behaviors utilized by the agriculture teachers can affect how well their students do at Career Development Event competitions. As a coach of either a Career Development Event team or a typical athletic team, coaches assume different responsibilities and behaviors. According to Hackman and Wageman (1995):

> Team leaders engage in many different kinds of behaviors intended to foster team effectiveness, including structuring the team and establishing its purpose, arranging for the resources a team needs for its work and removing organizational roadblock that impede the work, helping individual members strengthen their personal contributions to the team, and working with the team as a whole to help members use their collective resources well in pursuing them purposes. (p. 269)

Consequently, coaching behaviors exhibited by agriculture teachers can have an effect on how well his/her team members perform at annual Career Development Event competitions.

Program, teacher, and student success is determined by how well Career Development Event teams perform at selected contests. A study was conducted to explore the characteristics of effective agriculture teachers. Of interest to this study one of these characteristics was found to be, the teacher "has sound knowledge of FFA, actively advises the FFA chapter, and effectively prepares students for Career Development Events" (Roberts & Dyer 2004, p. 58). Since teaching Career Development Events contributes to determining teacher effectiveness, research (Roberts & Dyer, 2004, & Layfield & Dobbins, 2002) found teachers feel the need for more in-service training related to teaching Career Development Event teams. By determining coaching behaviors that work best for preparing teams in the Floriculture Career Development Event, inservice education can be tailored to meet these needs. Developing specific agriculture teachers' coaching behaviors will help them better their Career Development Event individuals and teams to be more successful.

Research has been conducted in the past related to career development events. A few studies have been conducted focusing on students achievement related to career development events (Johnson, 1991, & Johnson, 1993). Another study investigated the relationship between student demographics and the performance at national career development events (Rayfield, Fraze, Brashears, & Lawver, 2007). No previous studies have been conducted to investigate the relationship between coaching behaviors used and student performance in career development events.

Theoretical Framework

To a large extent, successful Career Development teams are dependent on students' content knowledge, preparation, practice and teachers' characteristics such as his/her coaching behaviors. Successful basketball coach John Wooden developed the Pyramid of Success™ to assist coaches in identifying successful coaching behaviors (Wooden & Carty, 2005). Coach Wooden's Pyramid of Success™ was based on his view of success, "Success is peace of mind which is a direct result of self-satisfaction in knowing you did your best to become the best that you are capable of becoming" (Wooden & Carty, 2005, p. 23). Coach Wooden utilized a pyramid or triangle shape to emphasize the foundation and the building blocks of the pyramid (Wooden & Carty, 2005). The Pyramid of Success™ contains 15 building blocks including: industriousness, friendship, loyalty, cooperation, enthusiasm, self-control, alertness, initiative, intentness, condition, skill, team spirit, poise confidence, and competitive greatness (Figure 1). The Pyramid of Success™ and related expert opinion provided the theoretical framework for this study.

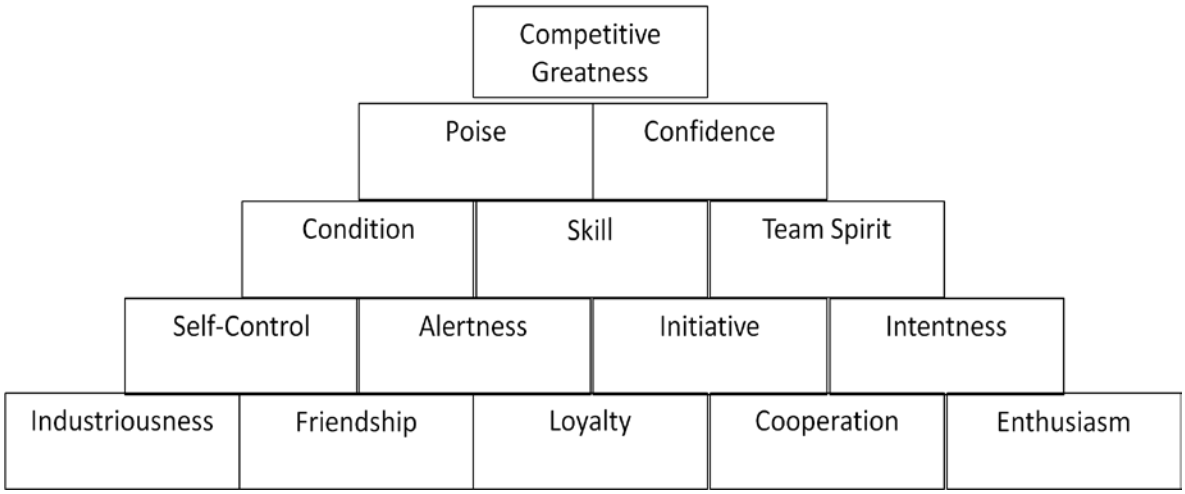

Figure 1. Displays the Pyramid of Success™ with the fifteen building blocks in the hierarchical order.

The Pyramid of Success™ began at one of its cornerstone foundation building blocks, industriousness. Industriousness consisted of two components, work and planning (Wooden & Carty, 2005). Industriousness was achieving worthwhile results through hard work and careful planning (Wooden & Carty, 2005). The next cornerstone building block was enthusiasm. Enthusiasm was, enjoying what you are doing which will brush off on others (Wooden & Carty, 2005). Coach Wooden's next foundation building block was friendship. Friendship was defined as, "Comes from mutual esteem, respect and devotion." (Wooden & Carty, 2005, p. 22). The next foundation building block of the Pyramid of Success™ was cooperation. Cooperation was, listening to others and finding the best way for others (Wooden & Carty, 2005). The last foundation building block was, loyalty. Loyalty was defined as, being faithful to yourself and those who depend upon you (Wooden & Carty, 2005).

Self-control was the next building block of coaching behaviors and is found on the second tier of Wooden's Pyramid of Success™. Self-control was, keeping emotions under control, using good judgment, and perform self-discipline (Wooden & Carty, 2005). Alertness was the next coaching behavior building block on the second level of the Pyramid of Success™. Alertness was defined as, constantly observing, staying open minded, and always learning and improving (Wooden & Carty, 2005). Following alertness on the second tier of the Pyramid of Success™ was initiative. Initiative was thinking and deciding along, and learning from failure (Wooden & Carty, 2005). The final building block on the second level of the Pyramid of Success™ was intentness. Intentness was achieving realistic goals by remaining determined and persistent (Wooden & Carty, 2005).

The first building block for the third tier of the Pyramid of Success™ was condition. Condition was defined by Wooden as, "Mental – Moral – Physical. Rest, exercise, and diet must be considered. Moderation must be practiced. Dissipation must be eliminated" (Wooden & Carty, 2005, p. 22). Skill was the middle building block of the third tier of the Pyramid of Success™. Skill was defined as possesing the knowledge and skill to perform the fundamentals quickly and successfully (Wooden & Carty, 2005). The final building block of the third level of the Pyramid of Success™ was team spirit. This was defined as being considerate of others and sacrificing for the interests of all (Wooden & Carty, 2005).

The building block which started the fourth tier of the Pyramid of Success™ was poise. Poise was just being yourself and being at ease in any situation (Wooden & Carty, 2005). Finishing the fourth tier was confidence. Confidence was defined as respecting but not fearing the competition, which may come from being prepared (Wooden & Carty, 2005). At the peak of the pyramid was competitive greatness. Competitive greatness was defined as performing at your best when it is needed (Wooden & Carty, 2005).

Purpose and Objectives

Agriculture teachers find great satisfaction in leading Career Development Event teams to successful outcomes for the team and individuals who participate. Frequently used coaching behaviors among high school agriculture teachers and those coaching behaviors which contribute to successful outcomes are conspicuously lacking in the research literature base. Because of the implication for change in coaching practice and the void in the literature, the purpose of this study was to describe the frequency in coaching behaviors and the relationship between the coaching behaviors and team placing (rank) within the Floriculture Career Development Event. The following research objectives were addressed in the study:

1) Describe the characteristics of agriculture teachers in Missouri who prepared a Floriculture Career Development Event team in terms of age, sex, years of teaching agriculture, classes taught related to Floriculture, years coaching Floriculture Career Development Event, and previous Career Development Event experiences.
2) Describe the coaching behaviors used by high school agriculture teachers to coach the Floriculture Career Development Event team.
3) Describe the relationship between the fifteen coaching behaviors and the placing (rank) of the state Floriculture Career Development Event teams.

Methods/Procedures

This study was *ex post facto* in design. The target population for the study was agriculture teachers in Missouri who coached a 2009 State Floriculture Career Development Event team (N = 51). The names and contact information were obtained from the Missouri directory of agriculture teachers and served as the frame for the study.

Instrumentation

Data were collected using a web-based questionnaire to address the objectives of the study. SurveyMonkey™ was the service provider for this study. Section one consisted of 45 statements related to coaching behaviors using the 15 building blocks of Coach John Wooden's Pyramid of Success™. Three statement items were developed for each coaching behavior. The coaching behaviors measured were alertness, condition, confidence, competitive greatness, cooperation, enthusiasm, friendship, initiative, industriousness, intentness, loyalty, poise, self-control, skill, and team spirit, This section was designed to measure the frequency of each coaching behaviors used by agriculture teachers while coaching a State Floriculture Career Development Event team in 2009. To measure the frequency of behaviors, a 5-point Likert scale was utilized for each statement. The scale was comprised of 1 = never, 2 = rarely, 3 = sometimes, 4 = very often, and 5 = always.

Section two of the questionnaire consisted of questions related to the agriculture teacher's characteristics. These forced-choice and fill-in questions pertained to teachers' sex, age, years of teaching agriculture education, years of coaching the Floriculture Career Development Event, number of classes taught related to the Floriculture Career Development Event, and whether they participated in the Floriculture Career Development Event as a student. Team rank was obtained from state records for each participant.

The validity of the questionnaire was determined through a panel of experts (n = 6) who had expertise and knowledge in the area of agriculture education, Career Development Events, and statistics. A pilot study consisting of agriculture teachers who coached a non-qualifying Floriculture Career Development Event team determined the reliability of the study. Reliability estimates were calculated on the 15 coaching behavior constructs derived from three statement items. Of the 15 coaching behavior constructs, 11 yielded a Cronbach's alpha above .60. These coaching behavior constructs included: industriousness (α = .84), friendship (α = .68), loyalty (α = .85), cooperation (α = .79), enthusiasm (α = .74), self-control (α = .65), alertness (α = .65), initiative (α = .79), condition (α = .61), skill (α = .85), and confidence (α = .70). Four of the 15 coaching behavior constructs yielded questionable reliability estimates: intentness (α = .12), team spirit (α = .11), poise (α = .18), and competitive greatness (α = .19). Because of the low reliability estimates of these constructs caution should be taken when interpreting their results.

Data Collection

The data collection process included 5-points of contact: pre-notice e-mail, e-mail with link to web-based questionnaire, first reminder e-mail, second reminder e-mail, and third

reminder e-mail. The pre-notice e-mail was sent to teachers to inform them of the forthcoming invitation to participate in the study. The first e-mail was sent to the teachers three days later and contained the web link to the web-based questionnaire. The first reminder e-mail was sent two days later to the remainder of the population who had yet to complete the questionnaire. The second reminder e-mail was sent out 48 hours after the first reminder e-mail and encouraged participation in the study. The third and final e-mail reminder was sent two days later and again encouraged participation in the study. After the 5-points of contact 40 of the 51 (78.43%) agriculture teachers in the study responded to the web-based questionnaire and comprised the accepting sample. No efforts to control non-response error was taken, thus the data applies only to those agriculture teachers who participated in the study. Data were analyzed for this study using SPSS 17.0 for Windows. To analyze the data, different types of descriptive statistics were used such as frequency, mean, standard deviation, range, and correlation. The strengths of the correlations were described using Davis' (1971) descriptors.

Findings/Results

Research objective one sought to describe the characteristics of agriculture teachers in Missouri who taught a Floriculture Career Development Event team at the state level in 2009 (Table 1). Of the teachers in the study, 25 (62.50%) were male and the remaining 15 (37.50%) were female. Age of the teachers ranged from 25 to 51 years with a mean of 33.98 and a standard deviation of 7.30. In regards to the number of years teaching agricultural education, it ranged from 3 to 29 years with a mean of 10.70 and a standard deviation of 6.41. The teachers' years of coaching the Floriculture Career Development Event ranged from 1 to 22 years with a mean of 8.15 and a standard deviation of 5.71. The number of classes taught by the teachers, which related to the Floriculture Career Development Event ranged from 1 to 7 classes with a mean of 1.90 and a standard deviation of 1.27. In regards to the teachers' previous experience in the Floriculture Career Development Event as a student 12 (30.00%) teachers did compete in the Floriculture Career Development Event as a student, with 28 (70.00%) not having competed as a student.

Table 1

Characteristics of Teachers Who Coached a 2009 State Floriculture Career Development Event Team (n = 40)

Teacher Characteristic	*f*	*%*	*M*	*SD*	Range
Sex					
Male	25	62.50			
Female	15	37.50			
Age			33.98	7.30	25.00-51.00
Years teaching agricultural education			10.70	6.41	3.00-29.00
Years coaching the Floriculture CDE			8.15	5.71	1.00-22.00
Number of classes taught related to the Floriculture CDE			1.90	1.26	1.00-7.00
Teachers with Previous Experience in Floriculture CDE as student	12	30.00			

Research objective two sought to describe the coaching behaviors used by the high school agriculture teachers to coach the Floriculture Career Development Event (Table 2). The top five most frequently used coaching behaviors were friendship (M = 4.57; SD = 0.57), confidence (M = 4.47; SD = 0.48), enthusiasm (M = 4.44; SD = 0.64), team spirit (M = 4.43; SD = 0.58), and cooperation (M = 4.39; SD = 0.64). The bottom five and least used coaching behaviors were skill (M = 3.64; SD = 0.65), industriousness (M = 3.97; SD = 0.85), condition (M = 3.99; SD = 0.73), poise (M = 4.17; SD = 0.65), and initiative (M = 4.18; SD = 0.63).

Research objective three sought to describe the relationship between the fifteen coaching behaviors and the placing (rank) of the 2009 State Floriculture Career Development Event teams (Table 3). For each relationship, a Spearman' rho correlation coefficient was calculated. The strengths of the correlations were described using Davis' (1971) descriptors. Industriousness (r_s = .73) was the only coaching behavior that had a positive correlation and a magnitude of very high. Alertness (r_s = .48), friendship (r_s = .45), condition (r_s =.41), intentness (r_s =.34), competitive greatness (r_s =.33), skill (r_s =.33), cooperation (r_s =.31), and initiative (r_s =.30) had a positive and a moderate correlation. Confidence (r_s =.29), loyalty (r_s =.28), team spirit (r_s =.25), poise (r_s =.19), and enthusiasm (r_s =.16) had a positive and a low correlation. Self-control was the only coaching behavior, which had a negative and a negligible correlation with placing (rank) of the 2009 State Floriculture Career Development Event teams.

Table 2

Use of Coaching Behaviors by Agriculture Teachers (n = 40)

Coaching Behavior Construct	*M*	*SD*
Friendship	4.57	0.57
Confidence	4.47	0.48
Enthusiasm	4.44	0.64
Team Spirit	4.43	0.58
Cooperation	4.39	0.64
Loyalty	4.36	0.64
Competitive Greatness	4.36	0.59
Self-Control	4.35	0.48
Alertness	4.33	0.64
Intentness	4.23	0.60
Initative	4.18	0.63
Poise	4.17	0.65
Condition	3.99	0.73
Industriousness	3.97	0.85
Skill	3.64	0.65

Note. Scale based upon 1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Very Often, and 5 = Always

Table 3

Correlation Between Teachers' Coaching Behaviors and Floriculture CDE Team Rank (n = 40)

Coaching Behavior	r_s	Magnitude
Industriousness	.73	Very High
Alertness	.48	Moderate
Friendship	.45	Moderate
Condition	.41	Moderate
Intentness	.34	Moderate
Competitive Greatness	.33	Moderate
Skill	.33	Moderate
Cooperation	.31	Moderate
Initiative	.30	Moderate
Confidence	.29	Low
Loyalty	.28	Low
Team Spirit	.25	Low
Poise	.19	Low
Enthusiasm	.16	Low
Self-Control	-.06	Negligible

Note. Davis (1971) correlation descriptors were used

Note. Intentness, Team Spirit, Poise, and Competitive Greatness all had Cronbach's alpha below .60

Conclusions, Recommendations, Discussions/Implications

The findings of this study are limited to the participants of this study due to the lack of control for non-response error. Findings should be interpreted with caution. From these findings it can be concluded the typical agriculture educator in this study was male and was 33.98 years old. The typical educator had taught for 10.70 years and coached the Floriculture Career Development Event team for 8.15 years. The typical agriculture educator taught 1.9 classes related to the Floriculture Career Development Event and did not compete in the Floriculture Career Development Event as a student.

From these findings it can be concluded the top five most frequently used coaching behaviors by agriculture teachers were friendship, confidence, enthusiasm, team spirit, and cooperation. The least used five coaching behaviors used by agriculture teachers were skill, industriousness, condition, poise, and initiative. The coaching behaviors with a middle frequency level by agriculture teachers were loyalty, competitive greatness, self-control, alertness, and intentness. It can also be concluded due to the different level of frequencies, each coaching behavior requires a different level of use.

The top five frequently used coaching behaviors are reflective of motivational efforts made by the teachers. Through the use of these coaching behaviors, teachers appear to be motivating their team members. Four of the five top used behaviors make up part of the foundation of the Pyramid of Success™. The foundation represents the base the Pyramid is built on, and this expresses the importance of these behaviors. This in turn expresses the importance of using motivating behaviors early in the team formation stage and throughout the team performance. The least used coaching behaviors appear to be reflective of personal ability. When used these coaching behaviors focused on increasing the personal ability of the Floriculture Career Development Event team members. The middle five behaviors are used less by teachers, but still held some value since they had a higher frequency than the last 5. The mid-level behaviors appear to be reflective of personal attributes of the Floriculture Career Development Event team members. Each coaching behavior will have a different level of use depending on the agriculture teacher.

Therefore, it is recommended for teachers to use these coaching behaviors related to motivation, personal ability, and personal attributes with varied frequency. For teachers who wish to motivate their team members, it would be recommended to use the top five coaching behaviors: friendship, confidence, enthusiasm, team spirit, and cooperation. Due to four of these behaviors being part of the Pyramid's foundation, it is recommended to use these behaviors at the beginning and all through the competitive process. For teachers who wish to focus on personal ability, it would be recommended to use to last five behaviors: skill, industriousness, condition, poise, and initiative. For teachers who wish to focus on personal attributes, it would be recommended to use the middle five coaching behaviors: loyalty, competitive greatness, self-control, alertness, and intentness. It is also recommended to use the behaviors at different frequency levels. Students have to be motivated throughout the entire competition process so in turn the behaviors related to motivation will be used more frequently. Coaching behaviors related to personal ability and attributes, perhaps should be used less frequently and at strategic times in preparing students to compete in the Career Development Events.

From these findings it can be concluded with this group of participants that the 15 coaching behaviors do not equally influence team ranking, rather some coaching behaviors can be considered more important than others based upon their level of influence. All the coaching behaviors except self-control, positively affect the placing of the Floriculture Career Development Event. It is also concluded nine (industriousness, alertness, friendship, condition, intentness, competitive greatness, skill, cooperation, and initiative) of the 15 coaching behaviors have a greater affect on the placing of the teams, compared to the six coaching behaviors (confidence, loyalty, team spirit, poise, enthusiasm, and self-control) with a magnitude of low or negligible.

Because of the positive correlation of the 14 coaching behaviors, these will positively affect the placing of the teams. When used, these behaviors will influence the placing of the Floriculture Career Development Event team. The more these behaviors are used the greater the benefit is for the Career Development Event team. Team success is dependent on the use of successful coaching behaviors (Becker & Wrisberg, 2008). With the negatively correlated behavior, the more it is used, the lower the placing will be or the less it is used the higher the placing will be. Or said differently, these behaviors are counterproductive. These behaviors would not benefit the Career Development Event team placing if used by the agriculture educator. With the very high or moderate correlation magnitude, the greater the relationship is between those behaviors and the team placing. These behaviors will have the greatest benefit to the Career Development Event teams' placing. Compared to the lower correlations, the more these are used the higher the rank will be. The behaviors with lower correlations will require more use to increase the rank then the higher correlated behaviors. These behaviors will have less of a benefit than the higher correlated behaviors.

Therefore, it is recommended to use all of the behaviors, which have a positive correlation. Since, these are positively correlated, when they are used the Floriculture Career Development Event rank should be higher. Moreover, it is also recommended to use the coaching behaviors with the highest correlations most frequently. The more these are used the more the individual scores and team placing will increase. An increase of the individual scores and team placing will help more students pass the technical skills assessment. This will in turn help agriculture teachers and agricultural education programs increase the ability to receive their Perkins Act funding (Department of Elementary and Secondary Education, 2010). Increasing student scores and team placing will also help students receive more rewards and recognition through the Career Development Events (National FFA Organization, 2006). These coaching behaviors can be further developed through in-service workshops. These workshops need to be available to the largest number of agriculture teachers at one time, which would be the Missouri Vocational Agricultural Teachers Association Summer Conference. These workshops should be a joint effort between DESE and agriculture teachers who have been successful in Career Development Events from around Missouri, to benefit all agriculture teachers in Missouri. This workshop should build upon the nine highest correlated behaviors.

Due to the increased emphasis on the success of Career Development Event teams, much research needs to be conducted related to the Career Development Events. First, research needs to be conducted on what educator characteristics have the greatest affect on how well their

Career Development Event teams do. Secondly, research also needs to be conducted on what student characteristics make their teams more successful than others. Much more research needs to be conducted on what coaching behaviors are used by agriculture teachers, and their relationship with the team placing. Due to the recent use of Career Development Events as a way for programs and teachers to be accountable, much research is needed to determine if Career Development Events are a way to assess the agricultural education curriculum. Even though this study focused on the Floriculture Career Development Event, research is needed in all of the different Career Development Event areas.

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Importance and Capability of Teaching Leadership as Perceived by Beginning Agricultural Education Teachers

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The teaching of leadership has an extensive tradition in secondary agricultural education programs and many leadership topics are being taught in the formal instruction component of secondary agricultural education programs. Thus, it is essential for agricultural education teacher preparation programs to better understand the teaching of leadership.

This descriptive research explored the importance of teaching leadership in secondary agricultural education programs and the self-perceived capability of beginning secondary agriculture teachers in Illinois, Indiana, Kentucky, Missouri, and Ohio to teach leadership. Based on the data collected, it was determined that a majority of beginning agricultural education teacher respondents had taken leadership coursework while in college. Furthermore, respondents reported that leadership topics were important to teach in secondary agricultural education programs and respondents perceived they were capable of teaching leadership topics.

Agricultural education teacher preparation programs are encouraged to consider leadership coursework in program requirements and to identify core leadership topics that should be taught in all secondary agricultural education programs. As the teaching of leadership continues to evolve, care should be taken to ensure that leadership development and leadership education efforts are harmonious and build upon each other to provide the knowledge, skills, and dispositions desired in future generations of leaders.

Introduction

Leadership exhibited by individuals now and in the future will determine the path of society. Leadership is valued by individuals, corporations, academic institutions, and society to address issues (Northouse, 2010). "We are faced with immensely threatening problems – terrorism, AIDS, drugs, depletion of the ozone layer, the threat of nuclear conflict, toxic waste, the real possibility of economic disaster" (Gardner, 1995, p. 4). Kouzes and Posner (1995) declared that now, more than ever, there is a need for leadership to lead us to greatness. Many of these same concerns and sentiments can be seen and heard today. Thus, continuing a critical need and desire for leaders with new approaches to leadership in a rapidly changing world (Komives, Lucas, & McMahon, 2007).

We are surrounded by leadership influences that impact our daily lives and the future will require numerous leaders. Gardner (1995) described this need by stating, "When one considers all the towns and city councils, corporations, government agencies, unions, schools and colleges, churches, professions, and so on, the number must be high" (p. 7). The call to leadership is for everyone. Teaching and learning about leadership at all educational levels is vital to the future of society. Thus, it is important that teachers who are called upon to teach leadership are prepared and capable of fulfilling this important responsibility. The teaching of leadership in agricultural education has an extensive history in leadership skill development through the FFA and has evolved to include classroom instruction about leadership. Since leadership is taught in

secondary agricultural education programs (Morgan & Rudd, 2006), it is important that agriculture teachers possess the knowledge and skills needed to fulfill that professional role.

Theoretical Foundation

Scholars have defined leadership a number of ways. "Leadership is the process of influencing others to understand and agree about what needs to be done and how to do it, and the process of facilitating individual and collective efforts to accomplish shared objectives" (Yukl, 2006, p. 8). Dubrin (2001) declared that "To be a leader, one has to make a difference and facilitate positive changes" (p. 3). "To an extent, leadership is like beauty: it's hard to define, but you know it when you see it" (Bennis, 1989, p. 1). The definition used in this study was purported by Northouse (2010) and stated that, "Leadership is a process whereby an individual influences a group of individuals to achieve a common goal" (p. 3).

The saying that "leaders are born and not made" has been heard for many years. Much of this thought was based upon a belief that leaders possessed special genetic traits that were the origin of their leadership ability (Komives et al., 2007). This early theory of trait leadership has given way over time to behavior and contingency theories (Chemers, 1995). More recently, approaches such as transformational, servant, authentic, and relational leadership theories have been described (Komives et al., 2007). A paradigm shift occurred during the transition in which leadership knowledge and skills were not simply inherent, but could be learned (Eich, 2008; Dubrin, 2001; Komives et al., 2007; Wren, 1995; Yukl, 2006). Therefore, it is believed that the potential for leadership exists in every student, and can be developed through focused educational programs (Cress, Astin, Zimmerman-Oster, & Burkhardt, 2001).

One key element of educational programs in leadership is a teacher who possesses and demonstrates efficacious behaviors. Albert Bandura (1986) defined self-efficacy as, ". . . people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (p. 391). Efficacious individuals tend to work harder, persist longer, participate more readily, and have fewer emotional reactions then those with lower self-efficacy (Bandura, 1997). An individual derives a level of self-efficacy through mastery experiences, physiological and emotional arousal, vicarious experience, and social persuasion (Bandura, 1997).

The theory of self-efficacy has been extended to aid in understanding the teaching process and is referred to as teaching efficacy (Woolfolk, 2004). Woolfolk (2004) defined teaching efficacy as, ". . . a teacher's belief that he or she can reach even difficult students to help them learn" (p. 370). Within teacher self-efficacy a teacher recognizes and analyzes a teaching task and then feels competent and confident to successfully complete the task (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Teacher self-efficacy plays a role in the teacher's ability to build learning environments for the student (Bandura, 1997). A teacher demonstrating a high level of teacher self-efficacy, ". . . will work harder and persist longer even when students are difficult to teach" (Woolfolk, 2004, p. 370). Woolfolk (2004) concluded that teaching efficacy, ". . . appears to be one of the few personal characteristics of teachers that is correlated with student achievement" (p. 370).

Teachers must possess content knowledge and skill in the content areas they teach. Figure 1 depicts components that are related to a teacher's ability to teach leadership which in turn contributes to student achievement in leadership.

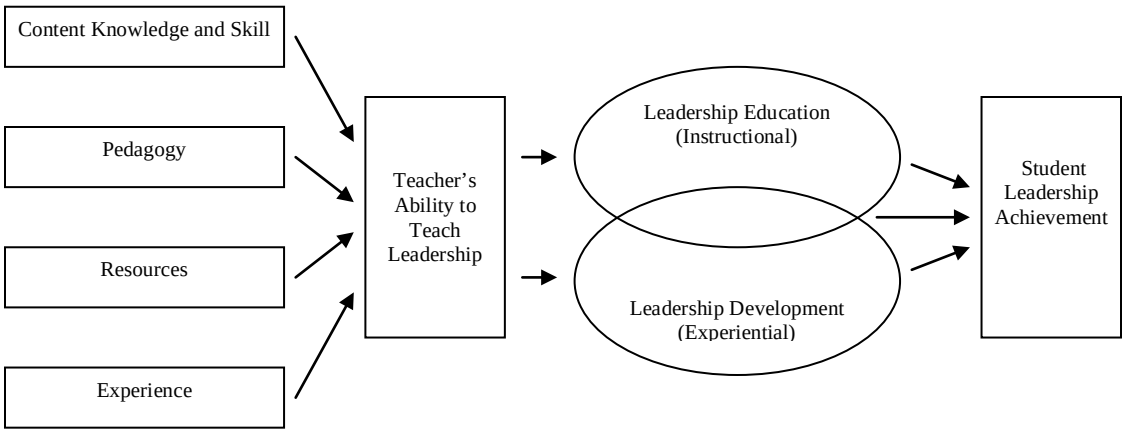

Figure 1. Conceptual Model of a Teacher's Ability to Teach Leadership

Purpose and Objectives

The purpose of this study was to describe the perceptions of beginning agricultural education teachers regarding the importance of teaching leadership topics in secondary agricultural education programs. This study also was conducted to describe beginning agricultural education teachers' perceptions regarding their capability to teach leadership topics. Findings from this study provide a basis for curriculum development and program planning decisions pertaining to effectively preparing secondary agricultural education teachers to teach leadership. Teachers should know, understand, and be able to demonstrate the content area that they teach (American Association for Agricultural Education, 2001; National Council for Accreditation of Teacher Education, 2008). This study provides information which can be used by university administrators and faculty to determine the perceived level of importance of teaching leadership topics within secondary agricultural education programs and if beginning agricultural education teachers perceive they are capable of teaching leadership. Information from this study can be utilized by university administrators and faculty to modify agriculture teacher preparation programs and courses accordingly.

Although leadership education and leadership development may be incorporated throughout all components in an agricultural education program; this study focused solely on the formal instruction component in secondary agricultural education programs. The following research objectives were developed to guide this study:

1. Describe the demographic characteristics of beginning agricultural education teachers.
2. Describe the importance of leadership topics as perceived by beginning agricultural education teachers.
3. Describe the perceived capability of beginning agricultural education teachers to teach leadership topics.

Methods and Procedures

This research was a descriptive study to explore and describe what exists. Survey research methods can be used to summarize characteristics or measure attitudes and opinions of phenomena to accurately describe a norm (Ary, Jacobs, Razavieh, & Sorensen, 2006). Survey research methods were utilized in this study to describe demographic characteristics of beginning agricultural education teachers, the perceived importance of teaching leadership topics, and the capability of beginning agricultural education teachers to teach those leadership topics.

Beginning agriculture teachers in their first, second, or third year of teaching agricultural education in Illinois, Indiana, Kentucky, Missouri, and Ohio comprised the population frame. Professional staff from teacher education programs and Departments of Education within each respective state identified the beginning agriculture teachers to be included in the frame. Upon receipt, the list was purged to eliminate duplicate listings and a census was then conducted based upon the population frame (N=330).

A researcher developed data collection instrument was used in this research. The data collection instrument measured the importance of teaching 60 leadership topics using a five point Likert-type summated rating scale (1 = Not Important to 5 = Very Important). The 60 leadership topics were derived from Units 2, 3, 4, and 5 of the *LifeKnowledge*® resource materials (National FFA, 2008). The perceived capability of respondents to teach the 60 leadership topics was measured using a five point rating scale (1 = No Capability to 5 = A Great Deal of Capability). A panel of experts comprised of four university agricultural education faculty and two leadership specialists from the National FFA Organization were used to establish content validity of the instrument. Cronbach's alpha reliability coefficient for internal consistency was used to assess reliability of the instrument through a pilot test (n=20). The pilot study revealed a Cronbach's alpha reliability coefficient for the perceived importance to teach leadership portion of 0.95 and the perceived level of capability to teach leadership portion of 0.94.

Data collection was conducted utilizing the Dillman (2000) tailored design method. Data were collected using SurveyMonkey®. Respondents that could not be reached through the online survey engine were mailed a copy of the instrument. The data collection process produced 137 usable responses for this research yielding a useable response rate of 42% (n=137). The IBM SPSS Statistics 18 – PASW Statistics 18 was utilized to analyze the data. A comparison of early to late respondents (Miller & Smith, 1983) was conducted based on ten randomly selected leadership topics. Early respondents were deemed as those responding within the first 12 hours of the electronic data collection window (n=44). Late respondents were defined as those teachers responding in the final 12 hours of the electronic data collection window (n=22). When comparing the means for the early and late respondent groups, all means were within one standard deviation of each other, therefore these findings are assumed to be representative of the population frame and may be generalized to the population described within this research.

Results and Findings

Research objective one pertained to the demographic characteristics of beginning agricultural education teachers. Subjects (n=137) provided responses to eight demographic

questions. Educational attainment measured by the highest level of degree held by the teachers included 101 (73.7%) with a Bachelor of Science degree, 32 (23.4%) with a Master of Science degree, and 4 (2.9%) with another form of degree. Thirty-seven (27.0%) reported they were in their first year of teaching, 56 (40.9%) in their second year, and 44 (32.1%) in their third year of teaching agricultural education. Teachers were asked to respond if they were enrolled in agricultural education and members of the FFA while in high school. Seventeen (12.4%) teachers indicated they were not enrolled in agricultural education while in high school and 18 (13.1%) were not members of the FFA. One-hundred-twenty (87.6%) respondents were enrolled in agricultural education while in high school and 119 (86.9%) were members of the FFA. The age of beginning secondary agricultural education teacher respondents ranged from 22 to 59 years of age with a mean of 28 years and a standard deviation of 7.67. Forty-four (32.1%) of the secondary agricultural education teacher respondents taught in Ohio, 40 (29.2%) in Missouri, 21 (15.3%) in Kentucky, 19 (13.9%) in Illinois, and 13 (9.5%) taught in the state of Indiana. Respondents included 76 (55.5%) female teachers and 61 (44.5%) male teachers. Respondents were asked to describe their participation in leadership courses during their teacher preparation programs. Sixteen (11.7%) teachers had not taken a leadership course while in college, 29 (21.2%) had one leadership course, 44 (32.1%) had two leadership courses, 21 (15.3%) had three leadership courses, and 27 (19.7%) had more than three leadership courses while in college.

Describing the importance of leadership topics as perceived by beginning agricultural education teachers was research objective two. Frequencies and percentage of respondents for each leadership topic are presented in Table 1. Sixteen leadership topics were described as *Very Important* by a majority of the beginning agricultural education teacher respondents. Topics included *Valuing honesty, Conducting a job search, Making decisions in teams, Demonstrating interview techniques, Managing time, Defining teamwork, Making proper first impressions, Deciding about a career path, Developing a resume, Utilizing critical thinking skills, Demonstrating effective listening, Developing public speaking skills, Importance of personal attitude, Accepting responsibility for actions, Setting goals,* and *Developing personal character*. One leadership topic, *Developing workshops and programs* (48.1%), did not have a majority of the teacher respondents rating the items as *Important* or *Very Important*.

Weighted frequency means were calculated for 60 individual leadership topics with respect to perceived importance of teaching each leadership topic (Table 1). For each respondent, a response of *Very Important* received a weighted score of five, *Important* received a four, *Fairly Important* received a three, *Slightly Important* received a two, and *Not Important* received a weighted score of one. Weighted scores for each topic were then summed and divided by the number of respondents to determine a weighted frequency mean. The leadership topics are listed in order of importance based on the weighted frequency mean. The weighted frequency mean for ten leadership topics exceeded 4.50. Conversely, only one leadership topic weighted frequency mean was less than 3.50. The leadership topic with the weighted frequency mean less than 3.50 was *Developing workshops and programs* (*Weighted Frequency Mean=3.45*).

Table 1
Perceived Level of Importance of Leadership Topics (*n*=137)

Importance to Teach:	*Frequency (Percentage)*					*Weighted Frequency Mean*
	NI	*SI*	*FI*	*I*	*VI*	
Valuing honesty	0 (0.0)	1 (0.7)	3 (2.2)	23 (16.8)	110 (80.3)	4.77
Developing a resume	0 (0.0)	2 (1.5)	8 (5.8)	30 (21.9)	97 (70.8)	4.62
Managing time	0 (0.0)	0 (0.0)	8 (5.8)	38 (27.7)	91 (66.4)	4.61
Accepting responsibility for actions	0 (0.0)	0 (0.0)	8 (5.8)	39 (28.5)	90 (65.7)	4.60
Developing public speaking skills	0 (0.0)	1 (0.7)	7 (5.1)	40 (29.2)	89 (65.0)	4.58
Making proper first impressions	0 (0.0)	0 (0.0)	7 (5.1)	44 (32.1)	86 (62.8)	4.58
Utilizing critical thinking skills	1 (0.7)	0 (0.0)	10 (7.3)	36 (26.3)	90 (65.7)	4.56
Setting goals	0 (0.0)	0 (0.0)	12 (8.8)	38 (27.7)	87 (63.5)	4.55
Importance of personal attitude	0 (0.0)	0 (0.0)	14 (10.2)	37 (27.0)	86 (62.8)	4.53
Developing personal character	0 (0.0)	2 (1.5)	8 (5.8)	44 (32.1)	83 (60.6)	4.52
Demonstrating interview techniques	0 (0.0)	2 (1.5)	9 (6.6)	47 (34.3)	79 (57.7)	4.48
Demonstrating effective listening	0 (0.0)	1 (0.7)	11 (8.0)	50 (36.5)	75 (54.7)	4.45
Deciding about a career path	1 (0.7)	4 (2.9)	10 (7.3)	43 (31.4)	79 (57.7)	4.42
Defining teamwork	0 (0.0)	0 (0.0)	15 (10.9)	50 (36.5)	72 (52.6)	4.42
Making decisions in teams	0 (0.0)	1 (0.7)	14 (10.2)	50 (36.5)	72 (52.6)	4.41
Describing professional ethics	0 (0.0)	0 (0.0)	14 (10.2)	59 (43.1)	64 (46.7)	4.36
Selecting problem solving strategies	0 (0.0)	2 (1.5)	10 (7.3)	61 (44.5)	64 (46.7)	4.36
Developing action plans to accomplish goals	0 (0.0)	3 (2.2)	11 (8.0)	58 (42.3)	65 (47.4)	4.35
Conducting a job search	0 (0.0)	5 (3.6)	14 (10.2)	46 (33.6)	72 (52.6)	4.35
Developing a service-leadership attitude	0 (0.0)	4 (2.9)	11 (8.0)	56 (40.9)	66 (48.2)	4.34
Defining personal core values	0 (0.0)	6 (4.4)	9 (6.6)	56 (40.9)	66 (48.2)	4.33
Implementing group problem solving	0 (0.0)	0 (0.0)	18 (13.1)	56 (40.9)	63 (46.0)	4.33
Understanding positive and negative influences	0 (0.0)	1 (0.7)	17 (12.4)	58 (42.3)	61 (44.5)	4.31
Connecting character and ethics	0 (0.0)	4 (2.9)	15 (10.9)	58 (42.3)	60 (43.8)	4.27
Identify opportunities for community involvement	0 (0.0)	3 (2.2)	17 (12.4)	60 (43.8)	57 (41.6)	4.25
Demonstrating compassion for others	0 (0.0)	3 (2.2)	21 (15.3)	53 (38.7)	60 (43.8)	4.24
Understanding motivation	0 (0.0)	3 (2.2)	16 (11.7)	64 (46.7)	54 (39.4)	4.23
Determining human potential	1 (0.7)	5 (3.6)	18 (13.1)	50 (36.5)	63 (46.0)	4.23
Recognizing roles of a leader on teams	0 (0.0)	1 (0.7)	18 (13.1)	67 (48.9)	51 (37.2)	4.23
Ensuring accountability on teams	0 (0.0)	3 (2.2)	20 (14.6)	57 (41.6)	57 (41.6)	4.23
Factors in earning trust	0 (0.0)	6 (4.4)	17 (12.4)	55 (40.1)	59 (43.1)	4.22
Appreciating individual talents	0 (0.0)	2 (1.5)	19 (13.9)	65 (47.4)	51 (37.2)	4.20

Note. NI = not important, SI = slightly important, FI = fairly important, I = important, VI = very important. 1.00 – 1.50 = not important, 1.51 – 2.50 = slightly important, 2.51 – 3.50 = fairly important, 3.51 – 4.50 = important, 4.51 – 5.00 = very important.

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Table 1 (continued)

Perceived Level of Importance of Leadership Topics (*n*=137)

Importance to Teach:	*Frequency (Percentage)*					*Weighted Frequency Mean*
	NI	*SI*	*FI*	*I*	*VI*	
Identify components of communication process	0 (0.0)	6 (4.4)	16 (11.7)	60 (43.8)	55 (40.1)	4.20
Communicating to influence others	0 (0.0)	5 (3.6)	17 (12.4)	63 (46.0)	52 (38.0)	4.18
Dealing with non-team players	0 (0.0)	1 (0.7)	21 (15.3)	68 (49.6)	47 (34.3)	4.18
Valuing the importance of building relationships	0 (0.0)	4 (2.9)	19 (13.9)	64 (46.7)	50 (36.5)	4.17
Defining roles on teams	0 (0.0)	2 (1.5)	23 (16.8)	64 (46.7)	48 (35.0)	4.15
Identify opportunities for others to succeed	0 (0.0)	3 (2.2)	24 (17.5)	59 (43.1)	51 (37.2)	4.15
Identifying resources	0 (0.0)	4 (2.9)	20 (14.6)	65 (47.4)	48 (35.0)	4.15
Developing a personal vision	0 (0.0)	5 (3.6)	25 (18.2)	56 (40.9)	51 (37.2)	4.12
Utilizing strategies to involve other on teams	0 (0.0)	4 (2.9)	22 (16.1)	67 (48.9)	44 (32.1)	4.10
Developing a common purpose on teams	1 (0.7)	3 (2.2)	22 (16.1)	67 (48.9)	44 (32.1)	4.09
Appreciating cultural diversity	0 (0.0)	7 (5.1)	29 (21.2)	46 (33.6)	55 (40.1)	4.09
Demonstrating creativity	0 (0.0)	5 (3.6)	23 (16.8)	65 (47.4)	44 (32.1)	4.08
Identifying factors related to self image	0 (0.0)	9 (6.6)	19 (13.9)	64 (46.7)	45 (32.8)	4.06
Utilizing effective brainstorming	0 (0.0)	4 (2.9)	26 (19.0)	66 (48.2)	41 (29.9)	4.05
Implementing presentation skills	0 (0.0)	4 (2.9)	30 (21.9)	62 (45.3)	41 (29.9)	4.02
Valuing diversity on teams	0 (0.0)	9 (6.6)	23 (16.8)	67 (48.9)	38 (27.7)	3.98
Identify opportunities to serve others	1 (0.7)	4 (2.9)	36 (26.3)	56 (40.9)	40 (29.2)	3.95
Building consensus on teams	0 (0.0)	4 (2.9)	35 (25.5)	68 (49.6)	30 (21.9)	3.91
Taking risks	0 (0.0)	2 (1.5)	42 (30.7)	63 (46.0)	30 (21.9)	3.88
Assessing others' strengths	1 (0.7)	8 (5.8)	38 (27.7)	51 (37.2)	39 (28.5)	3.87
Advocating for public service	0 (0.0)	10 (7.3)	39 (28.5)	52 (38.0)	36 (26.3)	3.83
Committing to a lifetime of service	2 (1.5)	9 (6.6)	35 (25.5)	55 (40.1)	36 (26.3)	3.83
Understanding the role of mentors	1 (0.7)	6 (4.4)	43 (31.4)	54 (39.4)	33 (24.1)	3.82
Defining situational leadership	2 (1.5)	10 (7.3)	33 (24.1)	60 (43.8)	32 (23.4)	3.80
Recognizing types of relationships	1 (0.7)	15 (10.9)	41 (29.9)	45 (32.8)	35 (25.5)	3.72
Influencing others through vision	2 (1.5)	12 (8.8)	46 (33.6)	54 (39.4)	23 (16.8)	3.61
Identifying barriers to serve	2 (1.5)	15 (10.9)	40 (29.2)	59 (43.1)	21 (15.3)	3.60
Developing workshops and programs	5 (3.6)	16 (11.7)	50 (36.5)	45 (32.8)	21 (15.3)	3.45

Note. NI = not important, SI = slightly important, FI = fairly important, I = important, VI = very important. 1.00 – 1.50 = not important, 1.51 – 2.50 = slightly important, 2.51 – 3.50 = fairly important, 3.51 – 4.50 = important, 4.51 – 5.00 = very important.

Research objective three was developed to describe the perceived capability of beginning agricultural education teachers to teach leadership topics. Table 2 reports frequencies and percentage of respondents based on their perceived capability to teach each leadership topic. There was one topic, *Developing a resume* (50.4%), that a majority of the teachers rated their perceived capability to teach as *A Great Deal of Capability*. A majority of teachers rated their capability as *A Great Deal of Capability* and *Quite a Bit of Capability* for 55 of the leadership topics. Five leadership topics that did not meet the aforementioned criteria were: *Recognizing types of relationships* (48.9%), *Advocating for public service* (46.0%), *Identifying barriers to serve* (31.4%), *Taking risks* (42.6%), and *Influencing other through vision* (38.0%). However, three respondents (2.2%) reported their capability to teach *Recognizing types of relationships* as *No Capability*, two (1.5%) reported *No Capability* to teach *Advocating for public service*, six (4.4%) reported *No Capability* to teach *Identifying barriers to serve*, one (0.7%) reported *No Capability* to teach *Taking risks*, and three (2.2%) reported *No Capability* to teach *Influencing other through vision*.

Weighted frequency means for each of the 60 individual leadership topics in relation to the perceived capability to teach the leadership topic are presented in Table 2. For each respondent, a response of *A Great Deal of Capability* received a weighted score of five, *Quite a Bit of Capability* a four, *Some Capability* a three, *Very Little Capability* a two, and *No Capability* received a weighted score of one. Weighted scores for each topic were summed and divided by the number of respondents to determine a weighted frequency mean. The leadership topics in Table 2 are listed in order of capability based upon the weighted frequency means. Fifty-seven of the leadership topic weighted frequency means were between 3.51 and 4.50. Three leadership topics that yielded a weighted frequency mean less than 3.51 were *Defining situational leadership* (*Weighted Frequency Mean*=3.50), *Influencing others through vision* (*Weighted Frequency Mean*=3.35), and *Identifying barriers to serve* (*Weighted Frequency Mean*=3.26).

Based on the results of this study, four major findings were revealed. According to the demographic data, most of the beginning agricultural education teacher respondents had taken one or more leadership courses during their teacher preparation program and nearly one in five had taken more than three leadership courses during their teacher preparation program. Nearly all of the respondents perceived teaching most of the leadership topics to be *important* or *very important* within the secondary agricultural education program. Conversely, none of the leadership topics included in this study were perceived to be unimportant. Beginning agricultural education teacher respondents perceived they were capable of teaching most of the leadership topics. And finally, the respondents perceived teaching leadership to be important and that they were capable of teaching those topics within a secondary agricultural education program.

Table 2

Perceived Level of Capability to Teach Leadership Topics (*n*=137)

Capability to Teach:	*Frequency (Percentage)*					*Weighted Frequency Mean*
	NC	*VLC*	*SC*	*QBC*	*GDC*	
Developing a resume	1 (0.7)	6 (4.4)	16 (11.7)	45 (32.8)	69 (50.4)	4.28
Valuing honesty	1 (0.7)	3 (2.2)	20 (14.6)	46 (33.6)	67 (48.9)	4.28
Developing public speaking skills	1 (0.7)	2 (1.5)	19 (13.9)	51 (37.2)	64 (46.7)	4.28
Making proper first impressions	1 (0.7)	1 (0.7)	21 (15.3)	60 (43.8)	54 (39.4)	4.20
Demonstrating interview techniques	1 (0.7)	2 (1.5)	21 (15.3)	61 (44.5)	52 (38.0)	4.18
Conducting a job search	1 (0.7)	1 (0.7)	27 (19.7)	54 (39.4)	54 (39.4)	4.16
Setting goals	1 (0.7)	3 (2.2)	30 (21.9)	46 (33.6)	57 (41.6)	4.13
Defining teamwork	1 (0.7)	1 (0.7)	27 (19.7)	64 (46.7)	44 (32.1)	4.09
Making decisions in teams	1 (0.7)	0 (0.0)	32 (23.4)	60 (43.8)	44 (32.1)	4.07
Accepting responsibility for actions	2 (1.5)	3 (2.2)	34 (24.8)	49 (35.8)	49 (35.8)	4.02
Importance of personal attitude	1 (0.7)	3 (2.2)	34 (24.8)	57 (41.6)	42 (30.7)	3.99
Defining personal core values	1 (0.7)	1 (0.7)	31 (22.6)	71 (51.8)	33 (24.1)	3.98
Implementing presentation skills	1 (0.7)	4 (2.9)	35 (25.5)	55 (40.1)	42 (30.7)	3.97
Deciding about a career path	1 (0.7)	3 (2.2)	36 (26.3)	59 (43.1)	38 (27.7)	3.95
Utilizing critical thinking skills	1 (0.7)	4 (2.9)	40 (29.2)	51 (37.2)	41 (29.9)	3.93
Recognizing roles of a leader on teams	1 (0.7)	2 (1.5)	36 (26.3)	66 (48.2)	32 (23.4)	3.92
Demonstrating compassion for others	1 (0.7)	3 (2.2)	46 (33.6)	46 (33.6)	41 (29.9)	3.90
Developing personal character	1 (0.7)	5 (3.6)	40 (29.2)	53 (38.7)	38 (27.7)	3.89
Describing professional ethics	2 (1.5)	4 (2.9)	42 (30.7)	48 (35.0)	41 (29.9)	3.89
Defining roles on teams	1 (0.7)	4 (2.9)	38 (27.7)	62 (45.3)	32 (23.4)	3.88
Developing a service-leadership attitude	1 (0.7)	4 (2.9)	45 (32.8)	49 (35.8)	38 (27.7)	3.87
Demonstrating effective listening	1 (0.7)	5 (3.6)	38 (27.7)	60 (43.8)	33 (24.1)	3.87
Connecting character and ethics	1 (0.7)	5 (3.6)	40 (29.2)	57 (41.6)	34 (24.8)	3.86
Identify opportunities for community involvement	1 (0.7)	5 (3.6)	40 (29.2)	58 (42.3)	33 (24.1)	3.85
Managing time	1 (0.7)	2 (1.5)	47 (34.3)	53 (38.7)	34 (24.8)	3.85
Identifying resources	1 (0.7)	4 (2.9)	47 (34.3)	49 (35.8)	36 (26.3)	3.84
Identify components of communication process	1 (0.7)	6 (4.4)	43 (31.4)	52 (38.0)	35 (25.5)	3.83
Appreciating individual talents	1 (0.7)	4 (2.9)	43 (31.4)	59 (43.1)	30 (21.9)	3.82
Identify opportunities for others to succeed	1 (0.7)	4 (2.9)	45 (32.8)	55 (40.1)	32 (23.4)	3.82
Implementing group problem solving	1 (0.7)	2 (1.5)	45 (32.8)	62 (45.3)	27 (19.7)	3.82
Identify opportunities to serve others	1 (0.7)	6 (4.4)	40 (29.2)	60 (43.8)	30 (21.9)	3.82
Developing action plans to accomplish goals	1 (0.7)	5 (3.6)	41 (29.9)	62 (45.3)	28 (20.4)	3.81

Note. NC = no capability, VLC = very little capability, SC = some capability, QBC = quite a bit of capability, GDC = a great deal of capability. 1.00 – 1.50 = no capability, 1.51 – 2.50 = very little capability, 2.51 – 3.50 = some capability, 3.51 – 4.50 = quite a bit of capability, 4.51 – 5.00 = a great deal of capability.

Table 2 (continued)
Perceived Level of Capability to Teach Leadership Topics (*n*=137)

Capability to Teach:	*Frequency (Percentage)*					*Weighted Frequency Mean*
	NC	*VLC*	*SC*	*QBC*	*GDC*	
Understanding positive and negative influences	1 (0.7)	7 (5.1)	39 (28.5)	60 (43.8)	30 (21.9)	3.81
Selecting problem solving strategies	1 (0.7)	3 (2.2)	43 (31.4)	65 (47.4)	25 (18.2)	3.80
Utilizing effective brainstorming	1 (0.7)	5 (3.6)	45 (32.8)	57 (41.6)	29 (21.2)	3.79
Ensuring accountability on teams	1 (0.7)	5 (3.6)	48 (35.0)	52 (38.0)	31 (22.6)	3.78
Utilizing strategies to involve other on teams	1 (0.7)	7 (5.1)	44 (32.1)	55 (40.1)	30 (21.9)	3.77
Valuing the importance of building relationships	1 (0.7)	8 (5.8)	45 (32.8)	51 (37.2)	32 (23.4)	3.77
Factors in earning trust	3 (2.2)	7 (5.1)	43 (31.4)	51 (37.2)	33 (24.1)	3.76
Communicating to influence others	2 (1.5)	6 (4.4)	43 (31.4)	59 (43.1)	27 (19.7)	3.75
Demonstrating creativity	1 (0.7)	8 (5.8)	46 (33.6)	52 (38.0)	30 (21.9)	3.74
Understanding motivation	1 (0.7)	7 (5.1)	46 (33.6)	59 (43.1)	24 (17.5)	3.72
Determining human potential	1 (0.7)	8 (5.8)	45 (32.8)	61 (44.5)	22 (16.1)	3.69
Assessing others' strengths	1 (0.7)	8 (5.8)	50 (36.5)	51 (37.2)	27 (19.7)	3.69
Dealing with non-team players	2 (1.5)	9 (6.6)	46 (33.6)	57 (41.6)	23 (16.8)	3.66
Developing a common purpose on teams	1 (0.7)	6 (4.4)	54 (39.4)	54 (39.4)	22 (16.1)	3.66
Identifying factors related to self image	1 (0.7)	14 (10.2)	44 (32.1)	50 (36.5)	28 (20.4)	3.66
Developing a personal vision	1 (0.7)	8 (5.8)	54 (39.4)	53 (38.7)	21 (15.3)	3.62
Building consensus on teams	1 (0.7)	11 (8.0)	48 (35.0)	56 (40.9)	21 (15.3)	3.62
Committing to a lifetime of service	3 (2.2)	10 (7.3)	46 (33.6)	57 (41.6)	21 (15.3)	3.61
Understanding the role of mentors	4 (2.9)	11 (8.0)	50 (36.5)	46 (33.6)	26 (19.0)	3.58
Valuing diversity on teams	2 (1.5)	11 (8.0)	52 (38.0)	51 (37.2)	21 (15.3)	3.57
Appreciating cultural diversity	4 (2.9)	13 (9.5)	47 (34.3)	49 (35.8)	24 (17.5)	3.55
Developing workshops and programs	4 (2.9)	22 (16.1)	40 (29.2)	38 (27.7)	33 (24.1)	3.54
Recognizing types of relationships	3 (2.2)	10 (7.3)	57 (41.6)	44 (32.1)	23 (16.8)	3.54
Taking risks	1 (0.7)	11 (8.0)	63 (46.0)	39 (28.5)	23 (16.8)	3.53
Advocating for public service	2 (1.5)	8 (5.8)	64 (46.7)	44 (32.1)	19 (13.9)	3.51
Defining situational leadership	4 (2.9)	15 (10.9)	49 (35.8)	47 (34.3)	22 (16.1)	3.50
Influencing others through vision	3 (2.2)	14 (10.2)	68 (49.6)	36 (26.3)	16 (11.7)	3.35
Identifying barriers to serve	6 (4.4)	13 (9.5)	75 (54.7)	26 (19.0)	17 (12.4)	3.26

Note. NC = no capability, VLC = very little capability, SC = some capability, QBC = quite a bit of capability, GDC = a great deal of capability. 1.00 – 1.50 = no capability, 1.51 – 2.50 = very little capability, 2.51 – 3.50 = some capability, 3.51 – 4.50 = quite a bit of capability, 4.51 – 5.00 = a great deal of capability.

Conclusions and Recommendations

The agriculture teacher preparation programs within the five states where this research was conducted did not require more than two leadership courses in their respective programs. It is possible that the beginning agricultural education teacher respondents may not have received their teacher preparation from the state in which they were currently teaching, however it was assumed that most of the respondents had completed their teacher preparation within the state in which they were teaching. Thus, it was further assumed that many of the respondents were not required to take the amount of leadership coursework for licensure that they reported, but rather they enrolled in elective coursework beyond the core curriculum requirements. This would lead to the conclusion that the teacher candidates may be going beyond their required program to obtain leadership knowledge, skills, and dispositions. Teacher candidates may be enrolling in additional leadership courses on their own accord or based on the suggestion of their academic advisor or colleague's recommendation. Regardless, nearly nine out of 10 of the respondents engaged in leadership coursework during their agriculture teacher preparation program whether or not it was required.

Respondents reported the level of importance in teaching leadership topics within a secondary agricultural education program as being *Important* or *Very Important* for nearly all of the leadership topics surveyed. This finding led to the conclusion that teaching leadership in a secondary agricultural education program is important from the perspective of beginning agricultural education teachers. Numerous scholars have supported the importance of leadership education and development for youth in order to develop future leaders who can make a positive difference in their community, state, and in society as a whole. The importance of teaching leadership as perceived by beginning agricultural education teachers echoes the views of leadership education scholars throughout the United States and around the world.

Beginning agricultural education teachers reported being capable of teaching most of the leadership topics addressed in this study. The self-perceived rating leads the researchers to conclude that the respondents were capable of teaching leadership topics within the formal instruction component of a secondary agricultural education program. Events within the teacher preparation program and the teacher candidate's experiences during their collegiate career explicitly and implicitly may be fostering a sense of efficacy among respondents to teach leadership. One should be careful to avoid the assumption that the agricultural teacher preparation program is the sole source provider involved in preparing teacher candidates to teach leadership. Rather, teacher candidates appear to be engaged in the teacher preparation program and additional elements that develop their ability to teach leadership.

The researchers concluded that based on the importance ratings, all 60 leadership topics in this research are important to teach in a secondary agricultural education program based on the perceptions of beginning agricultural education teachers. Furthermore, it was also concluded that beginning agricultural education teachers were capable of teaching the leadership topics examined in this research. Overall, the respondents perceived the teaching of leadership to be important within a secondary agricultural education program and that they were capable of teaching those leadership topics in a secondary agricultural education program.

Agriculture teacher preparations programs are expected to continue to focus on developing highly qualified candidates to become effective teachers of agriculture. This charge requires continual evaluation and modification of preparation programs to meet changing standards, criteria, requirements, and student needs. Teaching leadership at the secondary level in agricultural education programs has and will continue to evolve. Agricultural education teacher preparation programs should evaluate the core curriculum requirements and consider including leadership coursework. Those requirements should mirror the level of importance placed on the teaching of leadership and the developmental needs of agricultural education teacher candidates.

The importance of educating youth about leadership is vital to the future of society. Secondary agricultural education programs are expected to address a wide range of content areas including leadership. This situation requires that the secondary agricultural education teacher and supporting groups within the school and community make important and far-reaching decisions about priorities among various curriculum topics. The researchers recommend that continued effort should be made to identify core leadership knowledge, skills, and dispositions that should be taught within all secondary agricultural education programs. These leadership topics should represent the core elements of our culture in order to meet the needs of secondary education, post-secondary education, business and industry, and the global society as a whole.

Agricultural education teacher candidates and practicing agricultural education teachers should be assessed on a regular basis with respect to their capability of teaching leadership. Based on such assessments, agricultural teacher preparation programs should determine modifications needed within the preparation program. Program modifications should be framed within the context of teaching efficacy theory and capitalize upon mastery experiences, physiological and emotional arousal, vicarious experience, and social persuasion (Bandura, 1997). Agricultural teacher preparation programs should use the assessments to provide insight into areas of continual professional learning needed for practicing teachers.

Teaching leadership topics at the post-secondary level has evolved over time. The traditional focus on leadership skill development is still encompassed within those programs, but leadership education is a more inclusive title for what is being provided. As the teaching of leadership at the secondary level in agricultural education programs has begun to follow a similar path, it is essential that agricultural education teacher preparation programs include the knowledge, skills, and dispositions needed to develop highly qualified teachers of agriculture to teach leadership. Agricultural education teacher candidates will need to be exposed to not only leadership skills, but also topics in leadership education. Leadership development and leadership education should not be viewed as separate, but as harmonious and build upon one another to provide the knowledge, skills, and dispositions desired in future generations of teachers and leaders.

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Motivation for Enrolling in School-based Agricultural Education Expressed by College Freshmen Students

Discussant/Chair Comments by
Tracy S. Hoover, Pennsylvania State University

This study is interesting in that it focuses on the motivational needs that impacted student enrollment in secondary agricultural education programs in Missouri. The authors used the work of McClelland for their conceptual framework which is related to three types of motivational need: affiliation, power, and achievement and how these different needs influence enrollment in agricultural education programs. This is an important topic as enrollment in agricultural education is voluntary not a compulsory course/requirement in our high schools. One interesting factor to consider for future work is how future career choice impacted enrollment.

The purpose and objectives were clear and well written. The researcher developed questionnaire appears to have acceptable validity and reliability. Another factor to consider regarding enrollment is influence of significant others in the decision making process. This influence factor can be partly explained by affiliation.

Another question to investigate is FFA membership. The authors sorted the population based on reported enrollment data in high school agricultural education programs. One could ask about "active FFA membership status", how many of college freshmen in this study were active in the FFA or is Missouri an FFA affiliate state? Did the opportunity to join FFA influence students with a specific motivational need to enroll (achievement vs. power)?

Additional information on the career pathways offered to students in Missouri agricultural education programs would have helped clarify some of the results. For example, does Missouri have a state wide curriculum in agricultural education? What courses are taught? How does Missouri "count" program completers in agricultural education? It seems like all students enroll in Agricultural Science I & II then select a career pathway. Then it would have been interesting to see how many students in this study took four years of agricultural education versus a one semester course. Is this possible?

The authors do a great job of offering recommendations for teachers to meet the various motivational needs of students considering enrollment in agricultural education program. We can meet needs for power, affiliation, and achievement through our "three-circle" model.

Frequency of Coaching Behaviors Used by Agricultural Teachers in Relation to the State-Level Floriculture Career Development Event Team Rank

Discussant/Chair Comments by
Tracy S. Hoover, Pennsylvania State University

This study is interesting and timely as it seeks to investigate and identify those behaviors or coaching attributes that lead to "place" in rank of a state Career Development Event.

The theoretical framework focuses on the work of Wooden and Carty(2005) and is based on successful coaching behaviors. John Wooden was successful basketball coach and player. He was the first person to be inducted as coach and player in the Basketball Hall of Fame. As coach at UCLA he won ten NCAA national championships in 12 years.

I am not sure if the "Pyramid of Success ™" is based on empirical research or years of experience as the theoretical framework does not cite any other references than Wooden and Carty (2005). I do like the skills, attributes, and behaviors of successful coaches noted in the Wooden and Carty model as they help remind us of behaviors that help individuals succeed and advance. The Pyramid philosophy is based on giving your best when competing more than focusing on winning.

The purpose and objectives are appropriate and timely as teachers are being held accountable for academic standards and performance of their students. Participation in career development events provides evidence of learning and advancement in the FFA, SAE programs, and the agricultural education program.

The researcher developed a questionnaire around the 15 building blocks in the Wooden and Carty model, however, it is unclear on what theoretical constructs these questions are based. One would question if there is overlap between some of the constructs, such as, industriousness and initiative. I am wondering if this impacted the reliability coefficients for some of the building block factors.

A few questions:

1. It would have been interesting to quantify some student demographics in this study. Did those students who competed in the 2009 Floriculture CDE take 1 or more floriculture courses prior to competing? Can students in this state participate in the same CDE for multiple years? If so, this could impact the ranking in the event and how the coach interacts with the team.
2. How can you explain the lower ranking of industriousness (M 3.97/ SD .85) and the high correlation between rank and industriousness (r_s - .73)?
3. Why was the state Floriculture CDE selected to study?
4. I think I remember that Missouri only participates in a select number of CDEs on the state level, is this true? Does this impact how a teacher prepares teams for competition?

Importance and Capability of Teaching Leadership as Perceived by Beginning Agricultural Education Teachers

Discussant/Chair Comments by
Tracy S. Hoover, Pennsylvania State University

The study is well written and takes a deeper look at leadership and how pre-service teachers value leadership along with their perceived ability and capacity to teach leadership in their secondary agricultural education programs.

The theoretical framework is well written and focuses on self-efficacy in teaching and learning. Teachers who are confident and competent are more likely to build positive learning environments for students. The authors share a conceptual model of a teacher's ability to teach leadership, I am not sure if this is from the literature or based upon the work of the authors?

One aspect of teaching leadership to adolescents is to define why we do this? Some of the work related to critical features of positive adolescent development can really help us reinforce and in some cases justify the value of "teaching" leadership. For example, what is the outcome of teaching leadership? What leadership factors gained by participation in youth serving organizations contribute to the development of self-sufficient young adults who have the ability to build and maintain positive relationships and are good citizens? It might be of value to look at some of the scholarship in this area.

The purpose and objectives are well written and clear. The procedures used in the study were appropriate. The researcher developed questionnaire topics were based on the *LifeKnowledge* resource materials. It would add to the study to share the empirical base or theoretical frame behind the LK constructs/topics. The researchers included teachers from five states, which enriches the findings and depth of the study.

One interesting finding was that of the 137 teachers that responded 120 were in agricultural education programs as a high school student, and 119 were FFA members. This seems to be a very high percentage (83%) of beginning teachers to share this demographic. Is this representative of the population? If not, how could this impact results? Did those teachers who were not in agricultural education programs/FFA in high school feel "less than confident" to teach leadership as we present it in our pre-service programs?

Another interesting finding was the number of leadership courses teachers reported they took during their college career. I like that the researcher went back and did an analysis on the number of leadership courses required in agricultural education programs at the various institutions. An additional topic for study might be to collect syllabi on leadership courses offered in our teacher education programs and conduct a review on the leadership content and scope of these courses.

The Community Problems and Local Program Transformations of Vocational Agriculture before the Vocational Education Act of 1963

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Abstract

The transformation of local secondary agriculture programs before the Vocational Education Act of 1963 was caused by a variety of community problems. The legislation ended the production only curricula and compulsory supervised agricultural experience prevalent in vocational agriculture since the Smith-Hughes Act of 1917. While the Vocational Education Act of 1963 legally changed vocational agriculture, local programs had been adapting their programs and curricula to meet their changing communities before the legislation was enacted. The community problems of the growth of urban & suburban agriculture programs and rural flight led local programs to transform their programs to include agriculturally-related occupations, placement & non-production supervised agricultural experiences, and grassroots efforts to modify vocational agriculture. The ability of local programs to adapt and modify their programs based on local needs demonstrated the community-based nature of secondary agricultural education.

Introduction

The Vocational Education Act of 1963 altered secondary vocational agriculture education by modifying the mandates of the National Vocational Education (Smith-Hughes) Act of 1917 (Hyslop-Margison, 2001; Moore & Borne, 1986). For 45 years, vocational agriculture programs focused on preparing farm boys to go work on a farm. Vocational education was, "…designated to meet the needs of persons over fourteen years of age who have entered upon or who are preparing to enter upon the work of the farm or of the farm home…" (Phipps & Cook, 1952, p. 989). The Smith-Hughes Act included a mandatory production supervised agricultural experience (SAE) for all agriculture students. The legislation required that, "…schools shall provide for directed or supervised practice in agriculture, either on a farm provided for by the school or other farm" (Phipps & Cook, 1952, p. 989). Students had to have a SAE, which would give them a head start in farming. Secondary vocational agriculture was truly vocational by the start of the 1920s (Hillison, 1996). The six million farms operating in the United States seemed to justify these mandates (Hummel, 1913).

But, 45 years following the passage of the Smith-Hughes Act, Americans were migrating from the farms, out of small towns, and into cities, which were beginning to sprawl out into the countryside. These demographical changes were significant to communities of all sizes across the United States and for vocational agriculture. The percentage of the American workforce employed on a farm had declined from 20% in 1940 to less than 8% in 1960 (Vocational Education Act, 1963). Considering that every agriculture student had to have a directed or supervised agricultural experience, the potential population for vocational agriculture declined as well. Furthermore, one study found that only 10% of students enrolled in vocational agriculture actually entered the field of production agriculture prior to 1963 (Vocational Education Act,

1963). Many professionals believed that vocational agriculture needed to change in order to stay relevant (Beam, 1958; Berg, 1955a; Berg 1955b; Knox, 1955; Schaller, 1953). The Vocational Education Act of 1963 was the federal government's response to making vocational agriculture more relevant.

The Vocational Education Act of 1963 expanded vocational education to more schools and occupations (Vocational Education Act, 1963). It eliminated the mandate of every student having a SAE and broadened the concept of the secondary vocational agriculture curriculum to include agriculturally-related occupations (Phipps, Osborne, Dyer, & Ball, 2008; Talbert, Vaughn, & Croom, 2005). Although these changes occurred overnight, the migration of people and shift of agricultural occupations in communities should have elicited a response from local vocational agriculture programs before 1963. The examination of these responses could help substantiate the claims that vocational agriculture has been traditionally community-based (Martin, Ball, & Connors, 2006). Secondary agricultural education can learn from past experiences of local programs to better serve the discipline. What were the local program transformations that kept vocational agriculture relevant to their ever changing communities before 1963?

Purpose Statement and Research Questions

The purpose of this study was to examine the state of vocational agriculture at the local level before the passage of the Vocational Education Act of 1963. There were two guiding questions for this study. What were the specific demographic, economic, or cultural problems of local vocational agriculture prior to the passage of the Vocational Education Act of 1963? What local program transformations that occurred in vocational agriculture programs in response to the identified problems?

Methods

The author utilized historical research methods to accomplish the purpose of this study. The author examined a variety of resources and perspectives to formulate themes about a specific experience. Verification was built by the researcher throughout the study. The researcher employed triangulation by examining multiple forms of data from a variety of sources to build a broad perspective of the community problems and local program transformations. The researcher used rich, thick descriptions to allow for transferability of the themes. An external audit was conducted to ensure the accuracy of the themes that emerged in the study (Creswell, 1998). Presentism was avoided by framing the results of the study through the experiences of the participants. The only concept with a modern label was SAE. SAE has had numerous synonyms through its history, including home projects (Stimson, 1919), supervised farm practice (Schmidt, 1926), supervised farming program (Phipps, 1952), supervised occupational experience program (Phipps, 1980), and would have confused the reader. Causal inference was facilitated by including varying and rich descriptions of the phenomena described (Gall, Gall, & Borg, 2007).

Data was gathered through research at land-grant university libraries. The primary sources utilized in this study included articles from the *Agricultural Education Magazine,*

textbooks about vocational agriculture, university reports covering vocational agriculture, and hearings from Congress about the Vocational Education Act of 1963. Secondary sources of information included agricultural education books, and articles from the *Journal of Career and Technical Education* and the *Journal of Agricultural Education.* The researcher acknowledged that the inclusion and exclusion of references represented a type of bias. The researcher was interested in articles that articulated the purpose of the study. This criterion created a bias against articles that may have not shared the same view point as the author. This bias was reduced by including many of those views in the manuscript (Spalding & Parker, 2007).

This historical analysis of the community problems which led to local vocational agricultural program transformations was examined through a structural history research lens. The author was interested in explaining the structural mechanisms of the local secondary agriculture program. The structural historical model focused on "why" of historical events, not just the "what" of historical events (Burke, 1995). The structural historical model was significant for this study because the author was interested in the grassroots efforts of agricultural education instructors and stakeholders to transform vocational agriculture in response to demographic, economic, or cultural problems of their communities. The author utilized a maximum number of sources to assist in the explanation of the community problems and structural transformations in secondary agricultural education.

Findings

The demographical changes of the United States were the catalyst of transformation for vocational agriculture. Sutherland and Thompson (1955) did a survey that outlined some of demographical problems facing vocational agriculture. They surveyed 203 agriculture programs and 11,361 agricultural students in California. They found that 20% of the students were from suburban communities and over 5,000 of the students surveyed did not plan on farming upon graduation. The migration of people from the countryside to the city affected vocational agriculture programs significantly. The migration led to an increase in urban and suburban vocational agriculture programs. Correspondingly, rural vocational agriculture programs had less access to production SAEs because of the decline in the number of farm boys (students from a working farm) and an increase in the number of town boys (rural students not from a farm). These community problems led to important local program transformations in vocational agriculture, including the rise of agriculturally-related occupations, as well as the development of non-production and placement agricultural SAEs. Furthermore, some states began to redesign their state vocational agricultural programs based on their local needs. These demographical shifts stimulated transformations at the local and state levels in vocational agriculture before the Vocational Education Act of 1963 mandated these transformations legally. The first two problems deal with basically the same issue, rural migration.

Problem #1: The Rise of Urban and Suburban Agriculture

Vocational agriculture programs in urban and suburban high schools existed after 1917, but the programs encountered challenges. Most significantly, urban and suburban programs had difficulties finding students' SAEs mandated by the Smith-Hughes Act (Bressler, 1950). Urban and suburban students usually had to commute outside of the city to find a farm. These

experiences were increasingly placement in nature as students worked as hired hands. Furthermore, after World War II, cities began to sprawl, and the distance that students had to travel for their SAE became too great to be practical. Professionals began to recommend that urban and suburban programs start their own school farms. Indeed, school farms were developed in metropolitan communities where vocational agriculture was in demand (Bressler, 1950; Collins, 1952; Ferdun, 1956; Hovens, 1951; Juergenson, 1953b; Snell, 1955). The downside of the school farms, which included the cost of land and lack of ownership experiences for students, made school farms difficult to implement for all urban and suburban agriculture programs. Other professionals argued for a redesigning and broaden the agriculture curriculum to meet the needs of suburban and urban communities.

> … We now see a new need emerging in the field of instruction in agriculture-namely, the need of redesigning our program to meet the need of the suburban pupil, the boy who wants to acquire a working knowledge of agriculture in order that he may seek employment in the many vocations related to agriculture. (Knox, 1962, p. 185)

While local urban and suburban vocational agriculture programs encountered some challenges, the brunt of the rural migration affected rural vocational agriculture programs.

Problem #2: The Disappearance Farm Boys and Emergence of the Town Boys

The migration of people from the farm to the city was cited by many authors as a serious challenge for vocational agriculture (Chase, 1955; Naugher, 1953; Nystrom, 1953). Professionals possessed different opinions about how to deal with the flight of farmers and rural population. The central problem was that the farm boy was disappearing, because of the declining number of farms, and town boys were enrolling more and more in vocational agriculture. J. K. Coggin (1953), of North Carolina State College, argued for focusing more on the students who would be going into production agriculture and not the growing numbers of those going to work in agriculturally-related occupations.

> To enroll those students in the high school classes who are interested in farming and who have the necessary facilities, present or potential, to make a beginning and advance in farming during the high school training period is one way of doing a better vocational job and at the same time lighten the load of the teacher. (p. 39)

Professionals from across the nation agreed with the sentiment of keeping non-vocational agricultural curricula and town boys out of secondary agriculture (Beard, 1958; Doering, 1960; Johnson, 1958; Miller, 1957; Nicklas, 1960; Sasman, 1958).

Yet, some educators argued for breaking the mandates of the Smith-Hughes Act and opening vocational agriculture programs to town boys. H. L. Schaller (1953), of the *Better Farming Methods Magazine*, espoused the following.

> You should encourage town boy participation in vocational agriculture. Yes, encourage it. Some states, administrators, and teachers, I understand, prohibit

> town boys from taking vo-ag. But if the boys show an interest in ag, you cultivate and develop that interest. (p. 195)

This viewpoint, while shared by others (Beam, 1958; Berg, 1955a; Berg 1955b; Knox, 1955), was quickly repudiated by those who felt that vocational agriculture needed to focus on vocational and not general agriculture (Garris, 1954; King, 1954; Smith, 1955a, Smith, 1955b; Wall, 1955; Watson & Gaylord, 1959). They argued the value of having a production SAE and the time limitations of teaching both general and vocational agriculture. If town boys wanted to take vocational agriculture they had to have a production farm experience. A rationale that became popular was that any agriculturally-related occupation required the employee to have a production agricultural experience in order for the employee to relate to their farming clientele. The argument of whether to adapt the curriculum for the town boys would continue throughout the fifties.

At the core of the arguments was the term - vocational. During the late 1950's authors were going to back to Smith-Hughes Act for the precise purpose of the legislation. Just how vague was the term vocational in mandate of vocational training in agriculture? While the argument could be made for a vague definition of the term vocational, 40 years of tradition made a transformation difficult. Ralph Bender (1956) summed the dilemma up best.

> There are those who would like to see us broaden our objectives to include the training of boys who are likely to be employed in related agricultural occupations… this is likely to dilute our program to the point of losing effectiveness in our major task… Perhaps the problem of training for related agricultural occupations can be best met with schools that have broad curricula. A program of two years of vocational agriculture and the two years of diversified occupational training would appear to be more appropriate for many. (p. 124)

Whatever the opinion, most believed that having town boys in the vocational agriculture classroom was necessary to keep enrollment high enough to substantiate the existence of the agricultural program (Barton, 1956; Christensen, 1956). The town boy was a fixture that couldn't be removed from the vocational agriculture classroom by the 1950's. These community problems led to action by local vocational agriculture programs to transfer their programs

Transformation #1: The Rise of Agriculturally-Related Occupations

E. M. Juergenson of the University of California at Davis outlined a rural America that had outpaced the Smith-Hughes Act.

> As the field of agriculture is constantly changing and advancing, so must the emphasis in agricultural education shift to meet these new demands… Nowhere in our secondary school system is there any semblance of training available to this mass of non-farm students who will be associated with farming but not directly engaged in it. Vocational agriculture has the choice of maintaining its relatively narrow field or broadening its concept to meet the challenges and demands of our changing rural economy. (Juergenson, 1953, p. 17)

The decline in the production occupations and the rise of non-production agriculture occupations meant that many future agriculturists would never have vocational agriculture in high school, even in rural communities, if the Smith-Hughes mandates were to be fulfilled. The answer for Juergenson was simple, change the agricultural education mission from solely production to include non-production vocations. This sentiment was shared by Sutherland (1956), who argued for keeping vocational agriculture, but broadening the definitions of agricultural occupations. But how could teachers adjust their curriculum from production to agriculturally-related occupations?

This idea was not new, Byram (1936) wrote a supplementary unit of study on educating youth for agriculturally-related occupations in the mid-thirties. It would take two more decades for this type of curriculum to catch-on though. Pruett (1956) gave full credence to the need for vocational training in agriculturally-related occupations and emphasized using the local community in meeting this goal. He argued for the agricultural teacher to host agricultural career fairs for their students. "Career days are becoming very popular. A day is given to the three upper grades in high school in which persons from many professions and occupations come to the school and discuss, in groups, the various occupations" (p. 221). Other professionals (Bollwahn, 1956; Chrein, 1960; Farrar, 1960; McCann, 1958; Nichols, 1956; Palmer Hopkins, 1956; Thompson, 1958; Walton, 1958) agreed with the notion of broadening vocational agriculture to include local agricultural occupations beyond production farming. While the exact number is difficult to estimate, many local programs had started units of study about careers or conducted fieldtrips, career fairs, and guest speakers in non-production agriculture to meet the growing demand in their communities. While these curriculum changes began to address the educational needs of the town boy the production orientated SAE still presented a hurdle to the town boy.

Transformation #2: Placement and Non-Production Agricultural Experiences

W. R. Tabb (1946), a teacher educator in agriculture from the University of Kentucky, described the difficulties of the mandated production SAE. The major issues included access to farms and teacher time. By 1949 teachers were placing students into non-productive or placement agricultural SAEs, to fulfill the Smith-Hughes Act mandate. Students not living on a farm were encouraged, if not forced, to start SAEs in the areas of home or farm improvement, supplementary farm improvement, and placement in order to stay a vocational agriculture class. Articles espousing the educational and practical value of these projects grew through the 1950's. Placement experiences were ridiculed for not being as educational as an entrepreneurial experiencs. Professionals argued that projects owned by the students required reflective thinking and personal growth, which was not self-evident in placement SAEs (Garris, 1954; King, 1954; Smith, 1955a, Smith, 1955b; Wall, 1955). But, many professionals recognized the need of placement experiences to fulfill the mandates of the Smith-Hughes Act, while maintaining vocational agricultural enrollment. Also, many of the mainstream suggestions for the supplementary farm practice and farm improvement SAEs were non-production agriculture topics, including landscaping, home electricity, and entomology (Bollwahn, 1956; Deyoe, 1952; Gibson, 1949; Hutchings, 1949; Wooding, 1949). Non- production and placement SAEs became

more accepted, to the point that even the National FFA Organization started award these types of experiences starting in the forties (Tenney, 1954).

Phipps and Cook (1952) described the development of SAEs by reexamining the language used to describe SAEs.

> The "project" during recent years has become recognized as a *unit* in an individual's farming program. The terms *home projects* and *supervised farm practice* used during the earlier years of vocational agriculture are now replaced with the more appropriate and comprehensive term *supervised farming*. Some states and individuals have used this term for the past several years, but it has not been nationally used until recently. (p. 230)

The broader term that developed, supervised farming (Deyoe, 1947), replaced the older terms home projects (Davis & Dickinson, 1927; Stimson, 1919; Strom & Davis, 1921) and supervised farm practice (Schmidt, 1926; Stewart & Getman, 1930). The changing nature of the supervised agricultural experiences and non-production agricultural curricula reflected the changing character of agricultural vocations through the 1950's.

Transformation #3: States Respond

The community problems that asserted pressure on vocational agriculture programs caused some states to modify their state programs. Connecticut felt the pressures of a declining farm boy population particularly hard as the state became more urbanized. Stakeholders believed that vocational agriculture in Connecticut, as prescribed by the Smith-Hughes Act, was in trouble. Citizens and agricultural professionals were proactive though in their attempts to save vocational agriculture. A committee of stakeholders was formed to study the situation. The committee's recommendations illustrated much foresight into the future of secondary agriculture. The article from Harrington and Jacoby (1957) outlined their recommendations.

> The Sub-committee on Legislation met and… outlined a set of objectives which legislation should achieve. These were:
>
> 1. To make vocational agriculture available in every community to youth interested in agriculture as a career, rather than to youth in only one-third of the major farm towns.
>
> 2. To provide staff and facilities which will make possible a sound, applied program rather than being restricted primarily to academic agriculture…
>
> 5. To provide a flexible educational program which will meet the needs of youth planning to go directly into farming, related agricultural occupations or to colleges of agriculture. (p. 57).

The committee's suggestions were formed into a bill, which sailed through the Connecticut Congress, and the legislation was signed by the Connecticut governor on June 24th, 1955. State

study groups began to appear across the nation to address these types of issues in the latter half of decade, including Illinois (Hamlin, 1959), and California (Juergenson, 1963). These groups talked about transforming vocational agriculture, following the example of Connecticut, but they were halted by news of the forthcoming Vocational Education Act of 1963.

Summary

The Hearings for the Vocational Education Act of 1963 outlined many of the problems facing vocational education. "The panel found that vocational education is not available in enough high schools" (Vocational Education Act, 1963, p. 38). The hearings also indicated problems facing vocational agriculture. "The panel also found that vocational education programs are not preparing people for enough kinds of jobs. One study… found that only 10 boys studied vocational agriculture for every 100 males employed in that field (Vocational Education Act, 1963, p. 39)." The enacted legislation expanded the curriculum of vocational agriculture beyond production, into agriculturally-related occupations, and ended the compulsory SAE for all agriculture students (Phipps et al., 2008; Talbert et al., 2005). The vocational agriculture transformations mandated by the Vocational Education Act of 1963 would have lasting effects on secondary agricultural education.

Vocational agriculture students no longer had to have a mandatory SAE (Phipps et al., 2008; Talbert et al., 2005). Yet, the transformation of the SAE had already begun. The rethinking of the farm practice, into the supervised farming (Phipps & Cook, 1952) that included placement and non-production experiences (Bollwahn, 1956; Deyoe, 1952; Gibson, 1949; Hutchings, 1949; Wooding, 1949), would eventually become the SAEs of today. There are currently 47 proficiency areas within the supervised agricultural experience structure recognized by the National FFA Organization (2010), many of which are placement or non-production areas. This grassroots adaptation transcended the mandates of the Vocational Education Act of 1963. Would supervised agriculture experiences have disappeared if supervised agricultural experiences remained production orientated and then were eliminated as a mandate by the new legislation? Professionals have citied a downfall of the supervised agricultural experience since 1963 (Phipps et al., 2008; Talbert et al., 2005), but an argument could be made that this integral component of an agricultural program was saved by local program transformations.

The Vocational Education Act of 1963 also transformed vocational agriculture curriculum. Programs could expand beyond production agriculture to teach agriculturally-related curriculum. Vocational agriculture curriculum had already been changing though (Chrein, 1960; Juergenson, 1953a; Nichols, 1956; Sutherland, 1956; Thompson, 1958; Walton, 1958). Courses such as plant science, animal science, and horticulture had begun rise to legitimacy. The ability to expand beyond production agriculture increased the capacity of urban and suburban schools to teach agriculture. The expansion of the vocational agriculture curriculum ensured the relevancy of agricultural education through the succeeding decades.

The Vocational Education Act of 1963 eliminated the production only mandates of the Smith-Hughes Act. But those production only mandates were already being ignored by many local agriculture programs. The rise of non-production SAEs and agriculturally-related occupational curriculum was stimulated by local community needs and not federal legislation.

The old model of production vocational agriculture existed through the 1960's, including the stereotypes, but secondary agriculture programs could not ignore the need to broaden their curriculum to meet the demands of their students, communities, and changing agricultural economies. These local agricultural program transformations demonstrated the community-based nature of agricultural education (Martin, Ball, & Connors, 2006).

This study had some limitations. First, causal references in historical research need to be made with care (Spalding & Parker, 2007). Despite all of the sources of data analyzed, actual practices of secondary vocational agriculture programs were difficult to ascertain. The community problems and local program transformations were real and explained through the sources, but the number of programs transforming their curriculum based on their community needs was impossible to ascertain. Despite these limitations the research holds historical creditability because these local program transformations became the model for what secondary agricultural education would become today.

The ability of local agriculture programs to adapt and lead through looming problems was a powerful implication from this study. Professionals in agricultural education did not wait for legislation to better serve their students. The transformations centered on the needs of the local communities. These adaptations were even copied by whole states, such as Connecticut (Harrington & Jacoby, 1957), to improve state programs of agriculture. Significantly, these changes proved relevant to the future direction of secondary agricultural education in the United States. Non-production agriculture expanded agricultural education to more students, schools, and communities, as well as ensuring agricultural education would remain strong through today.

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Reform Considerations for an Agricultural Teacher Education Program: A Case Study

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Abstract

Nationwide agricultural teacher education programs have suffered from decreased student enrollment. In order to supply qualified agriculture teachers, teacher education programs must evaluate and possibly undergo reform. This ethnographic case study outlines the first step of a three-phase reform process using the agricultural teacher education program at the University of Illinois, which had begun to suffer from a large decline in student enrollment. A conceptual model called the Agricultural Education Networked Learning Circle for Teacher Preparation (AENLC) was introduced to guide this process. The model demonstrated the collaborative nature of an effective teacher education program and can be used to evaluate and provide direction to key individuals involved in educating the pre-service teacher. Seventeen stakeholders were identified to participate in Phase One. Using a three-level approach, participants identified five areas of program improvement: 1) faculty recruitment and retention; 2) courses and curriculum; 3) certification options; 4) student professional development; and 5) student recruitment. Recommendations from the group were consistent with literature and the study provided preliminary data on the practicality of the conceptual model in program reform or renewal in other programs. The local program may now use the recommendations to develop a master plan that can be evaluated during Phase Two.

Introduction

The National Council for Agricultural Education has established a goal to increase the number of secondary agricultural education programs nationwide to 10,000 by the year 2015 (Loudenslager, 2006). Even though there has been an increased demand for secondary agricultural educators, there are several factors impeding progress including a decline in enrollment in agricultural teacher education programs, an increase in the number of teacher candidates choosing not to teach, and an increase in teacher attrition. In 2006, the number of programs nationwide was 8,013 thus requiring an increase of 1,987 agricultural education programs to meet the goal (Team Ag Ed, 2006). However, it was also estimated in 2006 that 40 secondary agricultural education programs would close nationwide due to the lack of a qualified teacher (Kantrovich, 2007). A review of the literature has yielded that there is a lack of current information concerning teacher education reform in agricultural teacher education. The last major reform in agricultural teacher education was in the 1990's when programs were transitioning from Vocational Education to Agricultural Education (Lynch, 1997). A report published in 1995 by the University Council for Vocational Education and the National Association of State Directors of Vocational Technical Education Consortium used new terms to emphasize that learning would take place in a variety of educational environments and asked that all levels of educators become involved in the reform. At the same time, reform was initiated by the University Council for Vocational Education, who began a 3-year study on teacher education and hosted a national summit to discuss reform of vocational teacher education. The summit resulted in a vision for vocational education and thirteen places to start reform (Lynch). With the

high need for qualified educators around the country, there has been a influx of new reform initiatives and research looking at the most effective ways to prepare educators (e.g. Darling-Hammond, Chung, & Frelow, 2002; Ridley, Hurwitz, Hackett, & Miller, 2005; Weiner, 2000). However, this is not the same case in agricultural education. It stands to reason that with the increase in the shortage of qualified agriculture teachers, it is imperative that agricultural education begin to take another look at systemic program reform.

Declining Numbers in Qualified Agriculture Teachers

Enrollment in agricultural teacher education programs has steadily declined since the 1980's (Kantrovich, 2007). The number of newly qualified secondary agricultural educators has decreased from 1,749 in 1977 to 785 in 2006 (Kantrovich). In addition, not all students who receive a degree in agricultural education enter the teaching field, resulting in an increased number of unfilled positions (Kantrovich). It was expected in 2007 that only 53% of the new teachers would take a secondary agricultural education teaching position the fall after graduating, leaving 38% of vacant secondary agricultural education positions unfilled. Due to the decreased supply of quality agricultural educators, the number of unfilled positions increased from 23 in 1990 to 78 in 2006 (Kantrovich). A recent meta-analysis found that factors such as extrinsic rewards, personal goals, advancement opportunities and salaries influence graduates' decision to choose a career other than teaching secondary agriculture, resulting in competition for student enrollment with more appealing programs that offer students economic security and status such as engineering, business and medicine (Guarino, Santibanez, & Daley, 2006).

In addition to dwindling student numbers and teacher candidates deciding not to teach, there is the issue of outdated or disjointed curricula that is no longer adequately preparing teachers for their future profession and thus aiding in the increase in teacher attrition (Lytle, 2000). Several studies have found that major factors influencing teacher attrition include feelings of isolation from colleagues and administrators, helplessness over influencing school policy that impact their programs, inability to manage a diverse and "needy" student population, and heavy workloads (Alliance for Excellent Education, 2005). Although teachers are expected to use new and updated curriculum, show the relevance of their programs in a high-stakes testing culture, and teach a diverse student population, many agricultural teachers are not making the changes and continue to use traditional curriculum (Swortzel as cited in Myers & Dyer, 2004). This can be contributed in large to their preparation before entering service. However, there are programs that have identified areas for improvement within the teacher education program and have begun to address these issues through a *renewal* process either by adding courses to the curriculum or amending existing courses (Goodlad, 2004). The renewal process is a constant evolution of the program and if the comprehensive program is not taking into account during these changes, it will lead to ineffective or disjointed curricula. Consequently, ill-structured curricula impact the number of students who are highly qualified and willing to consider a career as an agriculture teacher, which in turn impacts the overall quality of secondary agricultural education programs and the preparedness of students matriculating into institutions of higher education, (Goodlad as cited in Anderson, Barrick & Hughes, 1992; McGhee & Cheek, 1993).

It is important that teacher education programs nationwide are preparing a new breed of teachers that understand the rapidly changing world of agriculture and have the ability to

effectively teach the appropriate skills to their students while managing the myriad of other duties required of an agricultural educator. The renewal process may work for some programs, but for many, undergoing reform that builds local capacity while maintaining a rigorous external accountability system (Fullen, 2000). This reform should encourage an increase in students majoring in agricultural education and prepare a cadre of highly qualified teachers who are excited about teaching.

A Time for Program Reform

Goodlad (2004) defines program reform as a term that involves replacement or intervention; it implies that there is a problem to be fixed. To be successful, reform must be extensive and comprehensive, addressing the program's problems all together (National Commission on Teaching and America's Future, 1996). To prepare for reform, an organization should go through a series of steps to identify and evaluate each issue facing the program (Torres & Garton as cited in Swortzel, 1995). While evaluation of a program is an important first step of reform, it is not in itself reform; other factors have been identified to be crucial parts of teacher education reform (Swortzel). Throughout the reform process *conceptualization* is an important factor to incorporate. Conceptualization involves communicating thoughts, ideas, or intuition in regards to programs, measures and outcomes (Fullen, 2005). Everyone involved in the evaluation and reform process must continually communicate what their thoughts or ideas are in order to achieve the best plan for the program. Before incorporating any reform changes, there should be a *master plan* for reform that results in everyone working in cooperation to make progress through change and development (Fullen, 2000). Part of the master plan for teacher education reform should include the development of performance indicators in order to evaluate legislative mandates and the underlying philosophy and specific outcomes, practice and inputs (Rojewski, 2009). Using these performance indicators and other evaluation factors, *follow up studies* are commonly used to determine the effectiveness of teacher education programs. Follow up studies should also include accountability from outside audiences in order to achieve a non-biased evaluation (McGhee & Cheek, 1993). It is recommended that data related to career patterns and program perceptions be collected and evaluated every 3-5 years to determine if any further changes need to be made to the education program (McGhee & Cheek).

Due to the fact that agricultural teacher education programs have had very few national reform initiatives in the past, the literature is very sparse with providing frameworks for effectively guiding this process (Swortzel, 1999). One may argue that the lack of empirical information is due in part because agricultural teacher educator programs vary in so many ways because they cater to the needs of their respective states and that program reform for one institution is very different form another (Graham & Garton, 2003; McLean & Camp, 2000). However, as the educational and economic situations throughout the country become dire, a collective front and national protocol for best practices will be imperative to the sustainability of our teacher education programs, secondary programs, and the agricultural industry's highly skilled workforce.

Conceptual Framework

The Networked Learning Circle (NLC) as described by Duran, Brunvand, & Fossum (2002) provided the foundation for the conceptual framework in this study. Duran et al., discuss

the importance of the participation of three principle entities in the improvement of teacher education: schools of education, school districts, and colleges of arts and sciences. The advantage behind the NLC is that it takes multiple entities to successfully renew an educational program through the development of student teachers, even though each one has different areas of focus and strengths, they all need to collaborate to be effective. The focus of the NLC is the pre-service teacher--preparing them to enter the educational field and is made up of four parts 1) Student Teachers, 2) Content faculty--specializing in the student's field of study, 3) Education faculty--specializing in educational theories and practices, and 4) experienced practitioners—student's mentoring teachers and university-based supervisors. At the time the pre-service teacher is participating in the teaching internship, they have finished their coursework and have passed from the guidance of the content faculty to the guidance of the supervising or host teachers. The supervising teacher has the responsibility to then bring out the educational and content knowledge the student has acquired.

The Agricultural Education Networked Learning Circle for Teacher Preparation model (AENLC) (see figure 1) identifies four major stakeholder groups that together create the agricultural teacher education program. This unified body indicates the focus of the program; a comprehensive network instead of separate entities providing specific and sometimes disjointed or competing services. This network should wrap around the pre-service teacher, identifying the current educational climate and responding appropriately to train him or her based on one's individual strengths and areas of improvement. The first component to the network is the *content specialists*. The content specialists prepare pre-service teachers by teaching specialized skills in specific areas. These skills should be closely aligned to the current practices in agriculture, fusing research with application. The second component is the *teacher educators*. Teacher educators are the education faculty in both agricultural education and the college of education, providing pre-service teachers with educational theories and practices. They should have a clear understanding of what is occurring in schools as well as in the agricultural industry and provide a pedagogical foundation whereas the pre-service teachers have high self-efficacy toward effectively educating a diverse group of learners using multiple instructional approaches. The third component of the framework is the *governing body*. The governing body such as the school district, state education agencies, agricultural education agencies, etc., develops and administers policy with the goal of ensuring an effective and equitable educational environment. It is important that the governing body is a partner in the preparation process and that support is substantive and continual throughout the educator's career. The final component of the framework is the *mentors*. Mentors are made up of cooperating teachers, experienced teachers and university supervisors. Together these four components make up the comprehensive agricultural teacher education program. The agricultural teacher education program must maintain an open line of communication among all the components continuing to assess, conceptualize, implement, and evaluate the program in order to produce highly qualified agriculture teachers that will continue to engage and persist in the field. In program reform, all of these components must be taken into account.

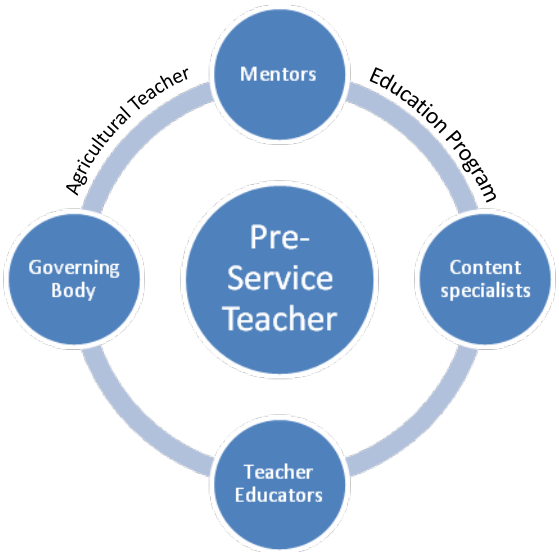

Figure 1: The Agricultural Education Networked Learning Circle for Teacher Preparation Model

Purpose and Objectives

This study is part of a larger ethnographic case study that includes a longitudinal three-phase implementation of the conceptual framework (i.e. program evaluation; master plan implementation; and program follow up study). However, the scope of this particular study, Phase One, is to utilize the stakeholder groups identified in the AENLC conceptual model to determine high-leverage strengths and areas of improvement in order to guide the program reform process (i.e. conceptualization). Although this study has an intrinsically high value for the institution, with the lack of current literature on reform in agricultural teacher education programs, it provides a framework and empirical evidence that can be used in other agricultural teacher education program reform initiatives nationwide. To accomplish this purpose, the following objectives were used to direct the study:

1. Identify the key characteristics of the local agricultural teacher education program including faculty, program of study, enrollment and the academic home;
2. Define the perceived high-leverage strengths and areas of growth for the local program identified by the focus group; and
3. Identify recommendations to improve the agricultural teacher education program as identified by the focus group.

Methods and Procedures

The population for this study is agricultural teacher education programs throughout the United States. The accessible population is the University of Illinois agricultural teacher education program, which has experienced declines in student numbers in a state with an increase demand for highly qualified agriculture teachers and has agreed to participate in a three-phase longitudinal reform process. The purpose of the study was to begin the reform process of

conceptualization by determining high-leverage strengths and areas of improvement as perceived by stakeholders identified in the AENLC. Therefore, a nested ethnographic case study was used. In order to be effective, the study was designed to be holistic, taking into account every part of the conceptual framework and sensitive to the context where the study took place (Patton, 2002). A nested study was used due to the fact that the researchers were interested in determining the individual experiences, attitudes, and recommendations of individuals representing the components of the learning circle as it relates to reforming the agricultural teacher education program being studied (Patton). Therefore, there are three levels to this case study (1) the individuals in the study, (2) the focus groups, and (3) the local program.

The sample used in this case study were key stakeholders nominated by the local program that represented three of the four components of the AENLC. This list included experienced teachers that have previously served as cooperating teachers and teacher leaders for the state, novice teachers who had gone through the program, recent graduates that were certified but not teaching, and educational and agricultural education governing board members. Twenty individuals were invited with 17 attending. According to Fern (2001), large groups of 12 or more members are more likely to focus on the information they have in common rather than on the unique aspects of their backgrounds and experiences. Therefore, the group was broken into smaller focus groups of 3-4 (Brown as cited in Barnett, 2002)

The first step within the procedures focused on the first level of the study, the individual. Participants brainstormed their idea of the premier agricultural teacher education program. From this list of characteristics, participants identified important themes that the group should continue to discuss as it relates to high-leverage strengths or areas of improvement for the local program. Once themes were identified for discussion, focus groups were formed. For level two of the study, participants were randomly divided into focus groups of three to four members. Each group was stratified to have at least one member from the governing body, one experienced teacher, and one novice teacher. Each group was provided a laptop to record notes, a theme from the list generated by the larger group, and two programs of study (i.e. one comparable out-of-state agricultural teacher education program and one comparable in-state program). In addition, each focus group received one of the state approved agriculture career pathways to discuss. The themes assigned to the groups were, teacher training and student teaching, student professional development, program image and outside partnerships, faculty responsibilities, and curriculum and content knowledge. Each focus group was given three hours to discuss their four assigned topics (Kitzinger, 1995). In addition, groups were instructed to provide high-leverage strengths and areas of growth for the program, recommendations and action steps for addressing the areas of growth.

For level three, the local program, the researchers used inductive data analysis by defining data and identifying key themes (concerns and recommendations) in relation to the key components in the conceptual framework. More specifically, identifying distinct recommendations, the components within the model that are impacted by the recommendations, and how those individuals can work to address the recommendations within the master plan for reform.

Results

The local program consisted of two faculty members, one member with agricultural education training at the Ph.D. level and one at the masters level. Combined there was five years of secondary agriculture teaching experience, 30 years of agricultural leadership development experience, and four years of teacher education experience. The local program had seen a turnover of four Ph.D. faculty members in five years taking with them much of the institutional knowledge and decades of teacher education experience. The program is housed in the college of agriculture and requires that students enroll in courses in the college of education as part of their professional training. The undergraduate program consists of two concentrations, agricultural leadership education and teacher certification. The teacher certification concentration required 126 hours of coursework including, 48 general education hours, 33 professional education hours, and 45 agricultural content and elective hours. Students are also required to document 2000 hours of agriculture work, over 80 hours of secondary classroom observations, and twelve weeks of a teaching internship. No program existed for certification at the graduate level. Finally, enrollment in the teacher certification concentration has consistently decreased from 36 to 20 total students in the last five years. During the five year period the female enrollment ratio steadily increased from 60% to 85%.

The results for research objective two are a summary of the themes identified by all five focus groups. Several strengths were identified throughout the study; focus groups agreed that many quality resources are available through the university for the local program, such as the high quality content courses. In addition, students gained practical experience and advice through student organizations and relationships with faculty. The connection that the program has with the state and local governing bodies was also a strength. Overall, focus groups felt that internships and field work did not reinforce content knowledge for students. Focus groups also found that some necessary coursework was lacking or unsatisfactory while other required courses were unnecessary. When compared to other universities, the local program required many more courses, resulting in very few course options for students within required coursework and electives. In addition, continuing education courses were not offered to current educators. The final concern was recruitment of faculty. Focus groups identified that it is important to re-evaluate faculty recruitment in order to recruit and maintain quality teacher educators. Table 1 is a summary of perceived high-leverage strengths and areas of growth for program as defined by the five focus groups.

As a result of the discussion of high-leverage strengths and areas of growth, focus groups provided 48 specific recommendations to improve the current agricultural teacher education program. For research objective three, redundant recommendations were removed leaving the following recommendations that are displayed in Table 2. These recommendations fell into five categories: 1) faculty recruitment and retention; 2) courses and curriculum; 3) certification options; 4) student professional development; and 5) student recruitment. Several recommendations were identified from the groups that dealt with the importance of quality faculty. This included tenure-track, non tenure-track, and adjunct or master teachers. Focus groups identified specific courses that were considered unnecessary or missing within the curriculum of the current program. The overall perception was that all courses in the curriculum should be reevaluated for appropriateness and effectiveness. In addition, recommendations for improving the certification options to better meet the needs of the state.

Table 1
High-Leverage Strengths and Areas of Growth as Identified by Focus Groups

Strengths	Areas of Growth
• Strong, quality introduction to horticulture coursework • Student and advisor relationship • Student organizations offer practical experience • Connection with educational governing body and mentoring programs	• Internships that build on content knowledge • Connection between in-service teachers and faculty • Courses exposing students to SAEs • Offer an agricultural mechanics and tech course for teaching content • Offer special education courses focusing on secondary education • Offer BSAA courses • Require only necessary coursework • Offer more options for required courses • Expose students to adequate multiculturalism • Increase the opportunity for practical experience • Recruit and Maintain faculty • Increase the number of continuing education courses • Improve program perceptions

Furthermore, focus groups felt that even though resources were available for student professional development, they are not being used to their full capacity. Groups recommended specific changes in the opportunities for professional development in order to make better use of the available resources at the university and throughout the state. These included, designating time to use the university agricultural farms, improved cooperating teacher training and opportunities for students to practice teaching skills within the university. Focus groups also recommended improving student recruitment efforts by improving connections with secondary teachers and increasing recruitment targets.

Table 2

Focus Group Recommendations for the Local Program

Theme	Recommendations
Faculty Recruitment and Retention	• Identify "master" or retired teachers that can be utilized in teaching content and Ag Ed courses • Establish pre-determined needs for adding faculty members • Recruit faculty members from diverse universities with teaching experience • Maintain strong connections between mentoring groups and governing bodies • Implement an annual self-evaluation program • Maintain a strong connection between students and faculty as well as in-service teachers
Courses and Curriculum	• Add SAE and FFA Course • Implement collegiate SAE project • Add Lab Methods course • Add Ag Sales, Ag Marketing and Ag management courses • Provide an advanced technology course to replace microcomputer course • Implement courses that focus on teaching the agricultural content • Require the introduction to agriculture education course for freshman and ensure that it is aligned to the state articulated introduction course • Consider eliminating rural sociology and microcomputer courses • Make room for more electives • Consider offering students course choices for required coursework • Create connections to integrate business partners into the classroom experience • Other courses should be available as part of the career pathways • Work to build in courses that count for general education requirements • Utilize feedback from current educators on best practices • Offer 1-2 week summer courses for continuing education in agricultural content • Offer online continuing education courses • Require courses that expose students to diverse cultures • Incorporate methods of instruction and evaluation of instructional strategies earlier in curriculum
Certification Options	• Work with State Board of Education to count more agricultural content courses for other secondary endorsements • Identify courses that count towards additional certifications • Introduce certification options at the graduate level and for

	provisional teachers
Student Professional Development	• Provide more structure for internships and field experiences • Develop course to prepare cooperative teachers for student teachers • Set up a priority schedule with university making time available for practical experience at university farms • Internships developed for students within the different career pathways to gain experience in areas that are different from their past experiences. • Provide opportunities for students to TA in content areas • Match teacher placement with cooperating teacher based on personality and teaching philosophy • Using university connections (career services) and alumni to help develop the connection inside and outside the curriculum
Student Recruitment	• Foster program recruitment of high school/collegiate students • Make connections with teachers throughout the state • Target underrepresented populations • Balance between research driven and practical application • Personalize the university (size) and take advantage of the reputation of college (small, family like, you are know, open door policy, staff knows you)

Conclusions and Recommendations

Phase One of this study yielded important information to begin to develop the master plan for reforming the local program. The following conclusion is a summary of the focus groups conceptualizations but also summarizes the third level data, the local program recommendations. Henceforth, the term "the group" will indicate the third level data. The group determined that most critical to this reform initiative is teacher educator quality and retention. The program has access to many institutional and governmental resources but the high turnover rate in faculty over recent years has had a large and negative impact on the program. Without disregard for the current faculty, the group reported a lack of confidence in the program's ability to effectively train pre-service teachers. This was apparent by the consistent decrease in enrollment and the repeated comments of negative perceptions of the program by stakeholder groups within the state. The group recognized a need for a strong but diverse teacher education team. This is consistent with the literature that agricultural teacher educators play a large role in the quality of the agricultural teacher education program, in order to diversify the input for agricultural education and provide a range of opportunities to expand and collaborate with other fields of education, a diverse professoriate is necessary (Swortzel, 1999). Therefore, the group recommended determining the most suitable qualifications of desired faculty and establishing a recruitment process to hire these individuals. Furthermore, support mechanisms should be put into place to promote faculty retention. In addition, several groups suggested maintaining the strong connections among the teacher educators, the governing body and mentors.

With the foundation of a diverse and knowledgeable teacher education team, the local program should look at the quality of the courses. Studies found a positive relationship between

the amount of professional coursework taken by teachers and their teaching performance, including their students' achievement (Darling-Hammond et al., 2002). The Group identified unnecessary coursework and many focus groups recommended removing specific courses or overlapping course requirements so that the curriculum had more flexibility to meet the needs of the individual pre-service teacher without compromising quality. In addition, the group identified holes within the program of study and recommended adding required courses or replacing topics within current courses. Recommendations to improve course offerings are consistent with literature where a review of several studies reported positive relationships between education coursework and teacher performance (Darling-Hammond et al., 2002). The group also strongly recommended that the teacher educators work closely with content specialists both within and outside the institution, including specialists in the agriculture industry and in-service teachers, to make sure that there is a seamless flow from theory to real-life application.

The next set of recommendations call for action by both the teacher educators and the governing body. Several focus groups commented on the fact that certification options for students need to be re-evaluated and requirements be more transparent to potential recruits and in-service teachers. The group recommended that the program pursue options to allow for secondary endorsements within the 4-year curriculum in other content areas such as science and math. In addition, the group recommended that post-baccalaureate certification options are introduced. More specifically, options for individuals who are interested in full-time graduate studies, those currently teaching under provisional licensure, and secondary agricultural education endorsements for core content teachers. The latter recommendation also addresses the issue of student recruitment in secondary agriculture programs in that secondary endorsements will increase the number of teachers with agriculture content knowledge, potentially exposing more students to agricultural applications. According to Thompson and Russell (1993), expanding agricultural literature and instruction outside of the vocational classroom in secondary education would introduce agricultural practices to more students, preparing them to make a decision to pursue agriculture. In terms of certification transparency, those who have contact with current students don't know or understand that process, making it difficult to explain to other individuals that may be interested. A more transparent certification process will make a more informed group of agricultural education advocates, which will only benefit the recruitment process.

The next set of recommendations targeted the responsibilities of the teacher educators, the mentors, and the content specialist in providing relevant professional development experiences for pre-service teachers. The group recommended that both internships and field experiences have more structure in order to offer students specific content knowledge. In addition, teacher training should be offered to cooperating teachers in the areas of effective instructional strategies, authentic assessment of teaching, and fostering a healthy mentoring relationship. The group also recommended that practical experience be offered to students at the university, including experiences assisting in content area courses and university farm experiences. Furthermore, they need to be exposed to situations where they must act on what they learn so that they can develop a strong professional philosophy focused on students as well as perspectives on practice (Lytle, 2000).

Finally, the group recommended that a larger focus be placed on recruiting students into the local program and that program faculty work to foster connections with current educators in the field. Consistent with the literature, it is important to realize that direct contact with students and teachers is necessary to develop relationships that will lead to successful recruitment efforts. Studies have shown that increasing students' interest in agricultural education will potentially result in more successful recruitment processes and increasing student enrollment (e.g. Esters, 2007). More specifically, a study by Harms and Knobloch (2005) purported that those who choose a career based on intrinsic interests are more satisfied than those who choose careers based on extrinsic motivates. Intrinsic motivation is most commonly the desire to help others (Harms & Knobloch) and is often based on the goals, beliefs, values and inspirations of an individual that influence their career decision (Fischman, Schutte, Solomon, & Wu Lam, 2001; Vincent, Ball & Anderson, 2009). Therefore, as agricultural educators work to increase student interest in agriculture, they must broaden their programs in order to target new groups of students and foster new relationships.

In addition to the aforementioned level-three recommendations, the following recommendations are provided for this Phase One study.

1. The local program should develop a master plan based on the recommendations provided in this study. The specific focuses of this master plan for reform are: the strategic vision for the program; faculty recruitment and retention; courses and curriculum; certification options; student professional development; and student recruitment.
2. Upon completion of the master plan, the local program should commence with Phase Two by bringing in a panel of Agricultural Teacher Education experts from other institutions to evaluate the program and the master plan and provide recommendations for plan implementation.
3. This study should be replicated with other agricultural teacher education programs throughout the nation to confirm the effectiveness and practicality of the conceptual model.
4. A relational study should be conducted to look at the impact the key stakeholders identified in the AENLC have on the pre-service teacher's professional preparation and decision to teach. This study should look at the AENLC as a comprehensive preparation system instead of as separate components.

In conclusion, as more demands are placed on secondary educators, it is important that agricultural teacher education programs are vigilant and take the measures to ensure that the program of study does not become outdated or disjointed due to small incremental changes to courses. Those programs that are not responsive and do not have a systematic plan in place will run the risk of becoming obsolete. It is evident that a teacher education program cannot prepare a pre-service teacher for all the tasks and responsibilities that await him or her (Lytle, 2000). However, just focusing on evaluating the effectiveness of the courses and not looking at the entire program is not enough. As demonstrated through this case study, the Agricultural Education Networked Learning Circle for Teacher Preparation conceptual model is promising as a framework for guiding the systematic process of agricultural teacher education program reform. Furthermore, we contend that this framework can also be used in program renewal efforts.

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What is the Value of the Scholarship of Teaching and Learning?

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Abstract

The purpose of this study was to determine faculty members' participation in and perceptions of the Scholarship of Teaching and Learning at the University of Florida. Faculty participation and perceptions of the SoTL were described by participants' respective departmental rank. Additionally, correlations between faculty members' years teaching, their participation in SoTL, and perceptions of its value were explored. Tenured or tenure track faculty with appointments in the College of Agricultural and Life Sciences, Emerging Pathogens, Genetics, and Water multidisciplinary institutes served as the population for this study. It was determined that while faculty participants had an average of nearly 15 years teaching at the university level, nearly 50 % of respondents had ten or fewer years of teaching experience. Regardless of rank and years of teaching experience it was concluded that faculty are largely unengaged in SoTL. Faculty were positive to neutral regarding the value of SoTL in teaching and its impact on their career. There was no correlation between years teaching at the university level and whether faculty had conducted SoTL. Additionally, there was a low, negative correlation between years teaching and the perceived impact of SoTL on their career, the perceived value for improving teaching and its value in the promotion and tenure process.

Introduction

In many classrooms across the nation, teaching occurs behind closed doors. The act of and products of teaching have remained a sole endeavor among the students and the instructor. Unlike traditional forms of scholarship, teaching as a scholarly pursuit is rarely based upon an intellectual inquiry, subject to peer review, and made available to a broader public. Thus, many universities across the nation have been reluctant to accept teaching as a valid form of scholarship (Shulman, 1993). Since the introduction of the concept of the Scholarship of Teaching and Learning (SoTL) more than 15 years ago, the notion of teaching as a scholarly endeavor equal to more traditional forms of scholarship has been the topic of much debate (Witman & Richlin, 2007). The basic concepts surrounding SoTL were originally proposed by Boyer and, over the years, have been further refined through many research articles and books over the past ten years (Kreber, 2005).

The move toward documenting SoTL has been driven by market demands and public concern over the quality of teaching in the classrooms and laboratories of American universities (Kreber, 2007). As such, much attention has been paid to SoTL and slowly, faculty across disciplines are beginning to recognize its value (Witman & Richlin, 2007). Often, SoTL means different things to different faculty members. When Boyer proposed the original concepts surrounding SoTL he did not provide a definition, rather a set of characteristics that served as an outline for conducting SoTL work (Defining SoTL Hand-out, 2008).

The literature has indicated several working definitions of SoTL, in addition to some disagreement in SoTL communities of practice, regarding one single definition. In describing SoTL Boyer (1990) stated that "As a scholarly enterprise, teaching begins with what the teacher knows…Pedagogical procedures must be carefully planned, continuously examined, and relate directly to the subject taught" (Defining SoTL Hand-out, 2008, para 1). While this description outlines scholarly teaching, it does not serve as the basis upon which most other definitions of SoTL are regarded (Defining SoTL Hand-out, 2008). In a recent study of university faculty more than one-third of respondents indicated that they had never heard of SoTL (Maxwell & Ball, 2009). In the same study, participants were asked to provide their own definition of SoTL. Only a small minority of faculty were able to construct an accurate and in-depth definition of SoTL (Maxwell & Ball, 2009). The remaining respondents either indicated that they could not provide a definition or described SoTL as a process of trial and error undertaken to improve teaching (Maxwell & Ball, 2009).

According to Shulman (1999), a teaching act is scholarly when it is made available to the academic public, is critically reviewed and evaluated by an academic or teaching discipline, and when said discipline utilizes or develops new work as a result of it. Several variations of this definition exist today, however most center around notions of public availability, peer review, and contribution. For the purpose of this study the researchers adopted the definition used at Illinois State University (ISU) in Normal, Illinois and will define SoTL as the systematic reflection on teaching and learning made public (Scholarship of Teaching and Learning, n.d.).

This Scholarly process described by Shulman (1999) is quite common when referring to one's research activity and findings; however, teaching has often been considered a much more private enterprise (Herteis, 2006). As a more consumer-driven, business-model of education emerges, higher education faces increasing pressure from stakeholders regarding program quality. Not only is the value of the curriculum taught being questioned but teaching quality is coming under increasing scrutiny as well. As a result of a more consumer-driven, high stakes notion of American education, "the scholarship of teaching and learning is an imperative for higher education today, not a choice" (Huber & Hutchings, 2005, p. 13).

Disciplines attempt to adopt SoTL practices in different ways. Many faculty members do not engage in the SoTL because of "the absence of support and reward for doing so" (Witman & Richlin, 2007, p.4). While some disciplines have embraced efforts in SoTL more than others, in general, there is still room for improvement. Ultimately, the reward for conducting work in SoTL will come from the respective researchers discipline; therefore it is important that studies in and about SoTL be conducted across disciplines (Witman & Richlin, 2007). By conducting SoTL work a researcher is able to "explore how to create the vital connection between themselves and the 'subject', themselves and the students, and students and the 'subject'" (Kreber, 2007, p. 3).

Much of the current work being conducted on SoTL has focused primarily in regard to the status of SoTL movement itself. Witman and Richlin (2007), in an assessment of the status of SoTL across different disciplines, found that they first had to address the differences between *scholarly teaching* and the *scholarship of teaching and learning*. They noted that while scholarly teaching and the scholarship of teaching and learning shared similar elements they differed in goals and in their final output (Witman & Richlin, 2007). SoTL aims to "result in a

formal, peer-reviewed communication in an appropriate medium, or venue, which then becomes part of the knowledge base" (Witman & Richlin, 2007, p.2). In contrast, scholarly teaching aims to impact teaching and learning in a classroom in the immediate sense (Witman & Richlin, 2007). Much variation between the disciplines studied was found both in how the SoTL is interpreted as well as how it is valued. Among the professions, and more specifically within higher education, it has been posited that SoTL is slowly becoming more widespread. Yet, for many years the professions have focused on providing teaching tips to faculty members rather than rewarding scholarly work in the areas of teaching and learning (Witman & Richlin, 2007).

Kreber (2005) suggested several goals or focus areas be considered and applied to SoTL. In particular, SoTL work should be focused on defining the SoTL and "whom we see as practicing the scholarship of teaching" (Kreber, 2005, p. 402). Also, it has been suggested that practitioners broaden their focus and look at larger issues facing curriculum and the overall college mission rather than focusing simply on how students learn (Kreber, 2005).

In a recent study it was determined that faculty in agriculture and related disciplines indicate that SoTL is a *real* form of scholarship, they are largely unengaged in SoTL (Maxwell & Ball, 2009). Those faculty who indicated that they had been involved with SoTL research described the nature of their involvement as serving as a reviewer of disciplinary based teaching articles (Maxwell & Ball, 2009). Despite this lack of involvement, participants felt that SoTL research had practical value for improving teaching in their disciplines (Maxwell & Ball, 2009).

Traditionally, colleges of agriculture have prided themselves in being student centered and often home to the best teachers on campus. As a result, one would expect to find a high level of awareness of SoTL and an equally high level of participation in SoTL research. Unfortunately, data to support these claims does not exist, nor does an abundance of research exist on how faculty perceive SoTL and/or conduct work in the scholarship of teaching and learning, either within colleges of agriculture or university-wide. In order to increase programming in SoTL, make the results of teaching more public as opposed to an isolated event behind a closed classroom door, and create a sense of value for scholarship in teaching and learning as equal to scholarship in research, more research is needed regarding who is conducting SoTL research, and the perceived value of conducting SoTL research.

Conceptual Framework

This study is framed conceptually around Fishbein and Ajzen's (1975) expectancy value theory. This theory attempts to explain behavior based on an individual's beliefs and perceived values of an action (Fishbein & Ajzen, 1975). Figure 1 below, adapted from Palmgreen (1984) helps to illustrate the theory. Fishbein and Ajzen posit that one's action or behaviors are a direct result of one's beliefs and evaluations. If an individual believes that a particular behavior will result in a desired outcome, and upon evaluation, the reward is great enough, then the individual will take action.

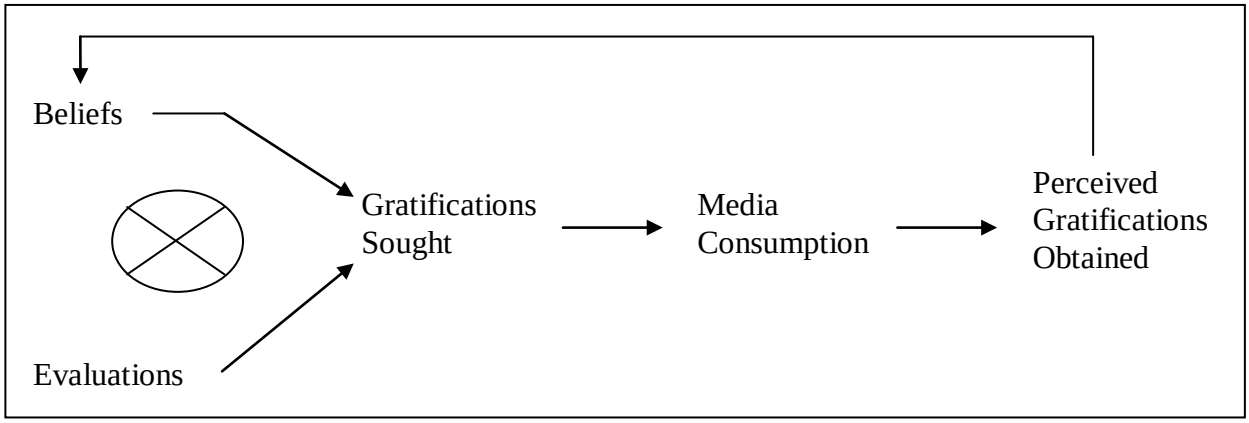

Figure 1: Expectancy Value Model (adapted from Palmgreen, 1984)

It can be hypothesized that one's participation and perceived value of SoTL is a function of one's beliefs and evaluations of the outcomes of conducting SoTL research. It is through this lens that this study is conceptualized. Research has shown that faculty in colleges of agriculture are largely unaware of and unengaged in the SoTL (Maxwell & Ball, 2009). However, little is known about who is conducting SoTL research in colleges of agriculture or the value that they perceive this type of research to poses. This study seeks to gain further insight into faculty beliefs and evaluations regarding SoTL in an effort to begin to better explain faculty involvement, or the lack there of, in this type of research.

Purpose/Objectives

The purpose of this study was to determine faculty members' participation in and perceptions of the Scholarship of Teaching and Learning. Specifically, the researchers sought to describe the population of study in terms of their rank and number of years teaching. Additionally, faculty members' participation in SoTL and perceptions of its value were described by rank. Finally, correlations between faculty members years teaching and their participation in SoTL and perceptions of its value were explored. The following objectives guided the stated purpose:

1. Describe faculty members' rank and years teaching.
2. Describe faculty members' participation, the perceived impact, and value of SoTL for improving teaching and in the promotion and tenure process by rank.
3. Describe the relationship between faculty members' participation, the perceived impact, and value of SoTL for improving teaching and in the promotion and tenure process by years teaching.

Methods/Procedures

The purpose of this study was to determine faculty members' participation in and perceptions of SoTL. This applied survey research was conducted in an entirely electronic format. Notices were sent via electronic mail to faculty in the College of Agricultural and Life

Sciences, Emerging Pathogens, Genetics, and Water multidisciplinary institutes. The survey instrument was developed for use with the online service Survey Monkey. Email based surveys present unique challenges for some groups. According to Dillman (2007)

> Certain populations, such as university professors, federal government employees, workers in many companies and corporations, and members of some professional organizations, generally have Internet addresses and access. For these populations, e-mail and Web surveys may have only minor coverage problems (p. 356).

Despite their access to internet, a study of faculty members showed an average response rate for email surveys of 32% compared to 47% for postal delivered surveys (Shannon & Bradshaw, 2002). Despite this lower rate the researcher chose to deliver the survey electronically, using multiple contacts, due to budgetary and time constraints.

After receiving approval for exempt status from the University of Florida IRB, participants received a pre-notice email message informing them that they will soon be asked to complete a questionnaire (Dillman, 2007). Following the pre-notice email participants received an email message containing a cover letter explaining the study with a link directing them to the Survey Monkey™ website for the instrument. According to Dillman (2007) the email containing the actual link to complete the survey should follow about two to three days later. In total, participants were contacted four times. Studies have shown that when email surveys are used, a four contact strategy produces response rates similar to surveys conducted using the postal service delivered format (Dillman, 2007).

A group of 855 faculty in the College of Agricultural and Life Sciences, Emerging Pathogens, Genetics, and Water multidisciplinary institutes served as the final population of this study. Lists containing faculty names and emails were obtained for each group. A census of the accessible population resulted in 287 questionnaires returned. A total of 90 recipients declined to participate in the study and an additional 12 were not reached due to invalid email addresses. This resulted in a final response rate of 38.1%. This manuscript utilizes only a portion of the responses gathered during the data collection process described above. Only data reported by tenured or tenure track faculty were included in these results (N = 179). Due to the nature of this study, results should not be generalized beyond this population.

To control for non-response error, early and late responders were compared in regard to two select demographic variables. These comparisons were made on the assumption that those participants that respond later, often after additional requests for participation, are more like non-responders (Armstrong & Overton, 1977). After comparison, no significant differences existed between the groups. Therefore, there was no reason to believe that non-respondents were different than respondents.

The survey instrument was developed by the research team based upon a review of literature of similar knowledge and perception studies. Many questions were based on a previously developed instrument used at Illinois State University (ISU) in Normal, Illinois. The research team received written permission from the developer of the ISU instrument to use it as the basis of the instrument for the study. To establish face and content validity the instrument

was reviewed by an expert panel of selected faculty in the Department of Agricultural Education and Communication who were experts in survey design as well as SoTL work. The reliability of the instrument was analyzed post-hoc, and the instrument yielded a Cronbach's alpha coefficient score of .86.

All data were collected and stored on Survey Monkey™ until participants were contacted using Dillman's (2007) four contact method and been given ample opportunity to respond. Data was then transferred and analyzed using the Statistical Package for the Social Sciences (SPSS). Standard statistical measures were preformed to describe the results and determine relationships between variables. Descriptive statistics including frequencies and percentages were determined and used to describe the respondents' perceptions.

Results/Findings

The first objective of this study was to describe characteristics of the faculty population. Overall the respondents had an average of 14.8 years teaching at the University level. Table 1 contains information regarding total years teaching and the position held in the department for respondents. Frequencies and percentages were reported for each category. Nearly 31% of the respondents held the rank of Assistant Professor and averaged 4.8 years teaching at the university level. Associate Professors accounted for nearly 28% of the respondents and on average had taught for 12.5 years. The remaining 41% of respondents held the rank of Professor and averaged 23.8 years of teaching experience at the university level.

Table 1
Characteristics of Faculty Participants (*N* = 179)

Characteristics	*f*	%
Years Taught at University		
0-5	41	22.9
6-10	36	20.1
11-15	26	14.5
16-20	21	11.7
21-25	23	12.8
26-30	17	9.5
31 +	14	7.8
Other	1	.6
Position Held in Department		
Assistant Professor	55	30.7
Associate Professor	50	27.9
Professor	74	41.3

The goal of objective two was to describe faculty participation in SoTL and its perceived impact on faculty members' careers. Additionally, this objective sought to describe the perceived value of the SoTL in terms of helping to improve one's teaching and its value to the promotion and tenure process. Table 2 displays participants' responses to the question "have you ever conducted SoTL research?" Regardless of rank, a strong majority of respondents indicated that they had never conducted and SoTL research. Associate professors indicated the

largest percentage of participation in SoTL with 26 % indicating they had conducted a SoTL project. Nearly 23 % of assistant professors indicated they had participated in SoTL followed by 12 % of faculty at the rank of professor.

Table 2
Participation in SoTL by Rank (*N* = 165)

	f		%	
Rank	*Yes*	*No*	*Yes*	*No*
Assistant Professor	12	41	22.6	77.4
Associate Professor	12	34	26.1	73.9
Professor	8	58	12.1	87.9

Table 3 presents participants' mean responses to the question "what impact would conducting SoTL research have on your career?" Regardless of rank, participants generally held neutral to positive perceptions related to the impact that conducting SoTL research would have on their career. Assistant professors (*M* = 3.6) had slightly more positive perceptions than both associate professors (*M* = 3.5) and professors (*M* = 3.3).

Table 3
SoTL Impact on Career by Rank (*N* = 145)

Rank	*N*	*M*	*SD*
Assistant Professor	45	3.6	.72
Associate Professor	43	3.5	.74
Professor	57	3.3	.58

Note. Coding: 1= Very Negative, 2 = Negative, 3 = Neutral, 4 = Positive, 5 = Very Positive

Participants' perceptions of SoTL's value in terms of improving teaching are presented in Table 4. Regardless of rank, participants generally held neutral to positive perceptions related to the value of SoTL in terms of improving teaching. Associate professors (*M* = 3.7) had slightly more positive perceptions than both assistant professors (*M* = 3.6) and professors (*M* = 3.5).

Table 4
SoTL Value for Improving Teaching by Rank (*N* = 138)

Rank	*N*	*M*	*SD*
Assistant Professor	43	3.6	.56
Associate Professor	39	3.7	.54
Professor	56	3.5	.68

Note. Coding: 1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

In Table 5 participants' perceptions of the SoTL's value in the promotion and tenure process are presented. Regardless of rank, participants were generally neutral in terms of their perceptions of how conducting SoTL research would be valued in the promotion and tenure process. Associate professors (*M* = 3.7) had slightly more positive perceptions than both assistant professors (*M* = 3.6) and professors (*M* = 3.5).

Table 5
SoTL Value for Promotion and Tenure by Rank (N = 140)

Rank	*N*	*M*	*SD*
Assistant Professor	45	3.0	.53
Associate Professor	42	3.1	.56
Professor	53	2.9	.66

Note. Coding: 1= Strongly Disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly Agree

Objective three sought to describe the relationship between faculty members' participation, the perceived impact, and value of SoTL for improving teaching and in the promotion and tenure process by years teaching. Table 6 represents the relationship between participation in SoTL and number of years teaching at the university for participants (N = 164). A Point-biserial correlation was used to determine the strength of the relationship between variables with effect size descriptors taken from Bartz (1999). For the purpose of interpretation it should be noted that data was coded into the following categories: 0 = No, 1 = Yes. It was determined that a very low relationship (r_{pb} = -.01) existed between faculty participation in SoTL and the number of years teaching at the University level.

Table 6
Relationships Between Participation in SoTL and Years Teaching (N = 164)

Characteristic	Years Teaching (r_{pb})	Effect Size
Conducted the SoTL	-.01	Very Low

Note. Coding: 0 = No, 1 = Yes

Table 7 represents the relationship between the perceived impact conducting the SoTL would have on ones career and number of years teaching at the university for participants (N = 144). A Spearman correlation was used to determine the strength of the relationship between variables with effect size descriptors taken from Bartz (1999). It was determined that a very low, negative relationship (r = -.14) existed between the perceived impact of conducting SoTL and the number of years teaching at the University level.

Table 7
Relationships Between Impact of SoTL on Career and Years Teaching (N = 144)

Characteristic	Years Teaching (r)	Effect Size
Impact on Career	-.14	Very Low

Data explaining the relationship between the perceived value SoTL has in terms of improving teaching and number of years teaching at the university for participants (N = 137) is presented in Table 8. A Spearman correlation was used to determine the strength of the relationship between variables with effect size descriptors taken from Bartz (1999). It was determined that a very low, negative relationship (r_{pb} = -.17) existed between the perceived value SoTL in terms of improving teaching and the number of years teaching at the University level.

Table 8
Relationships Between Value of SoTL for Improving Teaching and Years Teaching (N = 137)

Characteristic	Years Teaching (r)	Effect Size
SoTL Improves Teaching	-.17	Very Low

Table 9 represents the relationship between the perceived value SoTL has in the promotion and tenure process and number of years teaching at the university for participants (N = 139). A Spearman correlation was used to determine the strength of the relationship between variables with effect size descriptors taken from Bartz (1999). It was determined that a very low, negative relationship (r = -.15) existed between the perceived value SoTL has in the promotion and tenure process and the number of years teaching at the University level.

Table 9
Relationships Between Value of SoTL for Improving Teaching and Years Teaching (N = 139)

Characteristic	SoTL Valuable for P&T (r)	Effect Size
Years Teaching	-.15	Very Low

Conclusions/Implications

Objective one of this study was to describe selected characteristics of the sample, in regard to rank and years in the profession. Respondents represented tenured or tenure track faculty at various departmental ranks and years of service. Comparisons of these groups indicated no significant differences based on demographics, suggesting that study participants are representative of the faculty population. It was concluded that nearly half of the respondents had ten or fewer years of teaching experience at the university level. It can be argued that because these participants are relatively new to the academy they may well be focused on more traditional forms of scholarship in their disciplines. Despite this early career group of respondents, overall study participants had an average of nearly 15 years teaching at the university level implying that faculty generally have ample opportunity to conduct SoTL research.

The second objective of this study was to describe faculty participation, perceived impact, and value of SoTL for improving teaching and in the promotion and tenure process by rank. Study has shown varying levels of acceptance of SoTL across disciplines and the findings of this study deem to support that research (Whitman & Richlin, 2007). It was concluded that faculty, regardless of rank are largely unengaged in SoTL. According to Fishbein and Ajzen (1975) this would seem to suggest that faculty beliefs and evaluations about the reward derived from participation in SoTL are not great enough to warrant conducting this form of inquiry. Additionally, research seems to support the suggestion that perhaps this is due to a sense that there is no reward for conducting such research, or because faculty are unaware of what SoTL is and therefore unaware of potential involvement (Maxwell & Ball, 2009)

The findings of this study further indicate that faculty at the associate professor and professor rank are neutral when asked what impact conducting SoTL research would have on their career. Assistant professors indicated that conducting this research would be positive for

their careers. It was concluded that there is a great deal of opportunity in terms of improving the status of SoTL, especially with faculty at the assistant level who appear to be slightly more positive about the value of this type of research.

While generally speaking, faculty across ranks hold neutral to slightly positive views on the impact SoTL would have on their career and the value you of SoTL for improving teaching, they were neutral about its value in the promotion and tenure process. It is intriguing that assistant and associate professors felt that SoTL would have a positive impact on their career yet they were neutral regarding the value of SoTL research in the promotion and tenure process. It was previously reported that a majority of faculty feel that SoTL is a "real" form of scholarship (Maxwell & Ball, 2009). Despite this, faculty across ranks were neutral in terms of the perceived value of this type of research in the promotion and tenure process. The findings seem to imply that a potential disconnect between what activities junior faculty feel will positively impact their career and what activities will be rewarded during the promotion and tenure process seems to exist. The implication of this finding is that if participation in SoTL research is to increase, faculty members must feel that they will be rewarded for their efforts.

While it might be intuitive to assume that faculty members of higher ranks would be more involved in the SoTL, the results of this study do not support this anecdotal claim. Faculty holding the rank of professor participate in the SoTL less frequently than faculty at lower ranks and are less positive about its impact and value (see Table 5). It can be posited that this lack of participation is a result of professors beliefs and expectations about the value of conducting SoTL research (Fishbein & Ajzen, 1975). Once again this seems to present an interesting situation. While faculty of lower ranks are more involved and feel that SoTL can positively impact their careers, faculty at the professor rank, who will be evaluating their junior counterparts teaching and research do not seem to share their views. This seems to imply that those charged with evaluating promotion and tenure dossiers place less value than SoTL type research. This would appear to suggest a shift in the views among faculty regarding what constitutes scholarship.

The final objective of the study sought to describe the relationship between selected variables and the total number of years respondents had been teaching at the university level. A very low, negative correlation (r_{pb} = -.01) was found between participation in SoTL and faculty years teaching, when using effect size descriptors from Bartz (1999), suggesting that the longer a faculty member has been teaching at the university the less engaged in SoTL they are likely to believe. This finding was not surprising when compared with the results of objective two that showed that faculty across ranks were largely unengaged in SoTL with faculty holding the rank of professor having the highest percentage of respondents indicating they had never conducted SoTL research. It was concluded from this finding that while a very low relationship may exist, there does not appear to be a practical relationship between participation in SoTL and years teaching.

While no relationship between years teaching and participation in SoTL was found, once again using effect size descriptors taken from Bartz (1999), it was determined that a very low, negative relationship exists between the years of teaching experience a faculty member has and their perceptions regarding the impact SoTL could have on their career as well as its value in

terms of improving teaching and in the promotion and tenure process. Although very low in effect size, it was concluded from this finding that as faculty members accrue more years of teaching experience their perceptions of the impact and value of SoTL become less positive.

Recommendations

It is recommended that faculty professional development be directed towards junior faculty to further cultivate their support for this type of inquiry. Workshops on SoTL as well as formation of SoTL workgroups could provide much needed support to faculty interested in conducting this type of research. Future research should address faculty preferences in terms of topics of interest related to SoTL and preferred methods of professional development delivery. It is further recommended that research be conducted to gain a clearer understanding of faculty attitudes and perceptions of the value of SoTL so that more focused professional development can be provided to meet faculty needs. Additionally, it is recommended that greater resources in general be devoted to supporting faculty who engage in SoTL.

As previously concluded, there appears to be a difference in perceptions of the value of SoTL research between junior faculty and those holding the rank of professor. As a result it is recommended that further research focus on the promotion and tenure process. Specifically, study should focus on better understanding the discrepancy that seems to exist between faculty perceptions of the impact that SoTL can have on their career verses it value in the promotion and tenure process.

Finally, it is recommended that further study be directed at identifying relationships between participation in SoTL and other variables in order to better understand faculty involvement or lack thereof in this type of study. Efforts should be made to more clearly measure faculty perceptions and to more specifically identify their evaluations of the value of SoTL. Additionally, study should seek to include faculty from multiple institutions to more accurately represent the population of interest.

This study was undertaken to further explain faculty participation in and perceptions about the value of the Scholarship of Teaching and Learning. The results, while descriptive in nature and limited to this specific population seem to provide ample areas for future study. They also seem to indicate the need for faculty development initiatives focused on increasing participation in SoTL as well as improving its status when compared to more traditional, discipline based inquiry. Additional study regarding differences in faculty perceptions across rank and years of service are warranted. It is clear that much more work is needed to accurately determine the status of the SoTL across disciplines and universities. Previous studies have indicated, and these results seem to support findings indicating a very wide range of participation in the SoTL (Whitman & Richlin, 2007). It is hoped that this baseline data will serve as a springboard for future studies about the Scholarship of Teaching and Learning.

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The Community Problems and Local Program Transformations of Vocational Agriculture before the Vocational Education Act of 1963

Chair/Discussant Comments by
Steven R. Harbstreit, Kansas State University

The discussant is not an expert or does he claim to be regarding historical research but found this article intriguing. As we mature (nice way of saying getting old) we find that many problems we have faced in the past are either still with us or have a new twist. It is important to know where we have been in order for us not to repeat some of the mistakes of earlier times. To quote old saying "Those who do not know their History are bound to repeat it". This then, becomes the value of this research.

The authors do a good job of introducing the problem and need for this study. The purpose was to examine the state of vocational agriculture at the local level before the passage of the Vocational Education Act of 1963. Guiding questions were: What were the specific demographic, economic, or cultural problems of local vocational agriculture programs prior to the passage of the Vocational Education Act of 1963; and What were the local program transformations that occurred in vocational agriculture programs in response to the identified problems?

The methods used were appropriate and employed triangulation by examining multiple forms of data from a variety of sources. The authors identified two problems and three transformations that occurred that fundamentally changed "vocational agriculture". Problem 1: The Rise of Urban and Suburban Agriculture, Problem 2: The Disappearance of Farm Boys and the Emergence of the Town Boys, Transformation 1: The Rise of Agriculturally-Related Occupations, Transformation 2: Placement and Non-Production Agricultural Experiences, and Transformation 3: States Respond.

The authors do a good job in summarizing their research and putting it into perspective. The 1963 Vocational Education Act was developed in response to major changes that were occurring in vocational education at the time. In short, it was reactive rather than being proactive in nature. Does this ring a bell? What has the current educational system and more importantly, agricultural education, done to response to recently adopted educational legislation (NCLB). Are we developing programs in agricultural education the meet the needs of students today in the vastly different economic situation and culture we in which we find ourselves. Some food for thought! The authors are to be commended for their interest in historical research and encouraged to continue their efforts.

Reform Considerations for an Agricultural Teacher Education Program: A Case Study

Chair/Discussant Comments by
Steven R. Harbstreit, Kansas State University

The authors do an excellent job in the introduction at laying the groundwork for the need for the study. The theoretical framework to guide the research is well grounded and forms the underpinnings for this research. The need for qualified agriculture teachers is well documented as well as issues related to the recruitment and retention of teachers in the profession.

The purpose of this study was to utilize stakeholder groups identified in the AENLC conceptual model to determine high-leverage strengths and areas of improvement in order to guide the program reform process. Objectives used in this study were to: Identify the key characteristics of the local agricultural teacher education program; Define the perceived high-leverage strengths and areas of growth for the local program; and to Identify recommendations to improve the agricultural teacher education program.

The methods used were appropriate and well documented. The results were well presented and easy to read and understand. The results fell into five categories: Faculty Recruitment and Retention; Courses and Curriculum changes needed; Certification Options; Student Professional Development; and Student Recruitment. The conclusions followed the research questions and were supported by the findings.

So, from a practical standpoint, how do we get the changes identified implemented into programs of agricultural teacher education? Are they all appropriate for every state? How do we get state licensure and national accrediting agencies to change their standards to fit the needs of today's pre-service teachers and beginning teachers. How do we get agricultural teacher education to embrace these identified changes?

The authors are to be commended for taking on this area of research. There are no easy answers and as we all know, transformation and change are not always easy or welcomed.

What is the Value of the Scholarship of Teaching and Learning?

Chair/Discussant Comments by
Steven R. Harbstreit, Kansas State University

The authors are to be commended for focusing on an area of research in higher education that is coming under more scrutiny in many universities. The scholarship of teaching and learning is being recognized as critical to engaging students in the learning process and helping students to connect their learning with their potential careers.

The authors do an excellent job of laying the groundwork for why this study needs to be done. They cite several sources and identify several problems concerned with why the scholarship of teaching and learning should be important to faculty, students and universities. They do a thorough job of developing the conceptual framework and identify the Expectancy Value Model as the theory behind their research.

The purpose of the study was to determine faculty members' participation in and perceptions of the Scholarship of Teaching and Learning (SoTL). Objectives used in this study were to: Describe faculty members' rank and years of teaching; Describe faculty members' participation, the perceived impact, and value of SoTL for improving teaching and in the promotion and tenure process by rank and by years of teaching.

The methods and procedures used were appropriate and well documented. The results provided data in an easily understood fashion with appropriate tables that clearly provided a visual explanation. The conclusions are closely linked to the findings and reported by objective. In addition, the conclusions were supported by the findings and tie to the research foundation and lead to appropriate recommendations and implications.

While reading this article, some practical questions arose. This study found faculty are largely not engaged in the Scholarship of Teaching and Learning. So what can be done to change the culture of colleges and universities so that value is associated with SoTL? Should changes be made to promotion and tenure documents that will make it possible for "alternative forms of scholarship" to be perceived as having value? If so, how do we get this to happen? What outside influences (i.e. students, parents, etc.) may provide additional influence to change the emphasis placed on SoTL? The authors are to be commended for an excellent, well written paper.

Effects of Inquiry-based Agriscience Instruction on Student Achievement

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Abstract

Testing to build research-based evidence to support teaching methodologies that promote student learning has become increasingly important in a standards-based educational system in the United States. One challenge is the lack of studies that support specific methodologies so teachers and administers can make professional development and curricular decisions. This quasi-experimental study investigated the effect of two teaching methods on student content knowledge achievement. Inquiry-based instruction was compared to the subject matter approach in 15 agriscience education classes found within seven different secondary schools across the United States. Utilizing student pretest score as a covariate, there was a statistically significant difference between groups on the posttest. Those students taught through inquiry-based instruction were reported as having higher content knowledge achievement than students taught through the subject matter approach.

Introduction

National trends of student achievement in the United States have been recorded by the federal government through the National Center for Education Statistics (NCES) since 1969. The NCES assesses students in the areas of science, math, and reading at ages 9, 13, and 17. Throughout the 1970s the NCES reported declining scores in each area that led to a renewed focus on academics through what was referred to as a back-to-the-basics approach. The back-to-the-basics agenda progressed through the 1980s (NCES, 2000). In response to *A Nation at Risk* (NCEE, 1983) secondary schools adopted higher graduation requirements in the areas of English, math and science. Progression of student-driven achievement during the 1990s led to the establishment of academic standards and goals, and the NCES (2000) reported stable performance in the science and math subjects and modest gains in reading for all learners. In the early twenty-first century, No Child Left Behind (NCLB) legislation was passed and has remained a driving factor in measuring student achievement (USDE, 2009). Math and reading scores continue to increase among children, and achievement gaps show trends of closing across race and gender (NCES, 2008). Meanwhile science achievement has become stagnant and has even declined since 1996 (USDE, 2009). In 2000, 82% of the nation's 12th graders performed below the proficient level on the NAEP science assessment. According to the International Mathematics & Science Study, "the longer students stay in the current system the worse they do" (USDE, 2009, paragraph 3).

The USDE (2009) has called for scientific studies that prove the best ways to teach science and have indicated America's teachers must use only research-supported teaching methods. Efforts to provide research-based evidence have produced research in the areas of teaching and learning with experimental designs based on standardized testing (Anderson, 2002). Previous studies conducted that compared teaching methodologies in the agricultural education profession have reported mixed results. Boone (1990), Dyer (1995), Enderlin and Osborne (1992), Flowers (1986), Myers (2004), and Roegge and Russell (1990) all reported either low student

achievement scores or inconsistent treatment effects from their studies, leading to mixed findings.

The National Research Council (NRC) reports (1996; 2000) called for inquiry-based methods that led to current reforms and an increased emphasis on inquiry in science curricula. Inquiry has been identified as a teaching and learning method that provides learners with motivation to learn and develop skills to be successful throughout life (Dewey, 1910; Lederman, 1998). NRC explained that students benefit by learning science through authentic investigations similar to those conducted by professional scientists. In theory, with the placement of science in a context through inquiry-based instruction, teachers and students begin to develop their approach to science, and this investigative learning leads to greater understanding (NRC, 2000).

The National Research Agenda (NRA) (Osborne, n.d.) for agricultural education addressed the call by the NRC and outlined areas of research importance. The NRA's fifth research priority area in the section of agricultural education in schools is to "determine the effects of agricultural instruction" (p.21). When enhancing agricultural education programs and student achievement and performance, the goals of science education must be considered. Improved programs and student achievement will allow agriscience classrooms to implement curricula that are better suited for changing student needs.

Common ground exists between agricultural education and science education in addition to enhanced student science achievement. Student enrollment in agriscience courses provides an additional science-based course. Agricultural classes commonly receive science credit toward high school graduation (Connors & Elliot, 1995; Thoron & Myers, 2008). Thompson (1998) studied the results of agriscience in public schools and concluded that the integration of science will "academically strengthen vocational courses and make academic courses more relevant" (p. 77). A continued need exists for all elective subjects, including agriculture, to demonstrate value and contributions to student achievement in core subjects such as science (Odden, 1991). Studies have shown that agriscience students are more successful in state science exams than students not enrolled in agriscience education (Conners & Elliot 1995; Chiasson & Burnett 2001).

Traditional teaching methods are not satisfying the needs of individuals entering careers in agriculture, attending major universities, or pursuing other postsecondary education endeavors (NRC, 1996, 2009). The NRC (2000) stated that inquiry-based instruction is the optimal tool to provide students with the ability to transfer knowledge to real-world applications. Continued progress to provide evidence that agriculture contains science in secondary classrooms across the nation must be supported by emerging research that calls attention to this matter. As agriscience education highlights its science concepts, the teaching methods utilized in science education need to be investigated. The problem investigated in this study was the continuing lag in student science achievement scores (USDE, 2009) by secondary school students in the United States. There remains a need to determine if and how secondary agricultural education programs can help address this national concern.

Theoretical/Conceptual Framework

Figure 1 depicts the conceptual model used to guide this study and explain inquiry-based instruction. The model represents the interactions taking place in an inquiry-based classroom. There is a significant amount of student-to-student interaction during inquiry-based instruction (IBI). Students will draw upon each other's experiences during the inquiry. There is also the social and cultural context that occurs during inquiry-based instruction. When using IBI learners will develop a better understating of how to communicate with peer learners who have a different background than theirs (NRC, 2000). The social-cultural interactions that students have during this teaching method may lead to better communication skill sets and appreciation for different opinions.

Inquiry-based instruction promotes student-to-teacher contact. As in many cases, the teacher will act as the facilitator and aid the learners' thinking, thus explaining the instructor-to-student role seen in Figure 1. Another portion of the model is teacher preparation, skill, and knowledge. During inquiry-based instruction the teacher does not need to be aware of all the potentially correct answers. The teacher does need to facilitate learning, have a strong foundation, and know where to guide students to find the required information during their inquiry (NRC, 2000). Finally, a goal of the study was to utilize all interactions of inquiry-based instruction of the model and measure the effectiveness of the inquiry method in knowledge-based achievement.

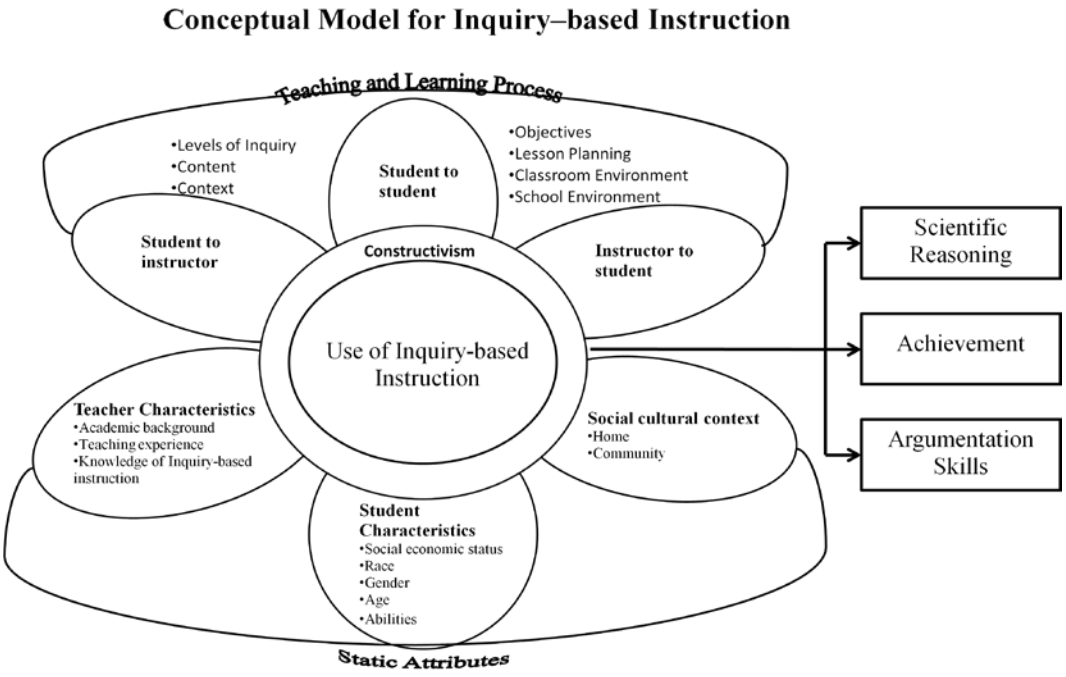

Figure 1. Theoretical model for the effects of inquiry-based instruction.

Purpose/Objectives/Hypotheses

The purpose of this study was to determine the effects of teaching method on student content knowledge achievement of high school agriscience students. Content knowledge is defined as students' ability measures on a standardized assessment. The specific objectives guiding the study were to:

1. Ascertain the effects of inquiry-based instruction on content knowledge achievement of high school agriscience students.
2. Examine the relationship between content knowledge achievement, ethnicity, gender, year in school, and socio-economic status of high school agriscience students.

The null hypothesis, H_o: no significant difference in student content knowledge achievement based upon the teaching method (inquiry-based teaching or subject matter approach), guided the analysis of the first objective.

Methods

Population and Sample

The population for this study was United States secondary school agriscience students. The accessible population was students of National Agriscience Teacher Ambassador Academy (NATAA) participants. A purposive sample was selected according to the ability of the teacher to effectively deliver both teaching methodologies under investigation, familiarity with the content of the units of instruction, and having two sections of the same class for investigation. All teachers were identified as highly qualified teachers prior to being selected to participate in the NATAA. Each teacher was selected to participate in the NATAA professional development by their state's FFA executive secretary and/or their state's agricultural education specialist (L. Gossen, personal communication, October, 26, 2008). The population of this study was composed of students (N = 437) at ten schools taught by NATTA participants.

Research Design

The independent variable in this study was the teaching method used in the agricultural education classes. Treatment groups utilized a subject matter approach or inquiry approach to learning. The dependent variable in this study was student content knowledge achievement. Covariates were used to adjust group means in order to compensate for previous knowledge in the subject matter. These covariate measures included pretests for the unit of instruction. This study utilized a quasi-experimental design because random assignment of subjects to treatment groups was not possible (Campbell & Stanley, 1963). Additionally, intact groups were used. Gall, Borg, and Gall (1996) stated that all groups may receive a treatment in the nonequivalent control group design. Gall, Borg, and Gall stated that the only essential features of this type of design are nonrandom assignment of subjects to groups and administration of a pretest and posttest to all groups.

Campbell and Stanley (1963) noted regression as a concern but explained that the risk of regression during a pretest-posttest procedure can be minimized if subjects are not selected on extreme scores. To address Campbell and Stanley's concern the teaching methods were randomly assigned to the intact groups (classes). The greatest threat of interaction in this design type is that the differences found in the posttest are due to preexisting group differences, rather than due to the treatment (Gall, Borg, & Gall 1996). The use of multiple classroom settings in this study reduced the risk of interaction of subjects, and the use of covariates of content knowledge achievement pretest scores to statistically adjust the means on the posttest and randomization of pretest and posttest questions addressed the interaction concern. Students in the agriscience classes included in the study were taught all lessons with the same method. Students completed the pretest assessment for the upcoming content that followed over the next two

weeks. Each student then took a posttest immediately following the instruction, followed by the pretest for the next segment of the content taught. The units were designed to require a total of 12 weeks to complete. There were a total of 7 pretests and posttests.

IBI	O_1	X_1	O_2	O_3	X_2	$O_4 \ldots O_7$
SM	O_1	X_1	O_2	O_3	X_2	$O_4 \ldots O_7$

Unit of Instruction Plans

Content selection is also a concern with conducting a study utilizing specific teaching methods (Myers, 2004). The content and context of the lessons for both the subject-matter and inquiry-based lessons were deemed appropriate by a panel of experts. Seven units of instruction that addressed the soil and plant science portion of the National Agriscience Content Standards for an agriscience course in the United States (CAERT, 2008) were selected by the researcher from the Animal, Plant, and Soil Science curriculum developed by Center for Agricultural and Environmental Research and Training, Inc. (CAERT). For the subject-matter approach (control) the CAERT lesson plans were utilized. For the inquiry-based approach (treatment) the CAERT lesson plans were adapted by the researcher to provide for inquiry-based instructional methods. The instructional plans were evaluated for content validity by a panel of experts from the Agricultural Education and Communication Department and the School of Teaching and Learning at the University of Florida. The panel determined that the inquiry-based and subject matter lessons were appropriate for the grade levels and deemed the lessons appropriate for inquiry and subject matter approaches.

Procedures

Boone (1988) suggested that when conducting teaching methodological studies and teachers are delivering the treatments, precautions need to be taken to ensure conformity to teaching the approach under investigation. Boone recommended professional development to prepare teachers to properly deliver the treatment. This study addressed Boone's recommendation by selecting from among teachers who were involved in NATAA professional development program. The NATAA is a five-day intensive professional development training on the inquiry-based instructional method. In addition to the five-day professional development in-service training, each teacher participating in the study received a researcher-developed audio tutorial that further explained the teaching methods and general information for participation in the study. Teachers were provided lesson plans, handouts, assessment instruments, worksheets, and supplemental items by the researcher so that the teacher could deliver the assigned treatments effectively.

To ensure utilization and adherence to the assigned treatment, each teacher presentation was audio taped and analyzed by the researcher. The Science Teaching Inquiry Rubric (STIR) (Bodzin & Cates, 2002) was used to determine the level at which inquiry was utilized. Following Dyer (1995) and Myers' (2004) procedures, the first class period and two other randomly selected classes were evaluated. The level of STIR was determined *a priori* that a mean greater than 2.5 on a 5 point scale would be essential to ensure that each treatment was delivered using the prescribed method. Students attending classes, in which the teaching method was not appropriately delivered, as determined by the STIR, would be removed from the sample. The researcher determined *a priori*, based on a study conducted by Thoron and Myers (2009), that

students missing more than 25% of the instructional time during the study would be removed from the sample.

Instrumentation

In order to measure student prior content knowledge and establish base-line knowledge for each group, the researcher designed a content knowledge pretest and posttest for each unit of instruction. All tests were similar in design and difficulty. Pretests and posttests for each achievement measurement remained the same, and questions were randomly ordered for each student each time the assessment was proctored. Teaching objectives were used as the basis for constructing the instruments. Lesson matrices were developed to verify that each objective included in the lesson plans was properly assessed in the instruments. A panel of experts from the University of Florida was used to determine face and content validity of the instruments. The instruments were determined to be valid. Data were collected electronically through student-completed assessments using the MYCAERT electronic testing system. The assessments were immediately scored by the computer system. Correct and incorrect answers and scores on the pretests were withheld from the students.

Prior to the study a coefficient alpha for the dichotomous data of the content knowledge achievement exams was calculated through a pilot test to assess reliability of the instruments. The posttest questions were asked in a randomly selected order to reduce testing effect (Campbell & Stanley, 1963). Test-retest reliability was calculated with a summated test score mean of 49.4% for content knowledge achievement (CKA) one, 50.0% for CKA two, 47.8% for CKA three, 48.2% for CKA four, 56.9% for CKA five, 45.3% for CKA six, and 57.5% for CKA seven. Reliability coefficients for the content knowledge achievement instruments were calculated using Kuder-Richardson 20 (KR20) for dichotomous data (Gall, Borg, & Gall, 1996). The instruments were determined to have a coefficient alpha of .94, .93, .91, .86, .87, .89, and .91 respectively.

Findings

The results address the objectives and hypothesis of the study in determining the influence of teaching method, gender, ethnicity, social economic status, and year in school on student achievement. The total group consisted of 437 students from ten different schools across the United States. Two teachers sustained health issues (one personal and one family) and another teacher was reassigned a new teaching role after the first week of the study, therefore 109 students were removed from the study due to non-participation or inability to complete the study. Twenty-three students were removed from the study due to missing 25% or more of the instructional sessions. Audio recordings of the administered units were scored using the STIR rubric to determine the level of inquiry investigation by students in the inquiry-based treatment group and that inquiry was not being delivered in the traditional treatment group. The STIR has been reported to have an overall correlation of r =.58 with a perfect correlation between two raters of r =1.00, establishing the STIR as an effective analysis tool (Bodzin & Beerer, 2003). It was determined that all seven teachers effectively delivered both forms of instruction.

After removal of participants unable to complete the study and students missing more than 25% of the instructional time, the original sample was reduced to n = 305. This equates to a 30.21%

mortality rate for this study. Previous experimental studies in agricultural education using intact classes reported similar or higher mortality rates (Boone, 1988; Dyer, 1995; Flowers, 1986; Myers, 2004) and Jurs and Glass (1971) described mortality rates may be as high as 50%.

Participant ethnicity was categorized into the groups of White (non-Hispanic), Black, Hispanic, and Other. The majority of students participating in this study were categorized as White (81.6%). The ethnicity of each of the treatments was similar to the ethnicity of the entire sample (see Table 1). The majority of the participants in this study (58.0%) were male. The treatment groups were similar to each other as inquiry-based instruction (IBI) contained 57.6% male and subject matter (SM) contained 58.5% male participants. Inquiry-based instruction yielded 170 participants and subject matter contained 135 students.

Of the 305 participants who reported grade level data, 48.5% (n = 148) were in the ninth grade. The remainder of the participants were either in tenth grade (n = 134, 44.0%), or eleventh grade (n = 23, 7.5%). There were no twelfth-grade students in the study. Grade level distribution by treatment groups varied little from that of the overall sample. Slightly more than 50% of the students in the inquiry-based group were in the ninth grade as compared to approximately 45% in the subject matter group. Treatment groups were similar in terms of grade level (Table 1).

Socio-economic status (SES) was determined by ability to participate in the national free and reduced school lunch program (Stone & Lane, 2003). Therefore, SES was categorized in the groups of non ability to participate, ability to receive reduced lunch, and ability to receive free lunch. The majority of the students participating in this study (72.5%) were not able to participate in the national school lunch program with 16.7% able to receive a reduced price in the school lunch program (Table 1). Treatment groups were similar in terms of SES.

Table 1. *Participant Ethnicity, Grade Level, and Socio-Economic Status (n = 305)*

	Treatment Group				Total	
	IBI		SM			
	n	%	*N*	%	*N*	%
Ethnicity:						
White, non-Hispanic	139	81.8	110	81.5	249	81.6
Black	8	4.7	5	3.7	13	4.3
Hispanic	16	9.4	15	11.1	31	10.2
Other	7	4.1	5	3.7	12	3.9
Grade Level:						
Ninth	87	51.2	61	45.2	148	48.5
Tenth	69	40.6	65	48.1	134	44.0
Eleventh	14	8.2	9	6.7	23	7.5
SES:						
Not a participant	122	71.8	99	73.3	221	72.5
Reduced lunch	26	15.3	25	18.5	51	16.7
Free lunch	22	12.9	11	8.1	33	10.8

Note. IBI = Inquiry-based instruction; SM = Subject Matter

The first objective sought to ascertain the effects of inquiry-based instruction on student content knowledge achievement of high school agriscience students. Each student's content knowledge

achievement was determined using the researcher-developed content knowledge achievement instruments. The maximum possible score on these instruments was 100. Pretest data were collected from 305 participants (100%) with an overall mean of 36.04 (SD = 12.18) for instrument one; 35.88 (SD = 13.41) for instrument two; 31.46 (SD = 11.66) for instrument three; 35.74 (SD = 13.47) for instrument four; 35.89 (SD = 12.27) for instrument five; 34.30 (SD = 13.79) for instrument six; 29.63 (SD = 12.18) for instrument seven (see Table 2). Although the IBI treatment group achieved similar mean content knowledge scores and similar standard deviations as the SM treatment group, the subject matter group achieved higher pretest mean scores and standard deviations on all instruments with the exception of instrument four.

Table 2. *Participant Mean Pretest Scores (n = 305)*

	Treatment Group					
	IBI		SM		Total	
Content Knowledge Instrument	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	35.57	11.68	36.64	12.80	36.04	12.18
2	35.72	12.78	36.09	14.20	35.88	13.41
3	31.20	11.06	31.79	12.40	31.46	11.66
4	36.19	13.88	35.17	12.96	35.74	13.47
5	35.82	11.89	35.97	12.77	35.89	12.27
6	33.72	13.78	35.02	13.83	34.30	13.79
7	29.27	11.74	30.07	12.75	29.63	12.18

Note. IBI = Inquiry-based instruction; SM = Subject Matter

Posttest data were collected from 305 students. The overall mean of content knowledge achievement posttest was 62.13 (SD = 17.71) for instrument one; 63.15 (SD = 16.94) for instrument two; 64.77 (SD = 16.86) for instrument three; 70.66 (SD = 15.70) for instrument four; 70.66 (SD = 17.28) for instrument five; 72.07 (SD = 17.11) for instrument six; 72.63 (SD = 16.59) for instrument seven. IBI recorded consistently higher mean scores on all content knowledge achievement instruments and lower standard deviations on six of the seven content knowledge achievement instruments than SM instruction (see Table 3).

Table 3. *Participant Mean Posttest Scores (n = 305)*

	Treatment Group					
	IBI (*n* = 170)		SM (*n* = 135)		Total (*n* = 305)	
Content Knowledge Instrument	*M*	*SD*	*M*	*SD*	*M*	*SD*
1	63.49	17.86	60.43	17.44	62.13	17.71
2	66.24	14.86	59.26	18.57	63.15	16.94
3	68.26	15.86	60.39	17.11	64.77	16.86
4	76.82	13.67	62.90	14.66	70.66	15.70
5	79.04	12.74	60.10	16.48	70.66	17.28
6	81.64	10.32	60.00	16.35	72.07	17.11
7	80.68	10.61	62.49	17.23	72.63	16.59

Note. IBI = Inquiry-based instruction; SM = Subject Matter

Objective two examined the relationship between content knowledge achievement, ethnicity, gender, year in school, and socio-economic status of high school agriscience students. Prior to any inferential analysis of the data, all variables were examined for correlations. For the purpose of discussion, the terminology proposed by Davis (1971) was used to indicate the magnitude of the correlations. Pearson Product Moment correlations were used to determine the relationships between the variables (see Table 4).

Content knowledge posttest scores were found to have moderate to substantial relationships with other posttests ranging from $r = .34$ to $r = .59$ with the exception of posttest one. Posttest one had negligible to low correlations with all variables. The treatment variable was found to have moderate or substantial correlation with four of the seven content knowledge posttests. The demographic variables of year in school (grade), gender, ethnicity, and SES contained negligible relationships with posttests and type of treatment (inquiry-based instruction and subject-matter approach). One relationship was determined to be low between Posttest two and year in school.

Table 4. *Correlations of variables*

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Posttest 1	--	.05	.18	.07	.17	.16	.10	.11	-.02	-.05	.01	-.09
2. Posttest 2		--	.34	.28	.35	.37	.30	.26	-.00	-.08	.02	-.21
3. Posttest 3			--	.41	.42	.37	.43	-.03	-.01	-.10	.00	-.23
4. Posttest 4				--	.59	.45	.35	.08	.05	-.12	.01	-.44
5. Posttest 5					--	.54	.49	.08	-.01	-.07	.05	-.55
6. Posttest 6						--	.46	.03	.00	-.08	.07	-.63
7. Posttest 7							--	.17	-.05	-.03	.03	-.55
8. Grade								--	-.03	-.04	-.06	.04
9. Gender									--	.03	.11	-.01
10. Ethnicity										--	.05	.01
11. SES											--	-.05
12. Treatment												--

Note. Posttest = Content Knowledge Achievement Exams; Treatment = Teaching method utilized.

The null hypotheses stated there is no significant difference in student content knowledge achievement based upon the teaching method. Student content mean scores were analyzed between groups through analysis of covariance technique. Student pretest score was utilized as a covariate to adjust for achievement prior to the treatment. Following the first instructional period (the first two weeks of the study), students who were taught through inquiry-based instruction (IBI) reported a mean posttest score of 63.49 (SD=17.86) and those taught through the subject matter (SM) had a mean score of 60.43 (SD=17.44) (see Table 5). Table 6 illustrates posttest scores were found to not be statistically significant, $F(4,334) = 2.82$, $p = .09$, $r^2 = .09$.

During the second instruction period, students in the group that was taught through IBI achieved a mean posttest score of 66.24 (SD = 14.86) with the SM group having a mean of 59.26 (SD = 18.57). This difference in posttest scores was found to be statistically significant, $F(19,550) = 17.30$, $p \leq .001$, $r^2 = .20$. For the third instruction period, students in the IBI group recorded a mean score of 68.26 (SD= 15.86) and the SM group recorded a mean score of 63.39 (SD =

17.11). This difference in posttest scores was also found to be a statistically significant, $F(17,256) = 22.08$, $p \leq .001$, $r^2 = .15$. During the fourth session of content students in the IBI group had a mean score of 76.82 (SD = 13.67) and the SM group scored a mean score of 62.90 (SD = 14.66). This difference in mean posttest scores was statistically significant, $F(16,849) = 73.43$, $p \leq .001$, $r^2 = .44$ During the fifth portion of the study, IBI students reported a mean score of 79.04 (SD = 12.74) while students learning under SM reported a mean score of 60.10 (SD = 16.35). The difference in posttest scores for the fifth assessment were found to be statistically significant, $F(27,956) = 129.94$, $p \leq .001$, $r^2 = .54$. For the sixth instructional unit, students in the group that was taught through IBI had a mean posttest score of 81.64 (SD = 10.32) and the SM group having a mean of 60.00 (SD = 16.35). This difference in posttest scores was found to be statistically significant, $F(41,219) = 230.72$, $p \leq .001$, $r^2 = .62$. Finally, the seventh instructional unit, students in the IBI group recorded a mean score of 80.68 (SD= 10.61) and the SM group recorded a mean score of 62.49 (SD = 17.23). This difference in posttest scores was also found to be a statistically significant, $F(26,626) = 133.96$, $p \leq .001$, $r^2 = .54$. Based upon these findings, the null hypothesis of no difference in content knowledge achievement due to teaching method was rejected.

Table 5. *Content Knowledge Posttest Scores by Treatment (n = 305)*

	Treatment Group			
	IBI		SM	
Content Knowledge Instrument	*M*	*SD*	*M*	*SD*
1	63.49	17.86	60.43	17.44
2	66.24	14.86	59.26	18.57
3	68.26	15.86	60.39	17.11
4	76.82	13.67	62.90	14.66
5	79.04	12.74	60.10	16.48
6	81.64	10.32	60.00	16.35
7	80.68	10.61	62.49	17.23

Note. IBI = Inquiry-based instruction; SM = Subject Matter

Table 6. *Univariate Analysis of Treatment Effects for Content Knowledge*

Source	*df*	*F*	*P*
CKP 1	2	2.82	.09
CKP 2	2	17.30	≤.001
CKP 3	2	22.08	≤.001
CKP 4	2	73.43	≤.001
CKP 5	2	129.94	≤.001
CKP 6	2	230.72	≤.001
CKP 7	2	133.96	≤.001

Note. CKP = Content Knowledge Posttest

Conclusions

Based on the results of this study, there are four conclusions: 1) participants were primarily White (81.6%), male (58%), enrolled in the ninth grade (48.5%), and did not qualify for free or

reduced lunch programs (72.5%). Minorities comprised 18.4%, tenth graders encompassed 44%, and 27.5% of the participants qualified for some form of meal support; 2) IBI and SM group's ethnicity, gender, grade level, and socio-economic status were similar and when taught using either IBI or SM approaches; 3) When taught with either teaching approach students showed gains in content knowledge on assessments. Inquiry-based instruction reported increased scores over students taught through the subject matter approach; and 4) Students taught using inquiry-based instruction scored higher on content knowledge assessments as compared to students taught using the subject matter approach.

Discussion/Implications

This study presents findings which indicate this form of inquiry-based instruction is effective in the agriscience classroom in increasing student content knowledge achievement. Previous studies conducted that compared teaching methodologies in the agricultural education profession have reported mixed results. Boone (1990), Dyer (1995), Enderlin and Osborne (1999), Flowers (1986), Myers (2004), and Roegge and Russell (1990) all reported either low student achievement scores or inconsistent treatment effects from their studies, leading to mixed findings. This study differs from the previously mentioned studies based on the following: 1) the preparation the teachers received prior to implementation of the study, 2) the length of the study, 3) the method of data collection, and 4) how the study was managed.

The preparation the teachers in the study received was an intense week of professional development through the NATAA. Teachers were taught the basics of inquiry-based instruction, were able to apply their skills through hands-on application of the method, and reflected and related the content to the curriculum they currently teach. Following the preparation NATAA teachers presented workshops at the National FFA Convention and NAAE conference. This form of professional development is ideal to focus the teachers' attention on the topic, allow them to utilize and experiment with the curriculum, and provide reflection with peers on effective utilization in their local curriculum. The NATAA teachers then taught at least one school year utilizing inquiry-based instruction before this study was conducted. Previous studies addressed professional development in a variety of ways, from asking teachers if they could teach the method, to conducting a one-day workshop on the specific teaching strategy. The amount of time spent in professional development and allowing teachers to experiment and become comfortable with the teaching method likely impacted the results of this study.

The length of this study is another factor that differed from previous studies that investigated teaching methods in a quasi-experimental design. Previous studies ranged from four to eight weeks of treatment. Had the treatment included only the two weeks of instruction prior to the beginning of this study and the first posttest result (four weeks total), this study would probably not found a treatment effect. By expanding the study to eight weeks, the researcher would have had to conclude mixed results at best, perhaps reporting four weeks of no significant difference in student achievement and four weeks (2 assessments each) of significant difference in student achievement scores. The delay in starting the study for two weeks to allow for students to adjust to inquiry-based instruction is an important consideration for future research that investigates teaching methodology. Finally, over the course of the twelve-week investigation, scores for the inquiry-based instruction increased at a faster pace than scores for students in the subject matter

group. Examination of ways to expedite the transition for the students will lead to stronger studies in the future.

Data collection was conducted electronically. Electronic forms of assessments and instant data delivered to the researcher allowed for the researcher to gauge the progress of the teachers as lessons were taught. Instant feedback to the researcher was important in keeping teachers on task and troubleshooting any problems that may have occurred. Teachers found the grading system effective, and the electronic format provided students with instant feedback on scores.

The continuous contact with the teachers was also vital to achieving high-quality results. Communication with teachers through a weekly message and supplying contact information for around the clock communication allowed for mentoring the teachers throughout the study, kept them apprised of the steps involved in the process, and provided encouragement and feedback on their teaching. Strong professional development coupled with encouragement and mentorship provided for clear results of this study.

Inquiry-based instruction is a teaching method that advances student achievement and supplies the profession with a sound template for future investigations. In summary, students learn more when teachers are well-prepared to teach the lessons, use a variety of instructional strategies, are given guidance and feedback on their teaching, and promote opportunity for students to spend time-on-task.

Recommendations

Based on the findings of this study, four recommendations were made for teacher educators and curriculum developers in secondary school education: 1) based on the finding that inquiry-based instruction is an effective method to deliver agriscience at the secondary school level, teacher educators should model inquiry-based instruction and provide practice similar to that of the NATAA; 2) Teacher educators should provide in-service education opportunities for current teachers on inquiry-based instruction; 3) Inquiry-based curricula and lesson plans that utilize this form of instruction should be developed to further the use of this teaching method; and 4) teacher educators should provide mentorship to teachers through guidance and feedback on their inquiry-based teaching, using a variety of instructional strategies, developing and teaching well-prepared lessons, and helping promote time-on-task for students.

Based on the findings of this study, three recommendations were made for practitioners in secondary school agriscience education: 1) Strong consideration should be given to attend the NATAA professional development workshops and learn inquiry-based instruction. Efforts to expand NATAA program opportunities nationally for more agriscience teachers are needed, utilizing NATAA teachers as state-wide leaders who can provide professional development at the state level; 2) IBI should be utilized in the agriscience classroom. At least four weeks of instruction or four unique lesson plans should be utilized to allow students to adjust to the new method of instruction; 3) Agriscience teachers with experience and sound knowledge of IBI should mentor teachers who are learning to teach inquiry-based instruction by providing feedback, clarity of content, thinking through potential questions and pitfalls, and sharing ideas.

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Nebraska Urban Environmental and Agricultural Systems Education Program: An Evaluation for Development

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The purpose of this study was to conduct an evaluation for development of an urban environmental and agricultural systems education program for the state of Nebraska through the assessment of school culture. Eight administrators from seven Nebraska school districts were interviewed. The results of the interviews indicated that when describing their school's culture, administrators cited demographic information, post-high school aspiration, and the students' limited awareness of agriculture. As a result, marketing will be vital to the successful incorporation of agriculture into the urban school culture. It was further explained that the proposed program should serve the purpose of preparing students for college and careers, and its structure ought to be characterized by a student interest-driven sequence of and hands-on, science-focused curriculum. Some potential challenges identified were limited resources and justification of program relevancy. Finally, it was also suggested that using agriculture as a context to teach other subjects may be a viable alternative to implementing a specific environmental and agricultural systems program.

Introduction and Conceptual Framework

Is the culture of a larger school in Nebraska accepting of an agricultural education program? Schein (1985) segmented school culture into three levels beginning with *artifacts* (visible organizational structures or processes), next ascending to *espoused beliefs* (strategies, goals, philosophies), and finally arriving at *basic assumptions* (affective beliefs, values and actions). It would seem that all schools would operate within their own contextual cultural setting. However, just in the contextual difference of size of school population, are there cultural differences which may influence the integration of an agricultural education program? The first step toward answering the question is to conduct an evaluation for development.

The conceptual framework of this study combines the premise of two models. The first is Schein's three levels (*artifacts*, *espoused beliefs*, and *basic assumptions*), and at each level integrates the four dimensional model of Schoen and Teddlie (2008). Schoen and Teddlie asserted that school culture is a context-specific branch of organizational culture comprised of: (1)*professional orientation* (the activities and attitudes that characterize the degree of professionalism present in faculty), (2) *organizational structure* (the type of leadership, communication and process that characterize the way the school conducts business), (3) *quality of the learning environment* (the intellectual merit of the activities, in which students typically engage), and (4) *a student-centered focus* (the collective efforts and programs offered to support student achievement). This model is visually represented by interlocking puzzle pieces to symbolize the overlapping and complementary nature of the four dimensions (see Figure 1).

Agricultural education at the secondary level began in 1917 with the Smith-Hughes Vocational Education Act (National FFA Organization, 2003). The initial programs were created to teach agricultural content to boys who would be returning to the farm. Agricultural careers have

expanded well beyond farming. Current secondary agricultural education focuses on agricultural literacy as well as preparing individuals for agricultural careers. Between 2010 and 2015, 54,400 annual job openings are predicted for individuals with baccalaureate or higher degrees in food, renewable energy, and environmental specialties. Of those jobs, 74 percent are expected in the areas of business and science, 15 percent in agriculture and forestry production, and 11 percent in education, communication, and governmental services (Goecker, Smith, Smith & Goetz, 2010). To provide this educated workforce, agricultural education may be more important now than ever.

In addition to providing an educated workforce, it is important for the American population to be agriculturally literate. Frick, Kahler, and Miller (1991) defined agricultural literacy as, "Possessing knowledge and understanding of our food and fiber system. An individual possessing such knowledge would be able to synthesize, analyze, and communicate basic information about agriculture" (p. 52). In *Understanding Agriculture: New Directions for Education* the National Research Council (1988) reported, "Too many Americans know very little about the social and economic relevance of agriculture in the United States, and agriculture is too important a subject to be taught only to a relatively small proportion of students enrolled in vocational agriculture" (p.1). Now, over 20 years later, this problem is still relevant as indicated by the continuance of research in this area (Reidel, Wilson, Flowers, & Moore, 2007; Warner & Washburn, 2007; Warner & Washburn, 2009). Warner and Washburn (2007) state, "The expansion of agricultural education programs in urban schools can assist in the effort to increase and diversify student enrollment and promote agricultural literacy among urban students" (p.151). In today's society, it is important for individuals to be able to synthesize, analyze and communicate information about agriculture, because these citizens are the ones making policy decisions that affect the agriculture industry.

During the 2007-2008 school year, the majority of Nebraska high school students did not have the opportunity to enroll in agricultural education due to the fact that an agricultural education program was not present in the four largest school districts in Nebraska (Nebraska Department of Education, 2008). Considering that 15 percent of the American workforce is involved in the agriculture industry, whereas every citizen is involved in the consumption of agricultural products, it is of the utmost importance to provide agricultural education opportunities to all students (National FFA Organization, 2009). For Nebraska, this may mean providing agricultural education programs in larger schools.

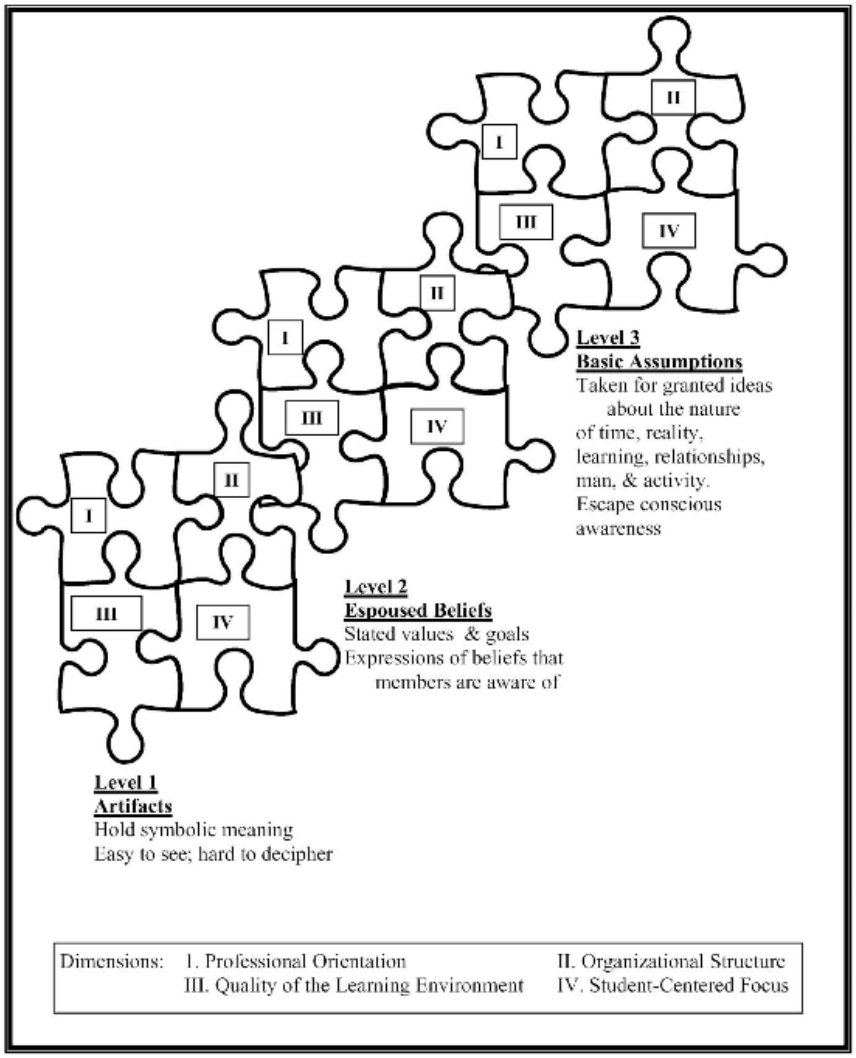
Purpose

The purpose of the present study was to describe necessary characteristics of consideration for an urban secondary environmental and agricultural systems program. The study was carried out by interviewing urban Nebraska public high school administrators whom make curriculum decisions. After evaluation of the data, this study will provide recommendations for an urban Nebraska environmental and agricultural systems education program. This study addresses agricultural education in schools research priority area three, increase access to agricultural education and programming, of the 2007-2010 Agricultural Education and Communication National Research Agenda.

Research Questions

1. How do urban Nebraska public high school administrators describe their school's culture?
2. How would agriculture be included in the urban high school culture?
3. What purpose(s) would a secondary environmental and agricultural systems program serve to urban Nebraska high school students?
4. How would a Nebraska urban secondary environmental and agricultural systems program be structured?

Figure 1. Comprehensive Model of School Culture



Comprehensive Model of School Culture. Adapted from Schoen, L. T., & Teddlie, C. (2008) A new model of school culture: a response to a call for conceptual clarity. *School Effectiveness and School Improvement,* p. 42

Methods/Procedures

To accomplish the objectives of this study, an evaluation for development was conducted. A strong body of research suggests that a needs assessment is the best approach to conduct an

evaluation for development (Owens, 1993). Witkin and Altschuld (1995) defined needs assessment as, "A systematic set of procedures undertaken for the purpose of setting priorities and making decisions about program or organizational improvement and allocations of resources. The priorities are based on identified needs" (p. 4). A needs assessment will collect information on the perceptions and values of stakeholders which will guide the program development.

The population consisted of Nebraska high school administrators within a population center of at least 20,000 people. The sample consisted of purposefully selected key informants from six subpopulations. The subpopulations were determined by grouping schools by location and population. To ensure administrators serving a variety of audiences were interviewed, Omaha and Lincoln area schools were further segmented by the percentage of the student body enrolled in the National School Lunch Program. Administrators were selected as a representative of a subpopulation through the recommendation of the research committee and the state career and technical education specialist. Eight semi-structured, face-to-face interviews were conducted. After agreeing to participate, administrators were mailed an agricultural industry and Nebraska Career Education fact sheet that was generated by the primary researcher and research committee. To maintain confidentially the administrators are identified by pseudonym: School A, School B, School C, School D, School E, School F, School G, and School H.

All individual interviews were audio recorded then transcribed verbatim by the primary researcher. Following transcription, the data was line-by-line analyzed and fragmented into meaningful pieces. After validation by the participating administrators, these meaningful pieces, (also known as codes) were transferred to a master-list organized by research question. Relationships and themes were then identified through the examination of the codes. Validity was maintained by declaring researcher bias, member-checking, and participative feedback. To ensure interpretive validity, main points from the interviews were sent back to participants to be verified. It should be noted that this research was conducted while the primary researcher was involved in a pre-service agricultural education teacher preparation program in Nebraska and is a graduate of an urban secondary agricultural education program in California. The researcher believes that leadership is vital to an agricultural education program and that all members of society should possess a foundation of agricultural knowledge.

Findings/Results

The participating administrators had been involved in curriculum decisions from six to 32 years, with an average of 20 years. Three administrators identified themselves as school principals, the others as district curriculum directors. Three women and five men participated. Three of the eight administrators considered themselves to have agricultural backgrounds. Two of the administrators mentioned they had grown up on a farm, while the third indicated growing up in a small town where agriculture was present. Half of the administrators said that at one time they had been associated with a school that offered an agricultural education program.

Question One: How do urban Nebraska public high school administrators describe their school's culture?

In relation to research question number one, two themes were identified**:** *demographics* and *post-high school activities*. In the description of their school's culture, administrators generally gave a statistic related to the diversity and socio-economics of their student body. School A stated, "We've got 60 percent free and reduced lunch kids in our district." School H claimed the culture of the school has, "[b]een changing significantly over the last five to 10 years. The increasing Latino population is probably the most significant (change). And just the increase in free and reduced lunch, we're over 50 percent. That's probably our most significant demographic." School B stated that, " The school is middle class, Caucasian, we are lacking diversity, but yet I shouldn't say that because when you think about nationwide diversity, it's about 14 to 18 percent and that's about our population."

Six administrators relayed that their students recognize the importance of continuing their education after high school. School D stated, "Most kids here know they have to continue some kind of education." Five administrators indicated that the largest percentage of their students attend a community college after high school, while the second highest percentage of students attend a four-year university. School H explained,

> In terms of academic things, I would say we probably have less kids seeking a four-year degree as their next step. A lot more students go to the community college, driven by a couple things. One obviously financial, but secondly, our counselors are doing a good job about communicating the types of employability that can come through some two-year programs.

The third largest percentage of students seek military opportunities or go into the workforce. School D stated, "We have a few kids join the military afterwards, and some go straight into the workforce, but not very many. Most kids here know they have to continue some kind of education." It should also be noted that multiple administrators mentioned the majority of students seek opportunities after high school close to home. School A indicated,

> One of the things that kind of hinders us, is there's not a lot in this area on the post-secondary side for Ag education. I don't think UNO has a lot of programs. The community college has a horticulture program, but I don't know if they have a pre-vet program. We are working with them on that as far as the traditional Ag program. The kids would have to go to Lincoln, and a lot of our kids, like I said, have never been west of 72nd Street. It's just not a reality, or just not possible for them to envision doing that.

Question Two: How would agriculture be included in the urban high school culture?

Three themes were identified in relation to research question two: *limited awareness of agriculture*, *marketing* and *science relationship*. Administrators did not think the incorporation of agriculture into the urban population would be impossible. School D stated, "You know, it doesn't have to be the whole culture has to accept that this is coming into the school, because it can start out pretty small." The administrators indicated that enrollment might be limited in the beginning stages of the program due to the lack of awareness. Marketing was identified by seven administrators as an important factor contributing to the acceptance of agriculture in the Nebraska urban high school culture. Five administrators also stated that environmental and

agricultural systems courses would be included most easily as part of the science department.

All of the administrators indicated that agriculture was minimally represented in their school's culture. Administrators recognized that their communities are surrounded by agricultural activities, but that the majority of their students do not have a connection. School D stated, "I would say most kids don't have experience with much agriculture at all."In reference to the student body's knowledge of agriculture School A said,

> I mean it's kind of a generation away. It seems like the older people, like in their 40's or 50's, were raised on farms and are now not doing that and we've kind of got a generational gap. I think a lot of our 18-year-old students just didn't have that experience. I think our older population has a pretty good idea of what agricultural education would be, and farming, but our younger kids just don't.

Not only did administrators indicate a limited awareness of agriculture in general, but also a limited awareness of agricultural careers. School G explained that the students have a, "Very limited focus (of agricultural careers). Kind of like a city kid would have. Agriculture is farms, you know, you raise cows and you raise chickens and you grow corn." School F indicated that, "It's just fascinating how complex agriculture really is and what it demands in the terms of thinking and so I don't think our kids have even the beginning sense of that." School G explained, "Because there hasn't been a need for us to offer a course like this (agricultural education) that they may see it as a possibility, but not something that they're necessarily interested in. Which as you should know, probably means that they don't know enough about it."

When asked if administrators could see cultural challenges related to the incorporation of an environmental and agricultural systems program, seven administrators indicated that the perception of agriculture would be a challenge. It was further identified that not only would the students' perceptions be important, but so would the perceptions of parents, staff, and community members. Marketing was therefore identified as a key factor in incorporating agriculture into the urban culture. To further emphasize the importance of marketing, School A stated, "I think we would probably get some strange looks if we went in and put in a full blown ag ed program without doing a lot of educating for our parents and the staff members too." School B claimed,

> We've learned that with so many of our programs you have to educate students as much as you have to educate parents and the community and so that will be one of our pieces. There might be students that are interested, but the parents will wonder why are we doing that? So, marketing plans have to include parents. School B gave an example of the importance of marketing,
>
> You've got to not sugarcoat it, but change it a little bit. I think when we simply offered a horticulture only academy, we couldn't get their enrollment. But once we started changing and tweaking how we would describe that academy, then we had more enrollment for it. I'll give you an example. A few years back we also had an insurance academy. The word insurance scared everyone off, but once we started calling it business and property all of a sudden we had kids that wanted to be involved in it. So sometimes

> it's just the name and the perceptions that students have at that time. So I think it will take a period of time to get that across to students that it is being called something a little bit different.

The administrators did not believe that their students had a negative perception of agriculture. As stated by School B,

> I don't think there's a negative stigma, I just think that students don't understand the general opportunities that are available and they're not correlating things that are truly agricultural industry jobs versus farming. And you know, when you think of the Conagra's and the food science opportunities that are out there, and the turf management and all the landscaping companies, all those kinds of things in their minds, they're not identifying those things as being agricultural.

It was identified by that job opportunities in agriculture must also be incorporated in the marketing plan. Administrators felt hat students do not associate emerging and/or nontraditional agri-science careers as being part of the agricultural industry.

Question Three: What purpose(s) would a secondary environmental and agricultural systems program serve to urban Nebraska high school students?

Administrators were unanimous that *college and career readiness* should be a strong purpose for a secondary environmental and agricultural systems program. Administrators indicated that an environmental and agricultural systems program would need to serve a larger purpose than agricultural content mastery. This type of program must help students prepare for activities after high school. School D stated, "I mean I think there's a bigger picture. There's a part of a well-rounded education involving that area of awareness, just having the background, but then there's also the sort of more specific, trying to get kids ready for what they're doing post high school." In the description of the purpose this program would serve, School H explained, "We need kids to leave us confident, competent, compassionate, committed citizens with all kinds of possibilities for their future." Administrators felt that the purpose of this type program must align with the mission of their school. In response to the question regarding the purpose of the program, School H explained that, "Sure, learning and content are nice, but what can I (the student) really do with this? Where can it take me? Community college, four year college, what are the career possibilities?"

Question Four: How would a Nebraska urban secondary environmental and agricultural systems program be structured?

Two themes emerged in relation to research question four: *program delivery* and *program development*. Administrators described the delivery of an urban agricultural and environmental systems program as a science focused, sequence of courses, driven by student interest, taught through hands-on and engaging curriculum. Program development included the identification of challenges such as resources, justifying program relevancy, and an alternative suggestion to a formal agricultural education program.

All administrators indicated that an urban environmental and agricultural systems program should consist of a sequence of courses. School F claimed, "I think if it were not a pathway it would be hard to generate and sustain momentum." School B stated,

> I guess I think of our programs of study that we have in place right now. We're always thinking of an entry-level course and then somewhere in the middle and then some sort of capstone kind of course. In this situation we'd probably have to start out within our biology curriculum, which is at the 9th grade level. We would definitely have to integrate some agricultural related units even before that, starting at the 7th and 8th grade level and even at our elementary schools. Exposure to careers in those areas is where I think you'd have to start.

When asked about curriculum, administrators were unsure if their students would be interested in traditional agriculture subject matter; however, all administrators indicated a science focus would be appropriate. The curriculum that was directly mentioned included: biotechnology, agricultural business/finance, nutrition, veterinary science, environmental/natural resources, sustainable practices, globally focused, renewable energy, food science, byproducts, animal science, and plant science. Administrators felt that it would be important for the delivery of this content to be hands-on and engaging. As School F explained, "You and I both know how much power there is in having kids actually see the sort of product of their work and the sum of their learning."

It was stated that in this type of program, the teacher would play a vital role in student interest. School H said, "I think with something like this the quality of the instructor would have a high effect on the enrollment of the program." School C claimed, "We've always said most kids don't take your class because of the curriculum, they go where they like the teacher. So I believe teachers are by far the biggest key in a program growing and being successful."School D said,

> When you think about will the culture be willing to accept this program, many kids won't know about it or they will, and again so much of it is based not necessarily on the perception, but its who's the teacher, how's it going to be taught, is this worthwhile, are these hands-on activities, does it get kids enthused about the area? I mean that will make or break it. I mean you could have a very sophisticated program ready to go in place and if the teacher's not right or the teacher doesn't relate to kids and get them hooked in, it's not going to go.

Other factors contributing to student interest included parents, friends, content, counselors, and post-high school plans. It was mentioned by School H that students from struggling families, economically or relationally, tend to have less parental involvement in their course selection. School C indicated that 50 percent of students are simply interested in easy courses.
When asked what factors influence student interest School H said laughing,

> A little of everything, friends, sometimes the teacher. I think a kid that's highly motivated is more likely to look for content. A kid that kind of does all right in school, but just likes being here, isn't really highly focused on one thing, I think he/she is more interested in what are my friends taking and who's teaching it.

For successful enrollment students and parents must be able to see the viable job opportunities in not only the industry but in their communities. School H explained,

> I don't know if our students even realize this, but we have some meat processing industry here and Armor was here, but now someone else is opening it up. I know one of our counselor's husband works for the USDA. He's a quality control technician; make sure I don't get E. coli kind of guy. I don't even know if our students are aware that those careers exist even within our town. When they think meat processing, they think of the person killing the cow and slicing it up.

Seven of the eight administrators mentioned justifying program relevancy. Cross-curricular linkages as well as dual-enrollment were suggestions given to help justify this type of elective program. In explaining the need for a cross-curricular approach School E said,

> In going back to the idea that everything is integrated and as far as the cycle of life that I think you definitely want to have an integrated approach to it. In recent years electives have really had to fight to justify their programs and they work really hard to say that we're learning math, were applying science, we are addressing communication skills. So I think you definitely have to have that cross-curricular application especially as budgets continue to tighten more and more this would be critical to justify the program.

Seven administrators talked about dual credit indicating that students taking certain courses at their school are receiving high school credit for graduation as well as community college credit. In reference to dual-enrollment School A explained, "A lot of our kids end up at Metro Community College and it would help if they had something we could feed our kids into, we do a lot of dual enrollment in this district."

Budget, equipment, and staffing (resources) were mentioned as challenges to implementing a sequence of environmental and agricultural systems courses. In reference to challenges of implementing an environmental and agricultural systems education program School D stated,

> The first thing that comes to mind is that it is virtually impossible to institute anything new in an era of budget cuts. I worry that we're going to be scrambling to be able to teach some of the courses we presently teach, let alone thinking about starting any new courses or even starting a whole new area of instruction.

It was also mentioned that post-secondary options in the area would need to be considered before curriculum decisions were made. School A stated, "I don't want to get these kids all ready to rock and roll and graduate from here. Now where are you going to send them? Where are we going to go to UNL or South or North, a lot of the kids like I said, they just don't have the resources and they don't leave the area."

All administrators indicated that if a full sequence of courses could not be implemented at their school, agriculture could be used as a context for teaching other subjects. School B said, "To truly identify three or four courses at the high school level that are solely geared toward ag may

be difficult." They indicated that the largest hindrance to this occurring would be their current teachers. They did not believe their current teachers have the knowledge to teach agriculturally related curriculum. School F said,

> I think our biggest challenge, I was going to say roadblock, but that sounds so pessimistic, our biggest challenge is our teachers themselves. It really means finding even a handful of folks who would be willing to seed the program and really supporting them, supporting the teachers and serve as coaches for professional development, helping them understand the benefit and power of integrated learning.

It was suggested that if offered professional development their teachers would be more than willing to use agricultural curriculum. School D stated, "It's not just the professional development, but it's the support during the school year."

Discussion and Recommendations

The challenge of constructing an urban agricultural education program is not new to the field of agricultural education. School A spoke of this exact problem, "I know nationally they're struggling with this too. The last time I was in Nashville I sat in on an urban agriculture (meeting) and they were as confused as I was. There were different models that schools were using, but no one had the correct answer."

In support of Schoen and Teddlie's (2008) model, the administrators in this study indicated elements of the culture are overlapping and complementary. For example, students' limited awareness of agriculture had an effect on the basic assumptions made by students as well as their espoused beliefs. When asked if there would be cultural challenges associated with the implementation of an environmental and agricultural systems education program, the administrators identified the perceptions of students, faculty, parents, and community.

Recommendation One: A marketing plan should be devised which includes marketing toward student, parent, staff, and community member audiences.

Supporting Esters and Bowen's (2004) research, administrators recognized that marketing would play a vital role in the success of a program. Not only would marketing be important to students, but perhaps more important for parents, staff, and community members. As noted by School B, naming of the program may be an important piece of the marketing plan, as well as advertising the viable career opportunities in the community. In concurrence with Talbert and Larke (2005), administrators stated that for students to understand the viable career opportunities in the industry, exposure must begin prior to high school. Marketing would relate to Schein's (1985) first two levels, *artifacts* and *espoused beliefs*, of school culture. Stakeholders must first comprehend the program structure and goals of the program before the third level can be attained: a valued program.

Recommendation Two: A teacher should be selected carefully for an urban environmental and agricultural systems program because the teacher himself or herself, and their teaching methods affect enrollment.

This research supports the findings of Myers, Dyer, and Breja (2004) who identified and presented solutions for recruitment of agricultural education programs. The administrators indicated that the teacher might be the most important factor for program enrollment and that the perception of agriculture (or rather the lack of agriculture awareness) would be a challenge. Myers, Dyer, and Breja (2004) determined the primary problem to be teacher quality and commitment. Parent involvement, friends, and curriculum were other factors identified by the administrators as factors in enrollment.

The largest challenge in the implementation of an environmental and agricultural systems program in an urban area may be the lack of awareness and current perceptions held by the population. The results indicate that due to a lack of involvement, neither urban students nor their parents possess an awareness of agriculture. This study therefore concurs with the findings of previous research that people in metropolitan areas have fewer opportunities to be exposed to agriculture (see: Frick, Birkenholz, Gardner, and Machtmes, 1995). The findings of this study diverge from previous findings, as the administrators did not believe their students had a negative perception of agriculture, but rather the perception that agriculture is strictly farming. Therefore, the findings of this study neither support nor contradict the research conducted by Richards, Nordstrom, Wilson, Kelsey, Marektzki, and Pitts (2000) who found students without agricultural experiences had positive perceptions of agriculture. However, the research concurred with Kalme and Dyer's (2000) finding that Iowa principals had favorable perceptions of agriculture programs.

Recommendation Three: Courses implemented should be science-focused, hands-on, and engaging.

The administrator's recognition of the relationship between agriculture and science supports the findings of Thompson (2001) who found that principals were in favor of integrating science into agricultural courses. The findings also agree with Trede and Russell (1999) with respect to urban agricultural education curriculum emphasizing global dimensions, hands-on activities, and professional development it did not, however, support their finding that science-based curriculum was of only moderate importance. A conclusion could not be made in terms of curricular content; nevertheless, the format of the program described would consist of a sequence of, hands-on, career oriented, science-focused, dual-credit courses.

Recommendation Four: Educators should make cross-curricular linkages between environmental and agricultural systems curriculum and other subjects.

Taking into account the climate of current state and national education, justifying program relevancy cannot be ignored. As mentioned by the administrators in this study, cross-curricular applications and dual-enrollment could be implemented. Cross-curricular application is one way to maintain that students are learning more than agricultural content. The learning that occurs in an agricultural education course could benefit the student in other subjects as well. This finding is supported by Brister and Swortzel (2007) who concluded agricultural education is making strides in the right direction to achieve academic status by incorporating science into the curriculum.

Recommendation Five: A professional development program should be created for Nebraska teachers in relation to science curriculum that emphasizes agricultural examples.

With regard to the challenges of implementing an environmental and agricultural systems education program, lack of some resources was identified. The current economic status of the United States in 2010 might have played a role in identifying funding as a deterrent to the program implementation. Indeed, School districts in Nebraska and across the nation are struggling to maintain their current programs. Therefore, the current economic climate may have been a factor in the suggestion to use agriculture as a context to teach other subjects, as hiring an additional educator is not feasible at this time.

Importantly, it may be time for the agricultural education field to reexamine the purpose of an agricultural education program. If the purpose is college and career readiness, as indicated by the administrators in this study, or agricultural literacy as proclaimed by Frick, Kahler, and Miller (1991), a four-year, stand-alone agricultural education program might not be needed. The idea of using agriculture as a context to teach other subjects, specifically science topics, should be further explored. As indicated by the administrators, the teachers themselves will be the largest barrier to the implementation of this type of curriculum—not a barrier of unwillingness, but rather a lack of knowledge. Thus, A professional development program with an established support system should be also explored.

In summary, the purpose of an urban environmental and agricultural systems education program is to create agriculturally literate students who are ready for college and/or a career in agriculturally relevant fields. For such a program to be implemented, the culture of the school and community must be first examined in order to develop an effective marketing plan. Then, for this program to be successful, the teacher must be selected carefully as structure and delivery will be of utmost importance. Alternatively, an environmental and agricultural systems education program may not be necessary accomplish the intended purpose. Instead, a viable alternative may be using agriculture as a context to teach other subjects.

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Describing the Relationship Between Cognitive Competency and Student Use of Engagement Opportunities

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Abstract

The purpose of this study was to describe student cognitive processing capabilities given higher or lower cognitive level processing opportunities during a ten-week university course. In addition, the researchers sought to describe the relationship between student use of engagement techniques and overall cognitive processing capabilities. A census of fourteen students, who were pre-enrolled in the course, became the convenient population for the study. Three instruments were used to collect the data and describe student cognitive competency on closing reflections and the final examination, as well as the use of cooperative learning techniques. Students were split into one of two groups prior to the first class session; one group received lower cognitive bonus questions, and the other group received higher cognitive bonus questions on all closing reflections during class sessions. Results were that there appeared to be no consistent pattern of cognitive processing capabilities demonstrated between groups on the weighted score on the final examination. In addition, five of the fourteen students used the cooperative learning techniques that were demonstrated to them in their own teaching. Of the five students who used the techniques, four scored in the top half of the class on the cognitive weighting of the final examination.

Introduction

Questioning students at higher cognitive levels stimulates cognitive skills and moves them beyond memorizing content (Gall, Ward, Berliner, Cahen, Winne, Elashoff, & Stanton, 1978). Higher cognitive questions are characterized by two factors; the first is that students are required to state predictions, solutions, explanations, evidence, interpretations, or opinions, and the answer should not be readily available to them from the curriculum taught (Gall et al.). Newmann (1987) defined higher order thinking that happens as a result of higher cognitive questioning or teaching, as an opportunity – an opportunity one is given to interpret, analyze, or manipulate information because the solution cannot be found through routine application of previously learned content. Newman stated that lower order thinking involves repetitive behaviors such as memorizing and inserting a solution.

Cooperative learning is the incorporation of students working in groups to accomplish the same goal (Gillies, 2007). According to Johnson and Johnson (1999), structuring learning situations cooperatively promotes students to work together to achieve group success. Consequently, when students work together toward a common goal, it typically results in higher achievement and greater productivity than if students work alone (Johnson & Johnson). Additionally, Johnson, Johnson, and Smith (2007) wrote that cooperative learning results in a greater transfer of the content learned from one situation to another, higher-level reasoning, and meta-cognition.

Theoretical Framework

Three theories were used to build the theoretical framework for this study; one was Piaget's theory of cognitive development. Woolfolk (2007) explained Piaget's theory as a model for describing how humans think about a problem and their surroundings. Piaget's theory consists of four stages including sensorimotor, preoperational, concrete operational, and formal operational. The first stage an individual goes through is sensorimotor, which is the period from birth until approximately two years of age. During this stage, an infant is said to make use of imitation; memory and thought begin to develop and one begins to recognize objects. Preoperational occurs between two and seven years of age, during which the child develops language. In the preoperational stage, one usually has trouble seeing other points of view, and can think logically in one direction. Concrete operational is the third stage an individual reaches, which typically occurs between seven and eleven years of age. An individual starts to solve hands-on problems in a logical fashion, as well as understand laws of conversation and reversibility. The final stage an individual reaches is formal operational, which occurs between the ages of eleven and adulthood. During this stage of development, one can solve abstract problems logically, can conduct scientific thinking, and can develop concerns about social issues and identity (Woolfolk).

The second theory was Bloom's Taxonomy; Bloom, Engelhart, Furst, Hill, and Krathwohl (1956) established a hierarchy of cognition comprising six levels. Theoretically, as one works through the hierarchy, each level demands the use of the lower level skills. The six levels include: knowledge, comprehension, application, analysis, synthesis, and evaluation. According to Bloom et al., knowledge, identified as the lowest level of cognition, emphasizes remembering and more specifically, recognition or recall of content material. Comprehension, the second level of Bloom's Taxonomy involves the student's ability to know given content material and be able to use the ideas presented. The third level of the hierarchy is application. When presented with a problem, students are using the cognitive level of application if they can apply an appropriate solution. Students are able to work through real-life situations, when presented with an application-based objective in the classroom. Analysis, the forth level of Bloom's Taxonomy, places an emphasis on the student's ability to breakdown the material and detect relationships between the parts. The fifth level of the hierarchy is synthesis, which includes putting parts and elements of the content together to form a whole. The synthesis level requires students to work with elements of a problem and create a structure or pattern that was not there before, whereas, during comprehension, application, and analysis, students are given the material to solve the problem. In synthesis, students must draw upon elements from many sources to form a solution (Bloom et al.).

The third theory was the social interdependence theory, supporting that the achievement of each individual's goal in a group is effected by the other member's actions (Johnson & Johnson, 2007). There are two kinds of social interdependence. The first is positive, which encourages cooperation, and the second is negative, which encourages competition (Johnson & Johnson). Positive interdependence occurs when members of a group perceive they can only reach their individual goals when the other group members reach their goals. Negative interdependence exists when members of a group perceive they will only reach their individual goal when the other members fail to reach their goals (Johnson & Johnson).

Conceptual Framework

In the study, two variables relating to the instructor, and two variables relating to the students, were examined to describe cooperative learning techniques used by the instructor, and cognitive processing capabilities of students across a ten-week university course (see Figure 1). The two variables, related to the instructor, were cooperative learning techniques modeled during class sessions and the cognitive level of reflection questions written. Student variables included the cognitive level of reflection questions received, and the cooperative learning techniques used in their microteaching lessons. These variables were used to describe the students' cognitive processing capability and cognitive achievement during the course.

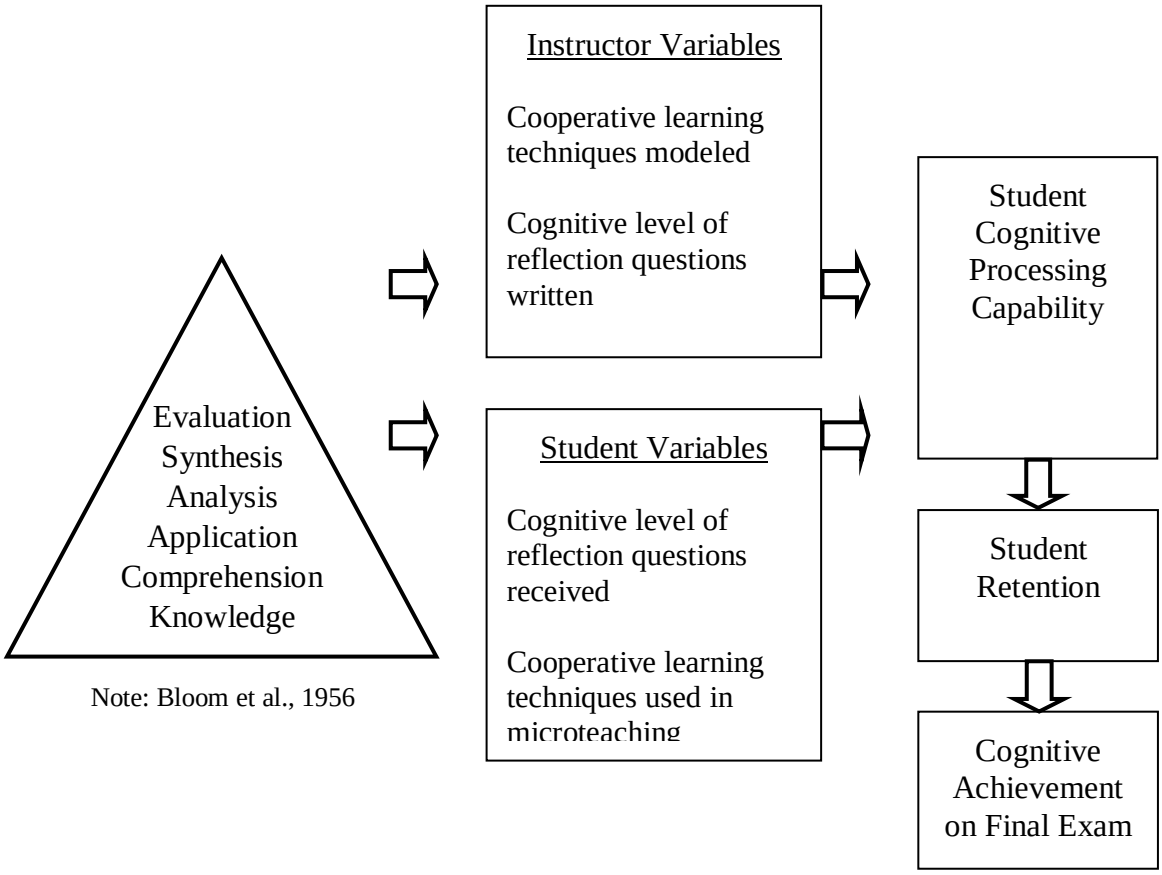

Figure 1. Conceptual Framework of Factors Influencing Student Cognitive Processing Capability

Purpose and Objectives

The purpose of this study was to describe student cognitive processing capability given higher or lower cognitive level processing opportunities during a ten-week university course. In addition, the researchers sought to describe patterns between student use of cooperative learning techniques, student processing of higher cognitive level reflection questions, and cognitive achievement. The research study was descriptive in nature. Four objectives were developed to guide the study:

1. Describe student cognitive processing capabilities when responding to lower and higher cognitive level of reflection questions.

2. Describe student use of cooperative learning techniques in their microteaching lessons.

3. Describe student cognitive achievement on the final examination.

4. Describe the relationship between cognitive competency and engagement opportunities (high or low cognitive grouping on reflection questions and student use of cooperative learning techniques in microteaching).

Limitations of the Study

The researcher chose to describe one university course, which was a convenient population (N=14). The findings cannot be generalized outside of the convenient population. In addition to the size of the population, maximum time was not provided to introduce the higher cognitive teaching techniques to the students. Because students were only given the opportunity to see the higher cognitive techniques three times, they may not have felt comfortable using them in their microteaching labs. Finally, researchers chose to make the higher/lower cognitive questions (the questions used in the research) *bonus questions*; thus, students were not required to answer the questions. Consequently, there is a possibility of missing data.

Methods

Population and Sample

Students enrolled in a university *Methods of Teaching in Non-formal Environments* course became the convenient population for the study. All students (N=14) agreed to have samples of their work reviewed for the purpose of the research. Students enrolled in the course were not formal teacher preparation students; they were enrolled in the course for non-formal educator preparation. The majority of the students (n=8) were Agricultural and Extension Education majors in the Extension option. Five students were working toward an agricultural education minor. One study abroad student from England requested to audit the course. All students, except the study abroad student, were required to take the course to fulfill either their major or minor curriculum requirements for graduation.

Instrumentation

The researchers implemented three instruments to collect the data. The first instrument was closing reflections, which all students received at the end of each class session. On each closing reflection, researchers added one bonus question, which was created using the Florida Taxonomy of Cognitive Behavior (Webb, 1970). The class was split evenly into two groups. The first group (n=7) received a lower cognitive bonus question (knowledge or comprehension level question) on each closing reflection, while the second group (n=7) received a higher cognitive bonus question (analysis, synthesis or evaluation level question).

Inter-rater reliability was established between the researcher writing the question and another researcher independently each day obtaining agreement on the cognitive level of questions that were being asked. The researchers established 100% agreement across the ten-week university course. A panel of experts in the field of teacher preparation and agricultural education reviewed the reflection questions to determine content validity of the questions used in the research. The panel determined the questions to be appropriate for assessing the cognitive level that which it purported to be measured.

The second instrument used was the microteaching lab videos of each student. Students were required, as part of the course, to participate in microteaching labs, in which they developed daily-plans and taught the content to their classmates. The researchers retained a copy of these videos, with permission from the students, in order for the researchers to evaluate the lesson as well. Each student's lesson was evaluated, with a frequency count, for the use of cooperative learning techniques as demonstrated by the researcher during class sessions.

Reliability for the microteaching lab videos was established using test-retest procedures (Ary, Jacobs, & Razavieh, 2002). The researchers reanalyzed randomly selected microteaching videos. Intra-rater reliability for the microteaching lab videos was established for the researcher by analyzing a randomly selected microteaching lab video. Five weeks later the same researcher reanalyzed the same microteaching lab video. A priori a 95% confidence band was established as acceptable. Upon one test-retest measure, the researcher had achieved the acceptable rate (95%).

Researchers also used the final examination as an instrument for this study. The final examination was not altered in any way for the two groups of students. The examination was constructed to test students on content from the entire course, and consisted of 27 items totaling 204 points. Questions on the final examination were asked at various levels of Bloom's Taxonomy. Each question was categorized into one of the six levels of Bloom's Taxonomy. The majority of the questions were asked at the knowledge level (n=17), and accounted for 73 of the points. Two questions were compound questions with two parts; one asked at the knowledge and comprehension levels and the other asked at the knowledge and analysis levels. Together these questions accounted for 30 points. Six questions were asked at the application level and accounted for 24 points. One question was asked at the analysis level and accounted for 2 points. The final question on the examination was asked at the synthesis level, asking the students to create a daily plan of instruction; the item accounted for 75 points.

A panel of experts in the field of teacher preparation and agricultural education reviewed the final examination to determine content validity of the questions created and used in the research. The panel agreed that the final exam was appropriate for the population being studied and that it would measure that which it purported to measure. To establish reliability, the researchers independently analyzed the final examination to determine the level of cognition at which each question was asked. Following the initial analysis, an expert in the area of cognitive levels and the graduate student researcher, discussed any discrepancies in the analysis. Two items were discussed and changes were made for an acceptable 92% confidence level.

Data Collection and Analysis

Closing reflection.

The graduate student researcher always handed-out the closing reflection, to ensure that each student received the correct cognitive level of question. To help combat any researcher bias, an undergraduate student worker in the department graded all of the reflections (students were assigned numbers so anonymity was maintained). After the reflections were graded, a copy was made for the research records; the original was returned to the student. Student answers on the lower level bonus questions were analyzed as dichotomous right or wrong. Answers to the higher level bonus questions were analyzed using a critical thinking rubric, the Florida Rubric for Assessing Critical Thinking Skills (FRACTS), created by Friedel, Irani, and Rhoades (Friedel, personal communication, April 13, 2010).

An expert panel of researchers in critical thinking developed FRACTS; this panel of experts set out to determine the essential elements of each critical thinking skill: analysis, evaluation, and inference (Friedel, Irani, Rhoades, Fuhrman, & Gallo, 2008). Within the three constructs defined by FRACTS: analysis, evaluation, and inference, there are six descriptors, creating a total of 18 descriptors. When evaluating a response, each descriptor received a score of one, two, or three. A score of one indicates that the individual showed no evidence of demonstrating or using the specific critical thinking skill. The score of two indicates the individual provided hints of using the specific critical thinking skill. Finally, the score of three indicates that the individual clearly provided evidence of demonstrating the specific critical thinking skill. The total range of scores for FRACTS is 18 to 54; within the three constructs, the range of scores is 6 to 18. The recommended interpretation of both the construct and total scores received on FRACTS can be found in Table 1 and Table 2 respectfully.

Table 1

Interpretation on each Construct Score Received on the Florida Rubric for Assessing Critical Thinking Skills (FRACTS)

Construct Score	Interpretation
6 to 9	Low level of critical thinking
10 to 14	Common level of critical thinking
15 to 18	High level of critical thinking

Note: Friedel, personal communication, April 13, 2010.

Table 2

Interpretation of Total Score Received on the Florida Rubric for Assessing Critical Thinking Skills (FRACTS)

Construct Score	Interpretation
18 to 28	Low level of critical thinking
29 to 43	Common level of critical thinking
44 to 54	High level of critical thinking

Note: Friedel, personal communication, April 13, 2010.

Microteaching lab videos.

Three of the lectures were taught using cooperative learning techniques. All of the students received the same instruction. The graduate student researcher gave these lectures so the students could easily distinguish between instruction practices used in the cooperative learning class sessions and the other class sessions. Three to five of the listed techniques were used during each class session: jot thoughts, paraphrase passport, timed pair-share, inside-outside circle, Q-approach, send a star, and window-paning as described by the Kagan (1994) curriculum of cooperative learning techniques. The researchers watched each student's microteaching lab video to determine if the students used the cooperative teaching techniques demonstrated during the three class sessions.

Final examination.

The student cognitive level of competency on the final examination was calculated using the process employed by Pickford and Newcomb (1989). A weighting system was implemented to give higher levels of cognition more weight due to the cognitive level of processing required to perform the task. The weighting factors were developed by two researchers (Newcomb & Trefz, 1987) who possessed expertise in the area of cognitive levels of teaching and learning. The weighting factors were developed in consultation with Krathwohl, an original author of Bloom's Taxonomy, and are consistent with the general support given to the hierarchical nature of Bloom's Taxonomy (1956). In Table 3, the cognitive weighting factors used for the final examination in the study are displayed.

Table 3

Cognitive Weighting Factors for Final Examination

Level of Cognition	Weighting Factor
Knowledge	.10
Comprehension	.20
Application	.30
Analysis	.40
Synthesis	.50
Evaluation	.50

Note: Bloom et al. (1956), Newcomb & Trefz (1987), Pickford (1988).

The same scale was used to give each student a weighted score on the final examination. Student weighted scores were used to examine the relationships between responses on the final examination and the cognitive group to which the students were randomly assigned.

Following the data collection period, all student responses and observations were entered into the Statistical Package for the Social Sciences 17.0 (SPSS 17.0). Appropriate measures of central tendency, variability, frequency counts, and percentages were generated for each characteristic of interest in the study. The SPSS 17.0 was used to run all analysis of the data for the study. The unit of analysis for this study was post-secondary students (N=14). The SPSS program was designed especially for analyzing data collected in studies related to social and behavioral research.

A Partial Eta Square was then conducted to describe the relationship between use of engagement opportunities and overall cognitive competency on the final examination. Engagement opportunities were defined as students' use of cooperative learning techniques in their own teaching as well as their cognitive grouping assignment, whether they were in the lower or higher cognitive group. Effect size of the relationship between the independent variables and the dependent variables were explained using Eta Square guidelines by Cohen.

Results

Student answers to lower cognitive questions were analyzed as dichotomous (right or wrong) variables. Data were reported missing if the students chose to not answer the item or if the student was absent for the day. A total of ten closing reflections were reported as missing data, leaving 89.8% of the closing reflections to be analyzed. On average, students answered ten questions correctly, and three questions wrong (one closing reflection was missing).

Student answers in the higher cognitive group were analyzed using FRACTS. Data were reported missing when, students chose to not answer the question or were absent for the day. A total of ten closing reflections were reported as missing data, leaving 89.8% of the closing reflections to be analyzed. On average, student answers to the higher cognitive questions scored 18.9 on the critical thinking rubric (range = 18 to 28). Scores were all in the low level of critical thinking category.

Findings were that out of the 27-microteaching lessons recorded, 3 different cooperative learning techniques were utilized by five students, 12 times. Less than half (36%) of the students incorporated cooperative learning techniques in their own teaching. The cooperative learning techniques used by the students included: timed-pair share, jot-thoughts, and window-paning.

The final examination was given a weighted score based on the level of cognition each question was asked, for a total weighted score of 57.8. Students' weighted score on the final examination ranged from 47.1 to 55.6, with a mean of 52.72 (SD= 2.76). The final examination items were written at five of the six levels of cognition as described by Bloom et al. (1956), including the knowledge, comprehension, application, analysis, and synthesis levels. Each of the cognitive areas was given a weighted score: knowledge 9.3; comprehension 1.0; application 7.2; analysis 2.8; and synthesis 37.5. Mean student scores for each of the cognitive areas were: knowledge 7.21; comprehension .80; application 5.96; analysis 2.14; and synthesis 36.61. Students, in ranked order of their cognitive weighted score on the final examination, along with their group assignment, and their use of cooperative learning techniques in their microteaching lessons, can be seen in Table 4.

Table 4

Students in Ranked Order of Cognitive Weighted Score and Engagement Opportunities

Student Number	Cognitive Weighted Score	Cognitive Group Assignment	Use of Cooperative Learning Techniques
Student #12	55.6	Higher	1
Student #3	55.4	Higher	0
Student #4	55.0	Higher	0
Student #7	54.9	Lower	2
Student #2	54.6	Lower	1
Student #10	54.6	Lower	0
Student #8	53.8	Lower	4
Student #11	53.3	Lower	0
Student #1	52.9	Higher	0
Student #13	52.2	Lower	0
Student #9	51.0	Higher	0
Student #5	49.2	Higher	4
Student #6	48.5	Lower	0
Student #14	47.1	Higher	0
Mean:	52.72	Total:	12

The multivariate analysis comparing student use of cooperative learning techniques and total cognitive weighted score on the final examination yielded a partial-eta square of .071, indicating a medium effect size, showing that use of cooperative learning techniques accounted for 7.1% of the variance on student's total cognitive weighted score on the final examination. Analysis comparing group assignment and total cognitive weighted score on the final

examination resulted in a partial-eta square of .035, indicating a small 3.5% variance in student's total cognitive weighted score on the final examination.

Conclusions

Students did not tend to use cooperative learning techniques during microteaching lessons after seeing them demonstrated during class sessions. Students in the lower cognitive group were able to answer their assigned reflection questions. Students in the higher cognitive group responded at the lowest level of critical thinking when responding to their reflection questions. Students possessed high cognitive competency on the final examination regardless of the cognitive group they were assigned. Students in the lower cognitive group scored higher on the final examination than students in the higher cognitive group. Due to the small population, no significance was found between student cognitive competency on the final examination and the engagement opportunities used. However, a pattern was beginning to emerge; four of the five students who used cooperative learning techniques in microteaching scored in the top half of the class on the cognitive weighted score of the final examination. Research needs to be continued to further describe this interesting finding.

Recommendations

When preparing future educators, Gillies and Boyle (2010), stated they should be "trained in the skills needed to implement cooperative learning in their classroom" (p. 938), including, the use of structured cooperative activities, and being able to teach students the social skills needed to effectively work in groups. Not only will students put forth more effort to achieve a goal when participating in structured cooperative activities, they will also develop positive and supportive relationships (Johnson & Johnson, 1999). When engaging in cooperative learning activities, students are able to observe outstanding group member behaviors and emulate them to become better students themselves (Johnson, Johnson, & Smith, 2007). Teacher educators need to further explore the use of cooperative learning techniques as a means for enhanced student cognitive engagement in class session content.

Discussion

Student's cognitive level of competency on the final examination, in this study, did not differ between students who practiced higher cognitive processing and those who did not. However, students who used cooperative learning techniques in their own microteaching lessons, scored in the top half of the class on the final examination, possibly suggesting that students who used cooperative learning techniques, tended to think more at the higher levels of Bloom's Taxonomy (1956), than students who did not use cooperative learning techniques.

More research needs to be conducted to further examine the relationship of frequency of use of cooperative learning techniques and level of cognitive competency. Students in this study were not required or asked to use cooperative learning techniques, the researchers wanted to see if and how often the students would use the techniques in their own teaching after simply observing the techniques used in lecture. In a future study, researchers will require students to use the cooperative learning techniques in their microteaching, and will construct the scoring

rubric to reward the use of cooperative learning techniques. Also student motivation was not addressed as part of this study, which could contribute to explaining why students who used cooperative learning techniques scored in the upper half of the class on the final examination. Further research should measure student motivation as a variable in the relationship to cognitive competency.

At the end of the methods of teaching course used in this study, one of the comments received from one student was, "this class was all about teaching, and I don't plan on teaching." Because the students in this study were either Extension option students or Agriculture and Extension Education minors, they do not have the same classroom internship requirement as an agricultural education teacher preparation student. The comment made by the student caused the researchers to ponder whether the students did not use the cooperative learning techniques because the students were not required to teach in a formal learning environment, and therefore, found no real relevance for incorporating varying techniques in their lessons.

During another methods of teaching course in which students were in the formal teaching option, cooperative learning techniques were introduced during two class sessions; None of the students were asked to use any of the cooperative learning techniques. However, after just one use of the cooperative learning techniques during lecture, the researcher saw evidence of students using the techniques in their lessons while teaching in the laboratory. The researcher saw two out of three students use cooperative learning techniques in their next lesson; Both jot-thoughts and timed-pair share were used. The students in the course consisted of students majoring in Agriculture and Extension Education, preparing to student teach. If a similar study is done, it is recommended that a formal teacher preparation course be used, in hopes that more cooperative learning techniques would be used by the students.

As the profession moves forward in its collaborating with other fields of science and education, using cooperative learning techniques in the classroom will allow students to develop skills for the work force. Cooperative learning gives students the opportunity to work in small groups, which is a skill that most employers expect from new employees (Ravenscroft, 1997). Ravenscroft pointed out that due to the nature of cooperative learning activities, students are teaching and coaching each other, which improves their learning. Through the coaching and teaching of their peers, students are able to "articulate their cognition and are able to observe and adopt the learning and study strategies of other students" (Ravenscroft, p. 187).

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Effects of Inquiry-based Agriscience Instruction on Student Achievement

Chair/Discussant Comments by
Wade Miller, Iowa State University

This paper examines the effects of inquiry-based agricultural science instruction on student achievement. The researchers reported that students taught using inquiry-based instruction scored higher on content knowledge assessments than students who were taught using a subject matter approach. Most studies conducted in the past have been inconclusive with respect to inquiry-based instruction as compared to subject matter instruction. The researchers have offered some possible explanations for the differences between previous studies and this study. The explanations included: the preparation of the teachers, the length of the study, the method of data collection, and how the study was managed. Are the results influenced by the teachers' expertise or by their view of inquiry-based instruction? If so, what does this mean? The length of the study is longer than some of the previous studies. Is there any research to suggest how long treatments such as this should last?

Are there any other advantages or disadvantages of using inquiry-based instruction? Does this type of instruction take more time? Does inquiry-based instruction promote depth of knowledge or breadth of knowledge? Is it effective with students who have different learning styles?

Since the results of this study are somewhat different from those of previous studies, is there value in conducting a replication?

Nebraska Urban Environmental and Agricultural Systems Education Program: An Evaluation for Development

Chair/Discussant Comments by
Wade Miller, Iowa State University

This study sought to determine what type of environmental and agricultural systems education would be viable in urban schools in Nebraska. The evaluation was conducted by asking eight urban school administrators four questions.

The first question asked administrators to describe their school's culture. Did each administrator have a common definition of *school culture?* The responses were placed under two headings: demographics and post-high school activities which tends to leave out other aspects of culture. Some may describe school culture as the school's "personality" which might include: norms, values, beliefs, rituals, and traditions. Did the administrators also provide responses that would address some of these aspects of culture?

The second question asked how agriculture would be included in the urban high school culture. Some administrators indicated that agriculture could be included in the high school culture, but that it might need to start out on a small-scale basis and that marketing of the program would be important.

The third question asked administrators to describe what purposes a secondary environmental and agricultural systems program would serve for urban students. They indicated that it could be included in the school provided that it was aligned with the mission of the school. One administrator talked about "well-rounded students and committed citizens." However; the majority of the responses listed seemed to center around educational and career opportunities. This was less an argument for environmental and agricultural literacy and more of an argument for a program that emphasizes educational and career possibilities.

The fourth question asked how an urban secondary environmental and agricultural systems program be structured. Administrators indicated a need for a sequenced set of courses. Basic subject matter would need to be included, a science emphasis would be important, and a hands-on, engaging curriculum would be essential. They also indicted the importance of the teacher to the success of such a program.

The overall impression is that there is a place for environmental and agricultural systems education in urban Nebraska schools.

Describing the Relationship Between Cognitive Competency and Student Use of Engagement Opportunities

Chair/Discussant Comments by
Wade Miller, Iowa State University

This study describes the student cognitive processing capabilities as they relate to selected student engagement techniques in a college course. In general cooperative learning techniques and examples were demonstrated in the course. What did the researchers expect to observe or measure as a result of the treatment?

It was noted that some students did not choose to use cooperative learning techniques in their lessons after these techniques were demonstrated to them. Does this mean that they do not value cooperative learning techniques, or does it mean that they value other techniques just as well? Should the assignments require the use of cooperative learning techniques rather than leaving this decision to be made by the student?

Students' level of competency as measured by the final exam was not significantly different between those who practiced higher cognitive processing vs. those who did not. It was observed that those who chose to use cooperative learning techniques in their lessons scored better on the final examination. Is the question of significant difference due to the small sample size in this study? What findings tend to encourage or discourage the researchers to continue their research in this area?

A Review of Current Special Education Research in Agricultural Education

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Abstract

This review sought to identify and summarize the results of agricultural education research related to teachers' perceptions about working with students with special needs. All manuscripts in the Journal of Agricultural Education and available American Association for Agricultural Education research proceedings since the passage of No Child Left Behind legislation (2001) were hand searched and coded. Eighteen studies were identified that met criteria for inclusion in the study. Findings from included studies, consisting of descriptive data and data on self-reported perceptions, were compiled and presented. In the results, studies were arranged in five categories according to the data collected on the perceptions of preservice and practicing teachers toward teaching with students with special needs: (1) preparation and challenges; (2) teacher efficacy; (3) attitudes, knowledge, and skills; (4) competence, success, and confidence; and (5) curriculum, instruction, and strategies. Additionally, conclusions and implications were developed from past research efforts concerning student success and teacher preparation. Finally, recommendations for future research were developed, including observation of positive student outcomes, experimental study of effective teaching practices, investigation of effective methods for preparing teachers, and qualitative study to develop theory within the field.

Introduction

Educational systems for students with special needs have gone through substantial revision in the last 35 years. The need and creation of federal legislative mandates for protecting student rights has served as the impetus for substantial reform efforts in education targeting students with special needs. The Education for All Handicapped Children Act of 1975 (EAHCA) provided initial direction to policy revision in public schools. In 1990, EAHCA was amended and renamed the Individuals with Disabilities Education Act (IDEA). IDEA also mandated change to the roles and responsibilities of the educational process itself for educators, administrators, parents and students with disabilities (Heward, 2009). Schools, along with the agriculture programs housed within them, were legally required to provide all students with access to a free and appropriate public education, in the least restrictive environment, with access to the general curriculum.

Twenty years later, another instrumental piece of federal legislation further shaped educational practices, which have ultimately impacted the ways in which schools deliver programs for students with special needs. The passage of No Child Left Behind (NCLB) on June 14, 2001 marked a significant shift in accountability practices for public schools. In response,

IDEA was reauthorized in 2004 with revisions to align with the changes that the No Child Left Behind Act created. Subsequently, the combination of NCLB and IDEA offered schools structured protocol for measuring student achievement to ensure that all students experienced success in school settings (Smith, Polloway, Patton, & Dowdy, 2008). Reform has also been observed in legislation related specifically to career and technology education. Revision of the Carl D. Perkins Act mandated provisions for the inclusion of students with special needs—providing additional incentive for change to agricultural education programs (Carl D. Perkins Career and Technical Education Act, 2006). This contributed financial incentive, in addition to the growing legislative pressure, for agriculture programs to provide access to students with special needs.

Historically, agricultural education has focused on preparing students for careers in agriculture. Additionally, secondary agricultural provides both valuable content and a rich context for teaching and learning (Roberts & Ball, 2009). Furthermore, the opportunities that agricultural education provides outside the classroom, such as FFA, supervised agriculture experiences (SAE), and cooperative work study programs, provide further learning opportunities from which students with special needs can benefit. The combination of potential benefits provided to students with special needs along with legislation-mandated inclusion suggests that agricultural educators have an ethical and legal responsibility to provide all students with these learning experiences.

One important characteristic of effective practice in education is meeting students' social needs (Phipps, Osborne, Dyer, & Ball, 2008). Agriculture classrooms can potentially be a safe haven for special needs students to experience success and develop relationships with a greater diversity of students. The impact of an agricultural education program to facilitate a positive social impact on students has been illustrated in a qualitative study in the context of competitive livestock exhibition (Davis, Akers, Doerfert, McGregor, & Kieth, 2005). Of the three themes identified within the study (social relations, family, and responsibility/knowledge and care of animals), the most pervasive theme was social relations developed with peers, advisors, sponsors, officials, and other individuals from the stock show environment. As suggested by these findings, the potential benefit experienced by students with special needs through agricultural education experiences extends well beyond the classroom.

Legislation and the development of teacher education literature have defined specific terminology to improve efforts in teaching students with special needs. Under IDEA (2004), there are 13 categories of special education under which students may receive service. Inclusion has been described as the education of students with disabilities in general education settings (Mastropieri & Scruggs, 2007). Currently, nearly 60% of special education students spend the majority of their time in general education classrooms (U. S. Congress, 2006). Teachers must be prepared to effectively teach these students, as they made up 13.4% of the general student population in the 2008-2009 school year (US Department of Education, 2010). Data suggest that the student demographics in agriculture classrooms are very similar—students identified with an

Individualized Educational Program (IEP) accounted for 12.03% of the total student population in Missouri agricultural education classrooms (Missouri Department of Elementary and Secondary Education, 2009).

An increase in agricultural education research focused on the instruction of students with special needs has been observed in the last 15 years in accordance with current shifts toward inclusive practice. According to Radhakrishna and Xu (1997), only one study pertaining to students with special needs was published in the Journal of Agricultural Education and AAAE proceedings combined between 1986 and 1996. Consequently, the majority of special education at the national level in the discipline of agricultural education has been published since the late 1990s. While this suggests that a base of special education research is being developed within the context of agricultural education, more work is needed to establish effective practice in the two domains of serving students with special needs and preparing agriculture teachers.

As a profession, indications suggest that agricultural educators are embracing students with special needs. Current editions of major agricultural education textbooks for training teachers include full chapters devoted to teaching students with special needs (Newcomb, McCracken, Warmbrod, & Whittington, 2004; Phipps, Osborne, Dyer, & Ball, 2008). One study (Talbert & Edwin, 2008) indicated that agricultural education programs are becoming increasingly aware of the importance of diversity in the preparation of postsecondary agricultural education students, and "are taking the appropriate steps in providing the needed experience as part of their teacher education (p. 58)." With these contributions to the preparation of teachers, investigation into the current body of research is needed to evaluate the current status and future direction for efforts in educating students with special needs.

In summary, a series of legal mandates and policy changes are currently leading educational reforms in US public schools. Subsequently, change has been observed in agricultural education as research efforts have shifted to include the study of students with special needs and revising teacher preparation efforts. As student populations continue to grow more diverse, further direction is needed to ensure that the influence of agriculture is afforded to all students. Thus, a need for a review of special education research within agricultural education literature has been identified in order to ascertain current knowledge and develop future research direction.

Purpose

A need exists for deeper understanding in the context of agricultural education toward ensuring access to curriculum, improving academic outcomes, and supporting the development of social skills for students with special needs. In response, this review of the literature intends to identify and assess recent related literature in the field, summarize current findings, and use that information to direct the development of a research agenda. The purpose of this review of the agricultural education literature was to identify and summarize the results of studies between

June 14, 2001 and June 14, 2010 related to teaching students with special needs. Based upon this purpose, the following research questions were developed:

1. What studies can be identified within agriculture education literature regarding teacher perceptions about teaching students with special needs?
2. What findings and recommendations can be developed from a review and summary of the agriculture education literature related to teacher perceptions of teaching students with special needs?

Methods and Procedures

Procedures for this review of the literature followed recommendations found in *The Handbook of Research Synthesis* (Cooper & Hedges, 1994). Accordingly, identification and evaluation of the special education research within agricultural education was performed according to appropriate search, coding, and analysis procedural protocol (Cooper & Hedges, 1994).

Search Procedures

White's (2004) search procedures were utilized, including developing criteria, surveying literature, and searching for inaccessible literature. The following criteria were employed to determine if a study was included in the resultant search: (a) published in AAAE research conference proceedings (regional and national) or the Journal of Agricultural Education (JAE), (b) were published between June 14, 2001 and June 14, 2010, (c) studied preservice or active agricultural teachers, and (d) included the study of effective practice in teaching students with special needs. The passage of No Child Left Behind (2001) was selected as a parameter for this search because of the importance/impact of this policy of delivery of educational services in educational content area instruction, including agricultural education.

A hand search was conducted for all online manuscript titles and abstracts from the Journal of Agricultural Education, the national research meetings for the AAAE, and regional AAAE research meetings (North Central, Southern, and Western). All volumes of the JAE were reviewed, but multiple conference proceedings were not available electronically (see Table 1). Further search attempts included consultation with agricultural education faculty members and the education reference librarian at the University of Missouri. Through these efforts, three additional studies were identified. The overall search yielded 18 articles that met the inclusion criteria for the literature search.

In addition to the eighteen articles that were identified in this review, one relevant previous review of the literature was retrieved (Radhakrishna & Xu, 1997). While the previous review of the literature identified only one study related to special education within agricultural education research, the procedures employed to analyze the literature provided structure and guidance for this review. This current study reflects the sound method for organizing and

discussing findings set by Radhakrishna and Xu (1997), while targeting similar variables of interest.

Coding Procedures

Coding procedures followed the recommendations of Stock (1994) in regard to coding decisions, construction of a code book, and controlling error. Studies were coded for the following variables: (a) participant description, (b) sample size, (c) study purpose, (d) method of inquiry, (e) findings, (f) recommendations, and (g) suggestions for future research. Reliability of coding was established through pilot testing with an additional researcher with similar substantive expertise, defined as appropriate experience to be considered a relative expert, in both agricultural education and special education (Orwin, 1994). Coding practices were then verified by the outside researcher through coding four studies, or approximately 20% of the studies. Pilot testing of criteria did reveal the need for greater specificity of one coding characteristic—the inclusion of both preservice and active agricultural teachers as participants. , Coding criteria were then modified to achieve 100% agreement between coders in order to ensure accuracy. Finally, manuscripts were reviewed again to ensure reliability following clarification of coding criteria. Thus, all coding protocol was verified through peer agreement.

An electronic code book was constructed utilizing Excel 2007©. Items considered for coding included report identification information (such as author, year, and source), setting, subjects, methodology, findings, and recommendations (Stock, 1994). Coding was performed through direct entry of data into the database once the categories for the codebook were finalized.

Analysis Procedures

All studies that appeared to target teaching students with special needs were printed for analysis during the search process. Subsequently, each study was reviewed and, upon meeting coding criteria, coded into the codebook (see coding procedures). Methods, findings, and discussion from each study were then compared, and consistencies were identified. Similarities in data analyses and findings were utilized to organize studies into logical groups which provided organization for review findings. Findings then guided the development of conclusions, implications, and recommendations.

Findings

Research Question One: *What studies can be identified within agriculture education literature regarding teacher perceptions about teaching students with special needs?*

The first research question sought to identify agricultural education literature that studied teacher perceptions about teaching students with special needs. Eighteen studies were identified that met criteria for inclusion in the review (see Table 1). The 18 included articles were

organized and summarized according to the article citation and the following seven characteristics: (a) participant description; (b) sample size; (c) study purpose; (d) method of inquiry; (e) findings; (f) recommendations; and (g) suggestions for future research.

Table 1
Studies published concerning students with special needs between 2001 and 2010.

	JAE				AAAE[a]				Total
Year	1	2	3	4	S	W	National	NC	
2010	0	2[b]			0[a]	0	0		0
2009	0	3[b]	0	0	0	NA	1[b]	0	4
2008	0[b]	0	0	0	0	0	2	1	3
2007	0	0	0	1	0	NA	0	2	3
2006	0[b]	1	0	0	0	NA	4	0	5
2005	0	0	0	0	0	NA	0[b]	0	0
2004	0	0	0	0	0[b]	NA	0	0[b]	0
2003	1	0	0	0	NA	NA	0	0	1
2002	0	0	0	0	0[b]	0	0	0	0
2001	0	0	0	0	NA	NA	0	0	0
Total	1	6	0	1	0	0	7	3	18

[a] Regional and national conferences arranged left to right by date.
[b] Other studies were identified but did not meet selection criteria.

Table 1 displays the included studies published in the Journal of Agricultural Education and research conference proceedings of the American Association for Agricultural Education between June 14, 2001 and June 14, 2010. The order of JAE volumes and AAAE conferences are arranged by date from left to right. In total, 18 studies were identified that involved teaching students with special needs. As shown, eight studies were identified from the Journal of Agricultural Education and 10 were found in AAAE conference proceedings. Nine other manuscripts were identified that related to teaching students with special needs, but failed to meet at least one of the criteria to be included in the study. For example, studies that observed students, parents, state professional staff, or university faculty did not meet criteria set in order to focus this initial review on the perspective of teachers' work with students with special needs.

The most consistent data collected across studies were demographic characteristics of participants, such as gender, years of experience, and level of education. Likewise, over half of the projects were censuses of teachers with intent to describe characteristics of teachers, students, or educational practice. For these studies, the statistical analyses included frequencies, percentages, and/or means, but no analyses above the descriptive level. The remaining eight studies analyzed data through correlation or multiple linear regression.

Research Question Two: *What findings and recommendations can be developed from a review and summary of the agriculture education literature related to teacher perceptions of teaching students with special needs*

Research question two sought to synthesize and summarize the agricultural education literature related to teaching students with special needs. Five areas of perceived teacher value for teaching students with special needs were emerged from the review. All 18 studies involved the observation of one or more characteristics from at least one of the following categories of perceptual data including:

1. preparation and challenges;
2. self-efficacy;
3. attitudes, knowledge, and skills;
4. competence, success, and confidence; and
5. curriculum, instruction, and strategies.

Preparation and challenges.

The first theme identified from the literature in the review was perception and challenges. The literature on perception and challenges of teaching students with special needs included seven studies (33.3%) that described teachers' perceived levels of preparation to teach students with special needs, practicing teacher or student needs, and/or the perceived challenges experienced by teachers or students in teaching special (Aschenbrener, Garton, & Ross, 2008; Ashcenbrener, Ross, & Garton, 2007; Boone, Watts, Boone Jr., & Gartin, 2008; Dormody, Seevers, Andreasen, & VanLeeuwen, 2006; & Pense, 2007, 2009). Data was collected from practicing teachers in all seven investigations; however, in two the primary data described students with special needs and the challenges that they pose to agriculture programs as reported by the teacher (Pense, 2007, 2009).

Teachers reported different perceived levels of preparation for working with students with special needs. For example, Aschenbrener et al. (2007, 2009) describe the perceptions of beginning teachers in Missouri and North Carolina toward working with students with special needs. The study found a low and positive relationship for teachers' perceived levels of success toward working with students with special needs. In contrast, findings in a study in West Virginia (Boone et al., 2008) reported that agricultural teachers felt prepared and confident to

work with students with special needs, but they perceived that they did not typically feel prepared or confident when they first started teaching.

Another study (Dormody et al., 2006) compared teaching students identified with different special needs labels, such as physical disabilities, emotional behavioral disorders, and learning disabilities. Findings identified that agriculture teachers in New Mexico experienced the greatest challenge in working with students with mental retardation more than six other student groups. Additionally, perceptions of the challenges of working with students of differing special needs lessened as teacher age increased.

Teacher efficacy.

The second theme that emerged from two manuscripts (11.1%) in the review was studies involving perceived teacher efficacy toward working with students with special needs (Aschenbrener et al., 2007, 2009). The primary subjects in these manuscripts were beginning teachers in Missouri and North Carolina. Efficacy in teaching accounted for 14% (Missouri) and 25% (North Carolina) of the unique variance in self-perceived success of working with students with special needs when controlling for administrator support, teacher preparation, and in-service programs. Beginning teachers reported success in teaching students with special needs, as indicated in their scores self-efficacy and self-perceived success. It was further concluded from the findings of the studies that the general support teachers assessed from administrators was generally adequate; however teachers in the studies reported that they needed more in-service activities addressing students with special needs. Finally, future research was suggested to define the remaining unexplained variance in teachers' self-perceived success of working with students with special needs.

Attitudes, knowledge, and skills.

The third theme identified from seven studies (28.9%) in the literature review was attitudes, knowledge, and skills (Andreasen, Seevers, Dormody, & VanLeeuwen, 2007; Boone et al., 2008; Giffing, Warnick, & Tarpley, 2009; Giffing, Warnick, Tarpley, & Williams, 2010; Hoerst & Whittington, 2009; Kessell, Wingenbach, Burley, Lawver, Fraze, & Davis, 2006c; Kessell, Wingenbach, & Lawver, 2009). Two of the seven manuscripts collected data on preservice teachers (Kessell et al., 2006c, 2009), while the remaining five studies reported perceptual data from practicing teachers.

Giffing et al. (2009, 2010) described the attitudes of 78 Utah agriculture teachers concerning the inclusion of students with special needs. Nearly 90% of teachers claimed to understand the concept of inclusion, yet 61.5% felt that students with special needs should be integrated into the regular classroom. A strong majority (88.5%) of teachers in the study perceived that in-class support, such as peer tutoring students and paraprofessionals, would provide beneficial support in the classroom, while 84.6% of teachers felt that consultations with special education teachers and parents would benefit their practice of including students with

special needs. Finally, less than one-fourth of the teachers felt they had received or are receiving adequate education about inclusion of students with special needs.

Andreasen et al. (2007) measured the importance and competence teachers perceived toward their teaching skills associated with students with special needs. The results of the study identified four of highest need to be strengthened: (a) dealing with uncooperative special education students, (b) working with more than one type of disability, (c) keeping special education students on task, and (c) adapting facilities for special education students. Additionally, the results of the study revealed four areas of deficiency in relation to inclusion practices: (a) understanding special education regulations, (b) understanding different levels of special education services, (c) understanding different levels of disabilities, and (d) understanding the social needs of special education students.

Another study (Kessell et. al 2006c) described preservice teachers' knowledge of IDEA, disabling conditions, and special education law. The data were utilized to determine if a linear relationship existed between preservice teachers' knowledge of disabilities as recognized by IDEA (learning disability, mildly mentally handicapped, attention deficit disorder, deaf or hearing-impaired, blind or visually impaired, emotional/behavior disorder, and physical impairment) and selected demographic variables (Kessell et al., 2009). Multiple linear regression was used and it was determined that there was a significant linear relationship between selected demographic characteristics and total knowledge scores. The characteristics of gender, age, and time spent with individuals with special needs outside of an academic setting accounted for approximately 9% of the total variance in knowledge.

Competence, success, and confidence.

Eight studies (44.4%) described teachers' perceived competence, success, and/or confidence in teaching students with special needs(Andreasen et al., 2007; Aschenbrener et al., 2007, 2008; Elbert & Baggett, 2003; Kessell et al., 2006a, 2006b, 2009; Stair, Moore, Wilson, Croom, & Jayaratne, 2010). Five of the studies observed secondary agricultural education teachers (Andreasen et al., 2007; Aschenbrener et al., 2007, 2008; Elbert & Baggett, 2003; Stair et al., 2010) and three collected data from preservice agriculture teachers (Kessell et al., 2006a, 2006b, 2009).

In a study of Pennsylvania agriculture teachers, the perceived competence levels needed by secondary agriculture teachers to work with disabled students were compared to teachers' desired competency levels (Elbert & Baggett, 2003). There was a statistically significant difference between the mean ratings of needs versus competencies for all 17 statements, suggesting that teachers felt less than competent while working with students with disabilities. Consequently, the authors' initial recommendation was to provide additional training to prepare teachers to effectively teach disabled students.

Two studies were identified that explored beginning teacher perception of success in teaching students with special needs (Aschenbrener et al., 2007, 2008). Teacher efficacy uniquely accounted for a significant portion of the variance in teacher's perceived success of working with students with special needs for teachers in Missouri (14%, $p < .05$) and North Carolina (25%, $p < .05$). Researchers recommended further research to determine if this finding is consistent for experienced agriculture teachers as well.

Preservice teachers' confidence levels for meeting the needs of special education students in agricultural education classrooms and laboratories were investigated in three related studies (Kessell et al., 2006a, 2006b, 2009). Teachers reported feeling below adequate in four categories of confidence level for teaching students with disabling conditions and following special education laws (Kessell, 2006b). Further analysis through forced entry multiple linear regression revealed that a linear combination of selected teacher demographic characteristics accounted for 25% of the variance associated with selected student teacher demographics (Kessell, 2006a). The variables of feeling prepared to teach students with special needs and time spent with a person with special needs outside an academic setting contributed significantly to this model.

Curriculum, instruction, and strategies.

The fifth theme, as reported by five (27%) of the studies in the review, included curriculum design, instructional practices and/or modification strategies for teaching students with special needs reported by secondary agriculture teachers (Hoerst & Whittington, 2009; Pense, 2007, 2008, 2009; Richardson & Washburn, 2006). All five studies involved data collection from secondary agriculture teachers.

Pense (2007, 2008, 2009) investigated 143 teachers' perceptions of curriculum designs that would meet the needs of students with special needs in Illinois agricultural programs. The studies reported that approximately 23% of the students in agricultural education classes in Illinois were labeled by their teachers as having a learning disability. Ninety-four percent of teachers reported that they were typically notified of the academic needs of their students with special needs. Teachers indicated that the Illinois core curriculum, which is available throughout the state, was very good in presenting information in an understandable way for all students. While teachers were generally satisfied with the Illinois core curriculum, they did indicate a need for modification of some content to better serve students with special needs. Teachers provided suggested modifications that included modified worksheets, hands-on activities utilizing multiple intelligences, more transparencies and visuals, guided notes and worksheets, suggestions for modifying lessons, lessons modified for inclusive classrooms, skeleton notes/outline of units, better PowerPoint© alignment to sample tests, study guides, and printable pictorial diagrams.

Hoerst and Whittington (2009) described the teaching practices of Ohio agriculture teachers (including teaching techniques, comfort levels with those techniques, and the services/resources provided to teachers) when educating students with special needs in inclusion

classes. The study concluded that secondary agriculture teachers felt prepared to teach students with special needs in inclusion settings. The participants of the study identified that they needed more knowledge of inclusion classrooms, clarifications about how inclusion classrooms function, and availability of resources to help strengthen their inclusion classroom structure.

A final study in the area of curriculum, instruction, and strategies reported the modification strategies for students with special needs utilized by North Carolina agriculture teachers (Richardson & Washburn, 2006). A Delphi technique was used to identify specific strategies teachers used to modify curriculum, instruction, and classroom/lab environments. The participating agriculture teachers gained consensus toward the effectiveness of five curriculum strategies, 27 instructional strategies, and six strategies for physically changing the learning environment to better serve students with special needs.

Conclusions, Implications, and Recommendations

Only two categories of data, demographic and perception-based, were observed in the last nine years of agricultural education research concerning teaching students with special needs. From the literature reviewed in this study, it was concluded that when possible, future studies should seek to measure data through direct observation and through intervention research. Comparison of student scores for students with special needs that attend agricultural classes to those that are not in agriculture classes and observation of the effectiveness of educational interventions are both recommended in future research. In addition, the effectiveness of agriculture education for students with special needs should be compared to measures of effectiveness for students without special needs. Furthermore, intentions to enter an agricultural career and other areas of potential impact of agricultural education on long-term outcomes for students with special needs should be explored.

The level of quality that practicing teachers perceived and reported for teacher preparation programs yielded inconsistent results as studies in the areas of teacher preparation and challenges were compared. However, Boone et al. (2008) suggested that teacher perceptions about their preparedness for teaching students with special needs increase with experience. Teachers' perceptions of the level of preparedness that their preservice programs provided for teaching students with special needs was influenced by experience as a teacher and time since engaging in preservice training. This finding suggests that efforts should be made to provide experiences during preservice teacher education to prepare teachers to work effectively with students with special needs and assess whether preservice teacher education programs were effective in developing teaching practices for teaching students with special needs. Additional research efforts should investigate ways to increase the value that teachers place on the preparation process, such as special education coursework, and the impact that perception has on the learning process. Likewise, study should be conducted to identify which strategies are effective for teaching students with special needs within agriculture classroom settings.

Findings from the two teacher efficacy studies (Aschenbrener et al., 2007, 2008) reported that beginning teachers felt that they were experiencing success in teaching students with special needs. However, teachers perceived that in-service programs contributed to their success less than other variables in the study. This suggests that in-service teacher professional development programs should provide more support for practicing teachers for teaching special needs students. Additional research should be conducted to measure teacher efficacy levels in relation to agriculture teacher preparation to teach students with special needs.

Multiple studies identified needed improvement of reported values for teachers' perceptions of attitude, knowledge, and skill. It was concluded that ways to increase teacher attitudes, knowledge, and skills toward working with students with special needs need to be identified and developed in the future. While it is commendable that Utah agriculture teachers reported willingness to include students with special needs into agricultural classrooms and they agreed that the regular classroom setting was the best placement for students with low need (Giffing et al., 2009, 2010), teachers perceived that their education about inclusion of students with special needs was inadequate. The addition of opportunities to interact with students with special needs outside of agriculture classroom settings (such as in IEP meetings, at extracurricular events, and during home visits) could potentially serve to increase preservice teachers' knowledge and attitudes toward teaching, provide learning opportunities, and offer experiences that increase skill level.

Experienced teachers generally feel prepared to teach students with special needs based upon research related to teacher competence, success, and confidence. However, confidence in teaching students with special needs was not identified in all areas for a group of student teachers in the Southern region (Kessell, 2006a, 2006b, 2006c). Future efforts should seek to develop teacher feelings of competence, success, and confidence through additional training to prepare teachers to effectively teach students with special needs, which was originally suggested to Pennsylvania agriculture teachers (Elbert & Baggett, 2003). Finally, further research is needed to determine if teacher efficacy supports a sense of success for established agriculture teachers in similar ways to beginning teachers.

This differs greatly from National data state that approximately 5.2% of all school-age children are classified as having learning disabilities (US Department of Education, 2010), yet nearly one-fourth of students in Illinois classrooms were perceived by agriculture teachers as have learning disabilities (Pense, 2007, 2008, 2009). It was concluded that either teacher perception differs from actual student representation or Illinois agriculture programs have a very high percentage of students with learning disabilities in their classrooms. This finding implies that teacher knowledge of disability characteristics needs to improve. Findings from another study identified need for additional knowledge, clarification, and resource availability in regards to inclusion practice (Hoerst & Whittington, 2009). It is suggested that these needs be met through in-service professional development opportunities. The 38 strategies for curriculum, instruction, and learning environments provide an additional resource for professional

development efforts (Richardson & Washburn, 2006). A few examples of these strategies include providing students with a competency guide, reading aloud for tests and assignments, and strategically grouping students.

Finally, this review of the literature did not identify any studies that utilized qualitative, quasi-experimental, or experimental methods to measure teacher proficiency in teaching students with special needs. This implies that the research to date in agricultural education has focused on establishing a foundational understanding about educating students with special needs. Currently, an important need exists for research efforts to measure teacher effectiveness with students with special needs utilizing both qualitative and experimental approaches. One study that fell outside of the scope of this review observed secondary agriculture students through quasi-experimental methods to identify positive results from redesigning curriculum for teaching students with special needs (Pense, Watson, & Wakefield, 2010). Further, qualitative and experimental research should be conducted to identify effective practice in teaching students with special needs within agriculture classroom settings. Initial efforts to identify interventions for study within agricultural education should be guided by evidence-based practices verified for special education students in related fields, such as math, science, and social studies. Finally, efforts toward developing theory and establishing operational models for preparing agricultural educators are needed.

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Bouncing Back: A Research Synthesis on the Role of Teacher Resilience in High School Agricultural Educator Burnout

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Abstract

The goal for this research synthesis was to introduce the concept of resilience to agricultural education and determine if further research is warranted on resilience and positive psychology as they relate to the agricultural educator. The current environment of public schools coupled with the ever burgeoning responsibilities placed upon the shoulders of educators makes resilience an increasingly vital characteristic to the classroom teacher. Teachers who are resilient are able to persevere through adversity and overcome stress to find success. The study of resilience has a theoretical base in positive psychology (Lopez & Snyder, 2009). Effective coping behaviors used to manage daily stress are essential to teacher retention and job satisfaction for teachers (Carmona, Buunk, Peiró, Rodríguez, & Bravo, 2006). Based on this synthesis of research, a conceptual model visualizing the relationship between teacher resilience and agricultural educator stress and burnout was developed as well as a list of recommendations for further research.

Introduction

The current environment of public schools coupled with the ever burgeoning responsibilities placed upon the shoulders of educators makes resilience an increasingly vital characteristic to the classroom teacher. Stress and burnout are words that have commonly become associated with the profession of teaching and more specifically agricultural education (Anderson, 2010; Croom, 2003; Straquadine, 1990; Torres, Lambert, & Lawver, 2009; Vaughn, 1990; Walker, Garton, & Kitchel, 2004). Stressed and burned out teachers show more instances of inappropriate behaviors (such as yelling in conflict with students), display more frequent cognitive misfunctions (incorrectly marking a written test), and reduced social functioning (lacking charisma, warmth, and involvement) when compared to their peers at lower levels of stress and burnout. These behaviors can potentially compromise the quality of education being provided to students (Byrne, 1999).

Effective coping behaviors used to manage daily stress are essential to teacher retention and job satisfaction for teachers (Carmona, Buunk, Peiró, Rodríguez, & Bravo, 2006). Teacher retention is of vital importance to schools, as attrition causes monetary losses for the district as well as the cost to students through decreased educational quality (Guglielmi & Tatrow; 1998). Teachers who are resilient are able to persevere through adversity and overcome stress to find success. The study of resilience has a theoretical base in positive psychology which focuses on the positive attributes and potential, rather than the negative aspects of an individual (Lopez & Snyder, 2009). A large gap in the literature exists on the relationship of coping mechanisms and resilience of agricultural educators and how these phenomena relate to burnout and stress of agricultural educators. The goal for this research synthesis was to introduce the concept of

resilience to agricultural education and determine if further research is warranted on resilience and positive psychology as they relate to the agricultural educator.

Research Purpose and Objectives

The purpose for this research synthesis was to define the role of teacher resiliency in high school agricultural educator burnout. The objectives included:

1.) Define stress, burnout, and resiliency as they relate to teachers.
2.) Synthesize and summarize literature that connects teacher resiliency to agricultural educator stress and burnout.
3.) Identify a conceptual relationship between teacher resilience and agricultural educator stress and burnout.
4.) Synthesize recommendations for further research on teacher stress, burnout, and resilience.

Methods

Research syntheses are essential to the progression of a particular field of research because they are a collection of past research which is necessary for the systematic construction of knowledge. The necessity for these collections is heightened the ever increasing level of specialization within the field of social science research (Cooper, 2010).

This research synthesis focused on the characteristic of teacher resilience as a dynamic of agricultural educator stress and burnout. Inclusion criteria for this synthesis included two categories: teacher resiliency and agricultural educator stress and/or burnout. Inclusion criteria for studies in the teacher resiliency category were: subjects included secondary educators and the primary focus of the study was to examine resiliency and/or effectiveness. Inclusion criteria for studies in the agricultural educator stress and/or burnout category were: subjects included secondary agricultural educators and the primary focus of the study was to examine stress or burnout in the educator. Studies from before the year 1999 were not considered for the synthesis. Due to the limited amount of research in the area of teacher resiliency, no geographical restrictions were considered.

Research Synthesis and Meta-Analysis (Cooper, 2010) was consulted for search and inclusion methods. Search strategies included a comprehensive search of reference and citation databases using Google Scholar, Summon@MU, Merlin, WilsonWeb, ERIC, and PsychINFO. Reference lists of all studies considered in the synthesis were also searched. Keywords and phrases utilized in the search process included “teacher/educator resilien*,” “agricultur* teacher/educator stress,” and “agricultur* teacher/educator burnout”. Any article that included the topics of stress, burnout and resiliency in relation to educators was printed to be later analyzed. Also included in the search process were consultations with agricultural education faculty members.

Upon completion of the comprehensive search on teacher resiliency and agricultural educator burnout and stress many books, dissertations, theses, articles, and conference proceedings were examined. Seven studies were selected belonging to the category of teacher resilience and nine studies were chosen to fill the agricultural educator burnout and stress category for a total of 16 studies to be used for analysis.

Results

Objective One: Define stress, burnout, and resiliency as they relate to teachers.

The purpose of objective one was to define the terms stress, burnout, and resilience in the context of the experience of teachers and more specifically high school agricultural educators.

Stress

Definition of Stress. Stress in the teacher has been defined as a perceived idea that the workplace is a threat to self-esteem or well-being, which in turn creates a negative emotional experience (Kyriacou, 2001; Kyriacou & Sutcliffe, 1978). As a predecessor to agriculture teacher burnout, the general causes of stress have been identified to be more attributed to daily events rather than major life events (Admiraal, Korthagen, & Wubbles, 2000; Lazarus & Folkman, 1984). The causes of teacher stress have been found to be generally agreed upon across available literature (Howard & Johnson, 2004). In a summary of many international studies, Kyriacou indicated ten main sources of stress in teachers including: lack of student motivation; maintaining discipline; time pressures and workload; coping with change; being evaluated; dealings with colleagues; self-esteem and status; administration and management; role conflict and ambiguity; and poor working conditions. When applied to a specific context, the daily activities of the classroom and agriculture program have an overall greater effect on agriculture teacher stress than the significant life events that happen sporadically. (Anderson, 2010; Knobloch & Whittington, 2002; Kyriacou, 2001; Kyriacou & Sutcliffe, 1978; Mundt & Connors, 1999).

Types of Stress. Olpin and Hesson (2007) designated stress as having two categories: "good" and "bad." Bad stress may cause reactions of emotional exhaustion, illness, and ultimately burnout. Good stress is related to performance--as the good stress increases, so will performance. This relationship can ultimately deteriorate when good stress becomes bad stress. There is also a difference between stress and distress. Distress in the workplace is defined in the *Job Stress Survey* manual as a stress score that is above the 70th percentile when compared to the norm data (Spielberger & Reheiser, 1999).

Reaction to Stress. When encountering adversity, an individual's first reaction is an evaluation of the stressful character of the situation, followed by an evaluation of an individual's capacity to confront the situation. Following these evaluations, an individual will then use strategies of adaptation from the cognitive and behavioral domains to deal and cope with the event (Montgomery & Rupp, 2005). Coping is essential to handling the daily stress in an individual's life and career. Coping is an "effort to master, reduce, or tolerate the demands that are created as a consequence of a stressful transaction" (Carmona, Buunk, Peiró, Rodríguez, & Bravo, 2006, p. 87). There are two identified categories of teacher coping behaviors: emotion-focused (palliative) and problem-focused (direct action) (Admiraal, Korthagen, & Wubbles, 2000; Dewe, 1985; Kyriacou, 2001; Leiter, 1991). Problem-focused coping behaviors are the most effective for teachers as they include strategies of action, such as defining the problem, developing alternative solutions, evaluating the alternatives, selection of a solution, and finally followed by taking action. Teachers who use problem-focused coping behaviors see conditions as changeable and are thus empowered (Kyriacou, 2001). By contrast, emotion-focused coping behaviors consist of defensive strategies including avoidance, minimization, and distancing. Emotion-focused strategies focus more on dealing with the emotions associated with the stress, rather than

handling the source of the stress (Kyriacou, 2001). Individuals using emotion-focused coping strategies believe the environmental conditions are unchangeable. Emotion-focused coping is cyclical in nature-- the escapist-type reactions to the chronic stress found in the workplace have a cumulative effect of burnout, which in turn cues escape-type reactions (Bandura, 1997).

Burnout

Definition of Burnout. A lack of coping with stress in effective ways can lead to burnout. Burnout is defined as a syndrome that typically affects people in jobs with high levels of social and ethical responsibility and is described as a state of emotional, physical, and attitudinal exhaustion (Freudenberger, 1974; Guglielmi & Tatrow, 1998; Maslach, 1984). Sarason (1983) pointed to society's emphasis on individualism over sense of community, making it difficult for those involved in human service professions, such as education, to remain committed to the career.

Causes of Burnout. Burnout is a result of a breakdown of a teacher's effective coping mechanisms or a product of ineffective coping mechanisms (Vandenberghe & Huberman, 1999). Burnout is a result of the accumulation of positive and negative emotional responses that occur as a result of coping mechanisms (Montgomery & Rupp, 2005). Teacher burnout is characterized by decreased sense of personal accomplishment through the perception of lack of efficacy and depersonalization. Burned out teachers often develop a calloused, cynical, and negative attitude towards students, parents, and colleagues (Vandenberghe & Huberman, 1999). Teacher burnout can lead to psychosomatic and psychological illness, absenteeism, and early retirement (Bauer, 2005; Vaughn, 1990).

Typically, these studies focus on sources of teacher stress (Anderson, 2010; Kyriacou, 2001; Kyriacou & Sutcliffe, 1978; Lazarus & Folkman, 1984; Montgomery & Rupp, 2005; Mundt & Connors, 1999; Torres, Lambert, & Lawver, 2009; Torres, Lambert, & Lawver, 2008; Vaughn, 1990), symptoms and the cause of burnout (Byrne, 1998; Croom, 2003; Evers, Welko, & Brouwers, 2004; Freudenberger, 1974; Maslach, 1982; Straquadine, 1990; Zunz, 1998). Agriculture teachers are at a high risk for teacher burnout as a result of the many extra responsibilities that they were assigned (Straquadine, 1990; Vaughn, 1990). Croom (2003) identified that agriculture teachers experience moderate levels of emotional exhaustion that are work related. However, low levels of depersonalization and a high degree of personal accomplishment with younger teachers having higher levels of depersonalization were found; it should be mentioned that this study only examined teachers who were currently teaching and not those who had left the profession. Teaching is a profession in which there are ups and downs on a daily basis leading to an almost constant exposure to stress. Burnout is the result of the strain that constant stress can have on the psyche (Hobfall & Shirom, 1993). Resilience is an individual characteristic that has been found vital to combat burnout (Brunetti, 2006; Castro, Kelly, & Shih, 2010; Howard & Johnson, 2004; Patterson, Collins, & Abbott, 2004; Tait, 2008).

Resilience

Luthans (2007) described resiliency, hope, optimism, and self-efficacy as constructs of the concept of Psychological Capital. Psychological Capital or PsyCap refers to the positive state of development of an individual being an indicator for performance and attitudinal behaviors (Luthans, 2007). Additional research indicated resilience is proactive and reactive in nature

(Bonanno, 2004; Reivich & Shatté, 2002). Evidence is building that self exploration and resilient qualities are expanded through the process of experiencing setbacks, which leads to personal growth and increased strength (Luthans, 2007).

Resilience is a phenomena defined by success in spite of adversity (Bandura, 1997; Luthans, 2007; Masten, 2001; Reivich & Shatté, 2002). In the 1970's, psychologists and therapists began observing the success of children faced with genetic and experiential adversity overcoming the odds. This phenomenon was labeled as resilience. Bandura (1997) described instances where children growing up in chronic poverty, victims of many forms of abuse, poor parenting, and mental disorders somehow manage to overcome these factors to become socially competent, academically achieving, and fulfilled adults contributing positively to society. These observations drew the interest of researchers, whose investigations have produced much data as well as many models and methods about the phenomena of resilience (Masten, 2001). There are four uses for resilience. The first three are reactive in nature, guided by the human desire to protect and defend ourselves. Included are: overcoming obstacles, bouncing back, and steering through the adversity of everyday life. The fourth use is reaching out of one's comfort zone to achieve higher. This is unique from the three other uses because it is proactive in nature, requiring one to be open to new experiences and challenges (Reivich & Shatté, 2002).

Masten (2001) stated that the concept of resilience requires judgment on both the perceived level of threat and the criteria on which an outcome is evaluated. The first type of judgment regards inference of threat, meaning that one cannot be considered resilient if he or she has not been subjected to a significant threat to development. The level of perceived threat is influenced by risk factors and assets or resources. Risk factors are defined as phenomena statistically associated with higher incidences of "bad" results, such as a lack of monetary resources or a recent traumatic life event. Assets, or resources, are associated with more positive outcomes, such as a special talent or an experienced mentor. The second type of judgment requiring inference is the criteria on which an outcome is evaluated as "good" or "bad" (Masten, 2001). Much controversy surrounds exactly how an adaptation or developmental outcome is to be evaluated and to what standard it is compared (Luthar, Cicchetti, & Becker, 2000; Masten, 1999).

Teacher Resilience

Blurred lines for value systems and ethical behavior, constant change, and increased competition typify today's workplace. These factors make resilience a very important characteristic of employees (Luthans, 2007). The positive psychology view of resilience defined previously is now being applied to the organizational workplace, (Luthans, 2007) and more specifically the school environment as an organization. Those who are unable to effectively cope and adapt will find the workplace described before to be stressful. Teacher resiliency is operationally defined for this study as *the capacity to adjust to adverse conditions to increase one's competence, achieve school goals, and remain committed to teaching*. Teacher resiliency is essential to success in the classroom and retention of teachers (Bobek, 2002; Brunetti, 2006; Patterson, Collins, & Abbott, 2004). The current environment of public schools make resilience vital to teachers, however there is an overarching lack of understanding of the resilience development of adults in the workplace setting (Bobek, 2002; Luthans, 2007). Teachers working in inner city high schools face great challenges within the diversity of the student body that require resilience (Brunetti, 2006). Bobek (2002) described the importance of resilience in teachers in order to be

able to cultivate that trait in students. Brunetti (2006) found resilience to be a critical factor in teacher productivity in an inner city classroom. When the information gleaned from the study of teacher resilience is applied to the specific context of agricultural education, the vitality of resilience in this field is very obvious when the nature and responsibilities of the occupation of agricultural educators is considered (Anderson, 2010; Croom, 2003; Straquadine, 1990; Torres, Lambert, & Lawver, 2009; Vaughn, 1990; Walker, Garton, & Kitchel, 2004).

Two theoretical approaches to teacher resilience have been defined. Gu and Day (2007) describe a multidimensional approach in which personal and environmental factors merge to compose teacher resilience. Patterson, Collins, and Abbot (2004) describe a strategic approach in which teacher resilience is a process of adaptation in which different strategies are engaged. Castro, Kelly, and Shih (2010) adopted a position utilizing aspects from both the multidimensional approach and the strategy approach. They identified teachers as "active agents, adopting various strategies to find balance and achievement in the face of adversity, often caused by minimal resources and challenging working conditions" (Castro, Kelly, & Shih, 2010, p. 623). People who are resilient in the face of adversity display three common characteristics. The first is that they develop a plan for overcoming the adversity through a task-oriented coping style. The second is that they have a belief in their own ability to overcome adversity and control the outcomes in life events. The third is that they utilize their connections with other people as a coping mechanism (Reivich & Shatté, 2002). Not coincidentally, all three of these characteristics fall into the problem-based coping style described by researchers (Admiraal, Korthagen, & Wubbles, 2000; Bandura, 1997; Kyriacou, 2001; Leiter, 1991). The capacity to adjust to adverse conditions to increase one's competence, achieve school goals and remain committed to teaching is essential for teachers to survive and even thrive in the current conditions of today's educational environment (Castro, Kelly, & Shih, 2010; Gu & Day, 2007; Patterson, Collins, & Abbot, 2004;

Objective Two: Synthesize and summarize literature that connects teacher resiliency to agricultural educator stress and burnout.

The goal of objective two was to synthesize the literature that connected teacher resiliency to agricultural educator stress and burnout. The results from the synthesis of seven studies from the category of teacher resilience and nine studies from the agricultural educator burnout and stress category are displayed in the following figures.

Characteristics of resilience found to be employed by teachers in the classroom included: help seeking and had a strong system of support, advanced problem solving skills, effective management of difficult relationships, had a sense of occupational agency, occupational competence, pride in achievements, flexible and adaptive, and utilized effective time management strategies leading to a positive work-life balance (Brunetti, 2006, Castro, Kelly, & Shih, 2010; Day & Gu, 2007; Howard & Johnson, 2004; Patterson, Collins, & Abbott, 2004; Roberts, Dooley, Harlin, & Murphrey, 2006; Tait, 2008). Figure 1 displays the summary of literature on teacher resilience.

Teacher Resilience					
Author (Year)	Study Purpose	Participants	Context of Stress/Burnout	Indicators of Resilience	Results/Themes
Brunetti (2006)	Describe what motivates experienced inner city high school teachers to remain in the classroom.	California inner city high school teachers Surveyed: 33 Interviewed: 4 Females, 5 Males	Student body: high poverty, 33% ELL, >91% ethnicity other than Caucasian, bottom 10% of state in achievement	Motivators for remaining in the inner city classroom	--*Motivators* 1) Devotion to students 2) Pursuit of professional fulfillment 3) Support received from administrators, peers 4) Organization and management of school
Author (Year)	Study Purpose	Participants	Context of Stress/Burnout	Indicators of Resilience	Results/Themes
Castro, Kelly, & Shih (2010)	Describe resilience strategies employed by first-year teachers in high-needs areas.	15American first-year teachers in high-needs areas 5 rural, 5 Urban, 5 Special Education	Challenges &/or major concerns during first year of teaching	Resources and strategies relied upon by new teachers in response to challenges a	--*Resilience strategies:* 1) Help seeking: difficult for new teachers 2) Problem solving: learn more advanced techniques 3) Managing difficult relationships: with adults inside & outside of school
Day & Gu (2007)	Investigate factors contributing to variations in teachers' effectiveness in different phases of their professional lives working in a range of schools in different contexts.	300 British teachers (VITAE Study)	Teachers are teaching in societies that are observing high rates of change in expectations, norms and behaviors	Teacher motivation, commitment, & effectiveness	--*Negative impact:* 1) Poor student behavior 2) Heavy workloads / additional responsibilities 3) Work-life tensions 4) Excessive paperwork 5) Adverse personal events 6) Frequent change with new educational initiatives 7) Poor health 8) Lack of in-school support --*Positive impact:* 1) Positive support from colleagues & administration 2) Promotion/Recognition 3) Quality personalized professional learning activities 4) Positive teacher-pupil relationships 5) Balancing personal & work life
Howard & Johnson (2004)	Determine if resilience as a concept is relevant to teachers.	10 Australian teachers 9 Females 1 Male	Coping effectively in high stress conditions & resisting burnout for an extended period of time	Protective factors of resilience used by teachers.	1) sense of agency 2) strong support group 3) pride in achievements 4) competence in areas of personal importance
Patterson, Collins, & Abbott (2004)	Examine strategies used by classroom teachers and leaders in building resilience and factors that influence the decision to remain in large urban school environments.	8 teachers & 8 teacher leaders from urban districts with at least 3 years of service	Urban schools = context of ongoing adversity	Characteristics of resilient teachers	1) Have a set of personal values that guides their decision-making. 2) Place a high value on professional development &find ways to get it. 3) Provide mentoring to others. 4) Are not victims—they take charge & solve problems. 5) Stay focused on the children 6) Do whatever it takes to help children be successful. 7) Support network of friends/colleagues 8) Flexible 9) Know when to get involved and when to let go.
Roberts, Dooley, Harlin , & Murphrey (2006)	Identify the required competencies & traits of successful agricultural science teachers.	40 American preservice and inservice agricultural educators	Agricultural education teachers have many responsibilities associated with their occupation	Characteristics of effective teachers	1) Caring/understanding 2) Internal motivation 3) Enthusiasm 4) Open-mindedness 5) Planning/organizing skills 6)Time Management 7) Resourceful 8) Responsibility 9) Creativity 10) Patience 11) People skills
Tait (2008)	Explore the relationships among resilience, personal efficacy, & emotional competence and	4 Canadian first-year teachers 3 Females, 1 Male	Rating of "quite" or "very" for the stressfulness of the first year of teaching	Rating of "quite" or "very" for satisfaction with choice of career in spite of a	--*Stressors:* 1) Concerns related to parents . 2) Concern for students with special education needs. 3) Frustrated with school bureaucracy.

	their impact on first-year teachers' sense of success, confidence, & commitment to the profession			stressful first year	--*Resilience:* 1) Recognized the signs of stress. 2) Utilized a variety coping strategies. 3) Sought social support. 4) Cared for health.

Figure 1. Summary of research on teacher resilience.

Several factors were indicated in agricultural educators as stressors and ultimately causes of burnout. Indicators of burnout found to be displayed in agricultural educators were moderate levels of emotional exhaustion (Chenevey, Ewing, & Whittington, 2008; Croom, 2003). Precursors to burnout in the agricultural educator were found to be: high levels of emotional exhaustion, high levels of occupational stress, and high levels of personal strain (Chenevey et al., 2008). Sources of stress for agricultural educators included: classroom management and student discipline, time management and work-life balance, occupational competence, program budgets and finances, working overtime, sex of teacher, work load, and lack of colleague and administrator support (Anderson, 2010; Mundt & Connors, 1999; Torres, Lambert & Lawver, 2008; Torres, Lawver, & Lambert, 2009; Walker, Garton & Kitchel, 2004). Factors found to decrease levels of burnout and in turn increase retention included: monetary benefits (salary, retirement, and insurance), adequate materials and facilities, positive work climate, administrator and colleague support, adequate time allotted for job responsibilities, advancement and security, and factors internal to the teacher such as inner sense of competence and effectiveness through observing student success (Morris, 2006; Walker, Garton, & Kitchel, 2004). Figure 2 displays a summary of literature on agricultural educator stress and burnout.

Agricultural Educator Stress and Burnout					
Author (Year)	Study Purpose	Participants	Context of Stress/Burnout	Indicators of Resilience	Results/Themes
Anderson (2010)	Identify stressors of 2010 agricultural student teachers	39 Agriculture student teachers from UK and OSU 14 Females, 25 Males	Beginning agriculture teachers experience the stress of adjusting to the occupation	N/A	--*Stressors:* 1) Classroom management / discipline 2) Time management 3) Technical competency in all areas of agriculture
Chenevey, Ewing, & Whittington (2008)	Describe the occurrence & levl of burnout of agricultural teachers.	145 Ohio agriculture teachers	Increased demands on teachers & decreased funding	N/A	--*Precursors to burnout:* 1) High levels of emotional exhaustion 2) High levels of occupational stress 3) High levels of personal strain --Ag teachers in this study were not experiencing occupational stress
Croom (2003)	Determine the level of burnout experienced by agriculture teachers using the MBI.	164 agriculture teachers in the southeastern US 39 Females, 125 Males	Emotional exhaustion and depersonalization	Personal Accomplishment	--*Negative impact:* 1) Moderate levels of emotional exhaustion --*Positive impact:* 1) Low levels of depersonalization 2) High levels of personal accomplish at work
Crutchfield (2010)	Identify factors related to career retention and to explore factors related to the decision to remain in the agricultural teaching profession.	Southern agriculture teachers serving 4 or more years 62 Females, 252 Males	Degrees of work engagement, work-life balance, & occupational commitment.	Decision to continue to teach	--*Negative impact:* 1) Slight to moderate conflict of work interfering with family --*Positive impact:* 1) Overall work engagement high (vigor, dedication, & absorption) 2) Moderate to strong commitment to occupation

(continued)

Author (Year)	Study Purpose	Participants	Context of Stress/Burnout	Indicators of Resilience	Results/Themes
Morris (2006)	Analyze the retention factors that influence secondary career and technical education teachers to remain in the teaching profession	154 Georgia career and technical education teachers	Teacher retention is important to the success of a school	Retention Influences of Georgia's Secondary Career and Technical Education Teachers	1) Retirement benefits and health insurance 2) Salary 3) Adequate materials and facilities 4) Positive work climate 5) Positive teaching experience 6)Adequate time to complete job responsibilities 7) Advancement 8) Security 9) Seeing students comprehend concepts 10) Inner sense of knowledge of doing a good job 11) Support from administration (was not indicated 30 years ago by teachers)
Mundt & Connors (1999)	Identify problems and challenges associated with the first years of teaching agriculture.	54 US Agriculture teachers, NVATA Outstanding Young Members	Beginning agriculture teachers experience the stress of adjusting to the occupation	N/A	--*Stressors:* 1) Curriculum issues 2) Time management 3) Classroom management and student discipline 4) Program budgets and funding
Torres, Lambert, & Lawver (2009)	Explain & predict job stress among secondary agriculture teachers.	370 Agricultural educators from Missouri & North Carolina 105 Females, 247 Males	Lack of Support Index, Job Pressure Index, & Job Stress Index	N/A	--*Job Stress Indicator (70%=distress)*: Job Stress Index: 60%ile Job Pressure Index: 67%ile Lack of Support Index: 56%ile ---Women are more stressed than men.
Torres, Lawver, & Lambert (2008)	Explore and describe the level of job stress among secondary agriculture teachers.	252 Agriculture teachers from Missouri 65 Females, 174 Males	High stress items (above norm data) evaluated by Job Stress Index	N/A	--*High Stress (Highest=1):* 1) Excessive paperwork 2) Working overtime 3) Meeting deadlines 4) Insufficient personal time 5) Co-workers not doing job 6) Critical on-the-spot decisions 7) Inadequate/poor quality equipment 8) Poorly motivated co-workers
Walker, Garton, & Kitchel (2004)	Determine the change in level of job satisfaction over time and if differences existed among those who stayed at the same school, moved schools, & left the profession.	123 Missouri secondary agricultural educators	Agricultural education teachers have many responsibilities associated with their occupation	Job satisfaction & perceived like/dislike for specific responsibilities associated with the occupation	--*Leavers:* 1) Lack of administrative support most common reason for leaving 2) Family issues ranked second 3) Enjoyed FFA/Leadership activities --*Movers & Stayers:* 1) Most enjoy tasks directly involved with students (Class/lab instruction, managing students, FFA Leadership activities, adult instruction) 2) Least enjoy administrative-type tasks

Figure 2. Summary of research on agricultural educator stress and burnout.

Objective Three: Identify a conceptual relationship between teacher resilience and agricultural educator stress and burnout.

The goal of objective three was to identify a conceptual relationship between teacher resilience and agricultural educator stress and burnout. Stressors indicated by Torres, Lawver, and Lambert (2008) were utilized as the common thread between teachers who are resilient and those who are

burned out. Figure 3 is a visual conceptualization of the relationship between stress, resilience, coping style, and burnout. Through this synthesis of research, a relationship was found between teacher resilience, a problem-focused coping style and essential assets and resources. A relationship was also found between teacher burnout, an emotion-focused coping style and existing risk factors.

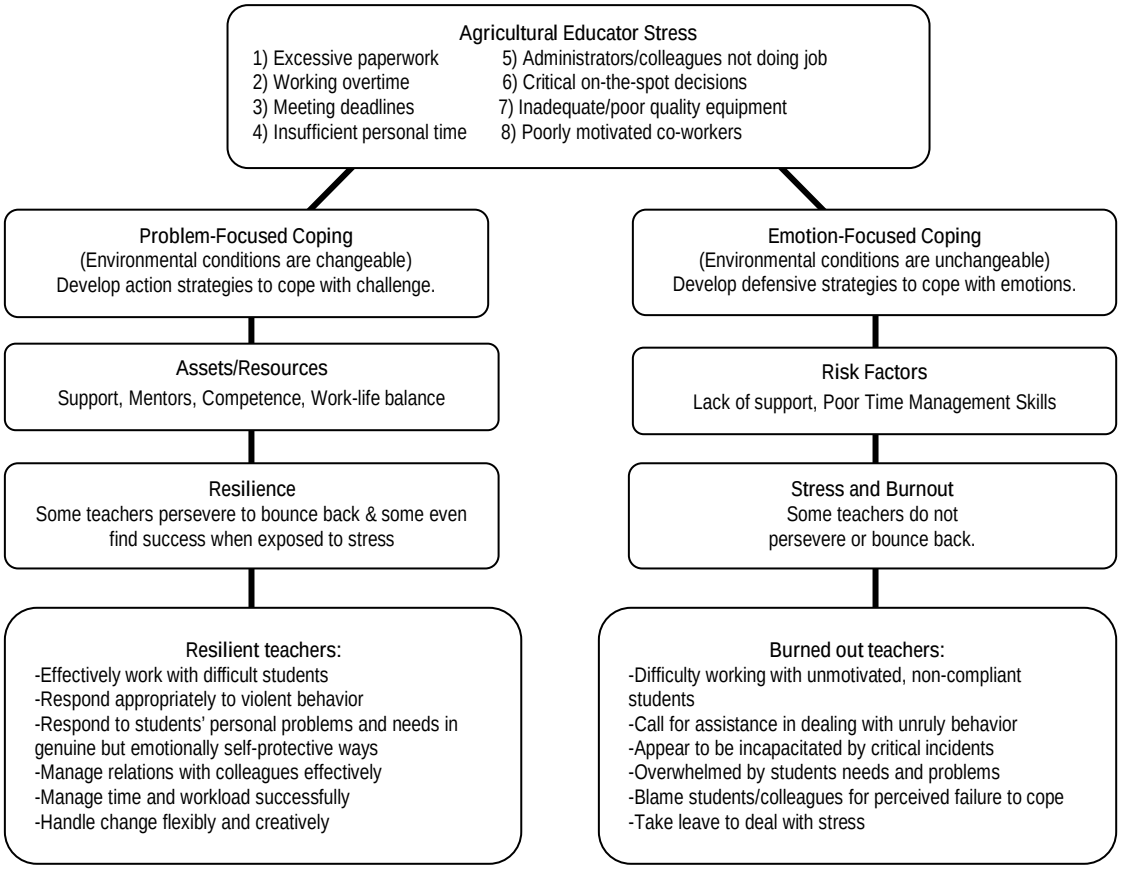

Figure 3. Conceptual model of the relationship between teacher resilience and agricultural educator stress and burnout. Adapted from "Resilient Teachers: Resisting Stress and Burnout," by S. Howard, and B. Johnson, 2004, *Social Psychology of Education,* 7, p. 406.

Objective Four: Synthesize recommendations for further research on teacher stress, burnout, and resilience.

The goal of objective four was to synthesize recommendations for further research on teacher stress, burnout and resilience. For clarity and organization, this objective will be divided into recommendations for practice and recommendations for further research.

Recommendations for Practice

Stress. Teacher education programs and administrators should proactively educate teachers on coping resources, time management, and stress management techniques (Chenevey, Ewing, & Whittington, 2008; Croom, 2003; Howard & Johnson, 2004; Mundt & Connors, 1999: Torres, Lawver, & Lambert, 2008). Agricultural educators should be encouraged to seek opportunities to

network and build a support group through professional opportunities and organizations (Torres, Lawver, & Lambert, 2008).

Burnout. There is a need for an awareness of the issues of burnout as they relate to agricultural educators among the agricultural educators themselves (Chenevey et al., 2008; Croom, 2003). Those involved in the agricultural education profession must become active advocates for the improvement of the educational environment in which teachers work (Croom, 2003; Torres, Lambert, & Lawver, 2009; Torres, Lawver, & Lambert, 2008). School professionals need to recognize that teachers in different phases of their lives have differing professional and personal needs (Day & Gu, 2007; Patterson, Collins, & Abbott, 2004). An atmosphere of support from teacher leaders and administrators needs to prevail to ensure teacher needs are being met (Day & Gu, 2007; Torres, Lawver, & Lambert, 2008).

Resilience. Administrators should work to recruit and retain teachers with high resilience (Brunetti, 2006; Patterson, Collins, & Abbott, 2004; Tait, 2008). Teacher preparation programs should implement more strategic admission processes to choose candidates who will be successful as teachers (Tait, 2008). As a follow-up, design of an instrument to measure teacher resilience would be useful in the selection of applicants for teacher preparation programs as well as educator positions in the schools (Tait, 2008). The ability to work with diverse students as a competency of effective agricultural educators is identified by Roberts, Dooley, Harlin, and Murphrey (2006). Teacher preparation programs should integrate problem-solving strategies and techniques into the training process through teaching case studies, action research oriented projects, and encourage more advanced problem solving skills. Teacher educators should initiate discussions concerning professionalism, managing parent and colleague relationships, and the school as a workplace. Teacher preparation programs should also consider implementing a cohort system to foster the concept of peer-support and foster an atmosphere of support that encourages students to seek advice and guidance (Castro, Kelly, & Shih, 2010; Howard & Johnson, 2004). Schools should implement school-wide behavior management programs to support teachers through common and emergency situations (Howard & Johnson, 2004). Achievements of teachers should be celebrated and recognized (Howard & Johnson, 2004).

Recommendations for Further Research

Stress. Researchers identify a definite need for further investigation on the subject of educator agricultural educator stress. The recommendation was made to examine stressors and job satisfaction for teachers across the continuum of service, from preservice to retirement (Anderson, 2010; Walker, Garton, & Kitchel, 2010). Analysis of stress by sex is called for, as it is posed that men and women may have different perceived stressors (Anderson, 2010; Tait, 2008; Torres, Lambert, & Lawver, 2009). Further analyses of stress and the ways that teachers cope and struggle are needed to provide greater depth on the subject (Anderson, 2010; Castro et al., 2010; Torres, Lambert, & Lawver, 2009; Torres, Lawver, & Lambert, 2008). Castro et al. (2010) recommend an examination of the influence of personal attribute on the type of strategies and coping mechanisms employed by the teacher (Castro et al., 2010).

Burnout. The process of burnout should be investigated in those who have exited the profession, as there has been a focus on those who remain (Chenevey et al., 2008; Croom, 2003; Walker, Garton, & Kitchel, 2004). Research is need on deterrents to stress and burnout of agricultural educators should be investigated so that preventive measures can be investigated (Chenevey et

al., 2008). Croom (2003) indicates the effects of school reform on teacher burnout should be examined as well as the effectiveness of induction programs in teaching preservice teachers to successfully cope with the demands of being an agricultural educator.

Resilience. The knowledge of teacher resilience as a concept is very limited, and even more restricted in the field of agricultural education. Brunetti (2006) calls for further investigation to determine if resilience is an inherent personality characteristic or a predisposition. Many researchers are indicating a high need for research that focuses on the resilience of particularly effective teachers in comparison to those who are not as successful and leave the profession (Brunetti, 2006; Castro et al., 2010; Roberts, Dooley, Harlin, & Murphrey, 2006). The working conditions and support necessary for teachers to perform at their optimum needs to be investigated (Brunetti, 2006; Torres, Lambert, & Lawver, 2009). Agricultural educators at all levels should be called upon to assess the total agricultural education and FFA program to determine the magnitude of the program and determine the capacity for teachers to effectively manage all components (Mundt & Connors, 1999; Torres, Lambert, & Lawver, 2009). One study indicates a need for more research on the ability of agricultural educators to work with diverse students as well as the preparation that teacher educators are providing for preservice teachers (Roberts et al., 2006).

Recommendations and Implications

The study of resilience and development of resilience in adults is in its infancy, but holds much promise to add valuable information to the body of knowledge for teachers, administrators, teacher educators, as well as those interested in organizational health. Maslach, Jackson, and Leiter (1996) stated that there is little need for more studies that examine relationships between teacher demographics and burnout, as an expansive body of knowledge exists. They call for more studies to determine the processes through which the variables of burnout function within the teacher.

Based on this research synthesis on the relationship of teacher resilience and agricultural educator stress and burnout, the following recommendations for further research are presented:

1.) The influence of the two types of coping mechanisms on agricultural educator retention, stress, and burnout through investigating teachers who are successful and thriving compared to those who leave the profession.
2.) Methods for improving the coping mechanisms employed by teachers to aid in preventing burnout and attrition.
3.) The influence of resilience of agricultural educators on retention, stress, and burnout.
4.) Characteristics and qualities of effective and resilient agricultural educators.
5.) The impact of agricultural educator resilience, teacher stress, and burnout on student outcomes.
6.) Development of an instrument to accurately measure resilience of both preservice and inservice agricultural educators.

Teachers, administrators, and teacher educators should be concerned with the resilience of our agricultural education teachers in order to ensure that our students are getting an optimal education from teachers who are performing at their full potential.

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Research Priorities within the Science Roadmap for Agriculture: Revisions 2009

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Abstract

The Experiment Station Committee on Organization and Policy (ESCOP) was formed to assist land-grant universities to tackle the important research questions currently facing the agricultural industry. The ESCOP "Science Roadmap for Agriculture" is updated every five years to provide direction for agricultural research over the next decade. Each research priority is specific enough that direction is given, yet broad enough each researcher may find their own interests within the topic. In 2009, this roadmap was once again updated. A total of 457 individuals were nominated from land-grant universities, and 240 completed the fourth survey. Using the Delphi process, information was gathered as to which research priories should be on the forefront of current research. Through this, 56 new research priorities were created, while a total of 64 received a positive consensus over 60%. The research priorities receiving the highest consensus were related to the management of natural resources and renewable energies. Many of the highest rated priorities also mentioned the improvement of sustainable agricultural practices. Further, the 2009 research priorities had more social science implications than in years past. With this information, funding and instruction can be provided to the areas that are deemed most necessary for immediate action.

Introduction

American agriculture continues to evolve as the public and producers are challenged with pressing domestic and global issues, as well as with changing public whims. Dramatic changes in agriculture have been influenced by the increasing reliance upon renewable energy, the advent of community-supported agriculture, the ongoing shift toward organic methods of production, and the local-food and whole-food movements, among others. Headlines read, "Can the earth provide enough food for 9 billion people?" (Francis, 2008); "News analysis: Students may need a grounding in agriculture as much as in the liberal arts" (Carlson, 2008); and "Farmer in chief" (Pollan, 2008). Clearly, agriculture is on the minds of many in America.

Dr. Gale Buchanan, Chief Scientist and Under Secretary for Research, Education, and Economics in the United States Department of Agriculture (USDA), recently indicated that the face of agriculture and of rural America is changing (Buchanan, personal communications). As this population is increasingly more diverse, with many disengaged with farming and production agriculture, a new dynamic is developing. Agricultural industry cultivates entrepreneurs. It provides opportunities for spin-off industries, and many farm families also generate substantial income from other occupations related to these spin-off industries. Many other people live in rural areas and do not farm but must deal with actions of agriculture. This generates social issues among non-agriculturalists. Rural education is a continuous, ongoing process, as in the case of *Extension* to assist these changing demographics. Agricultural production is increasing in diversity, with amplified emphasis on specialty crops and niche marketing.

USDA is also altering its funding processes (Buchanan, personal communications). Federal government research support is used to enhance and augment research, but not as the mainstay for discovery. Collaboration is necessary to build capacity in research, especially for local areas. Competitiveness is the mantra for funding. Research in all facets of agriculture must include social sciences in the planning processes of grants. With the social, economic, and political forces at play in rural America and in agriculture, grantees must build resilience into programs. With all of these changes and challenges, what are the grand challenges that agriculture can help contribute possible solutions toward solving? What are the research priorities of the community of agricultural researchers at land-grant universities and experiment stations?

Theoretical Framework

Wilson (1989) proposed the idea of grand challenges in the area of computational science. Grand challenges are "unsolved scientific problems of extraordinary breath and importance which will demand continuing … advances throughout the forthcoming … era" (p. 171). Since this initial proposition, other fields outside of computational science have adopted the stance to help frame and address the largest and most significant challenges in an area. A grand challenge exhibits at least the following characteristics:

1. It is demonstrably hard to solve, requiring several orders-of-magnitude improvement in the capability required to solve it.
2. The problem cannot be unsolvable. If it probably can't be solved, then it can't be a Grand Challenge [*sic*]. Ideally, quantifiable measures that indicate progress toward a solution are also definable.
3. The solution to a Grand Challenge [*sic*] problem must have a significant economic and/or social impact (Lunceford, ¶3, 2001; Nyerges, 2006).

Each of these grand challenge problem areas may be addressed by identifying the pertinent research priorities that define the challenge problem area. The individual research priorities were meant to be specific enough to create a request for proposals, yet also general enough that individual researchers could find their place within the priorities.

The ESCOP Science and Technology Committee is charged with "promoting and enhancing science and technology in the land-grant university system" (ESCOP, ¶1, 2008). This committee advises about and defines the researchable problems and fundable opportunities in and about agriculture in the broadest sense. The committee helps "identify future directions and anticipate and respond to research needs and opportunities for funding" (ESCOP, ¶1). Following this charge and function, the 2009 Science and Technology Committee initiated a Delphi process to amend and/or confirm research priorities associated with the existing grand challenge problem areas, thereby updating the USDA *Science Roadmap*. Prior iterations of the USDA *Science Roadmap* were conducted in 2001 (National Association of State Universities and Land-Grant Colleges (NASULGC), & ESCOP, 2001) and in 2006 (NASULGC, ESCOP, & Gage, 2006).

Objective

The research objective was to determine the research priorities under each of the existing grand challenge problem areas as posited by the 2006 version of the USDA *Science Roadmap*

(NASULGC, ESCOP, & Gage, 2006). In doing so, the updates are meant to aid in determining in what areas agricultural research should receive the most focus over the next decade. The research priorities were to be researchable problems that were broad enough for individuals to find a niche yet specific enough direction is given.

Methodology

Approximately every five years the ESCOP *Science Roadmap* is updated to provide direction for agricultural research over the ensuing decade. In order to accomplish this task in 2009, the Delphi methodology was used. The Delphi method is a "set of procedures for formulating a group judgment for subject matter where precise information is lacking" (Dalkey, Brown, & Cochran, 1969, p. 7; Dalkey, 1969). The Delphi technique may be used as a method to solicit interpretations, predictions, or recommendations (Strauss & Zeigler, 1975), using a purposively selected panel of experts who possesses competence on the question, represent the chosen population, and have been nominated by peers to remove researcher bias (Gordon, 1994). Experts may express a wide range of diverse opinions (Stufflebeam, McCormick, Brinkerhoff, & Nelson, 1985). Participants in this Delphi research were nominated between June to August 2009 for their knowledge on the agricultural industry and current research being conducted in agriculture. Faculty were nominated by the research director within each college of agriculture at all land-grant institutions, including the 1862-, 1890-, and 1994-institutions. In all, 457 nominations were secured by providing the research team with the individual's name and email address. A total of 240 participants responded to the final round of the Delphi method. Round 1 had 264 respondents for a 57.8% response rate. Round 2 had 260 respondents for a 56.9% response rate. Round 3 had 249 respondents for a 54.5% response rate. Round 4 had 240 respondents for a 52.5% response rate.

Participants were asked to complete four rounds of Delphi questionnaires. Questions (research priorities) used in Round 1 were generated from the previous science roadmaps for agriculture which was created and updated by NASULGC and the ESCOP Science and Technology Committee in 2001 and 2006. For the first round, research priority wording remained exactly as presented in previous science roadmaps in nearly all instances. This allowed direct comparison of the perceived importance for each research priorities from the past studies. The first three rounds involved participants response to proposed research priorities in a summated rating scale format of (5) *strongly agree* to (1) *strongly disagree*. The final round consisted of a dichotomous *yes-no* format, answering the question as whether each particular research priority should be included in the updated *Science Roadmap for Agriculture*.

In Rounds 1 through 3, questions with a mean response of greater than 3.0 and standard deviation of less than 1.0 were considered to have garnered sufficient consensus, were accepted, and were held for Round 4. Questions with a mean value below 3.0 were dropped from further consideration. In Rounds 1, 2, and 3, respondents were offered the option to reword or add additional relevant and imperative research priorities that they thought were missed in the original questionnaire. Agricultural scientists were encouraged to consider existing priorities and also propose new research priorities arising from the current state of agriculture. The new priorities and grand challenge areas were formed from these open-ended questions. For Round 4, the final round, research priorities were retained that garnered greater than 60% consensus among respondents.

Survey Sample

The research sample was compiled by emailing the deans and directors from all land-grant universities across the nation. In early May, 2009, an email was sent to deans and directors, which asked them to provide the names and contact information of five individuals with substantial knowledge and perspective of current research and issues within the agricultural industry. The director from each university was then also asked to participate in the Delphi process as well. Of the 457 possible participants, 240 (52.5%) completed Round 4.

On June 9, 2009, once the participants' names were compiled, each participant was emailed a welcome letter explaining the study and the basis for their selection. The Round 1 questionnaire was available for completion on www.surveymokey.com from June 11 to 17, 2009. The results from Round 1 were then analyzed using inductive analysis to collapse themes where appropriate, and the Round 2 questionnaire was created. The Round 2 questionnaire was available for completion from June 26 to July 6, 2009. Again, the results were analyzed, and the questionnaire modified to include the reworded and added research priorities recommended in previous rounds. Round 3 was open from July 10 to July 21, 2009. The Round 4 questionnaire was then created in a dichotomous format, simply asking if each priority was considered important enough to be included in the updated *Science Roadmap for Agriculture*. Round 4 was available to participants from July 31 through August 10, 2009. Participants were notified of a new round of surveying by email the day each round was opened as well as a reminder before each session was over.

Over half of the 240 respondents (55.0%) were primarily involved in some level of administration, followed by 19.2% who claimed research as their primary responsibility (Table 1). Respondents were spread across the country. Respondents were asked to provide what they considered their primary discipline of study. These were then grouped into 15 categories. While many are simply stated, a few were combinations of more than one category. *Animal science* included poultry and dairy science, applied ethology, and veterinary medicine. Included in *plant science* were plant breeding, pathology, horticulture and biotechnology. *Natural resources and environmental science* included forestry, watershed management, environmental chemistry, ecology, hydrology, toxicology, and resource management. *Agricultural economics* encompassed environmental and resource economics. *Agricultural extension* included 4-H, cooperative extension, agricultural education and communication. *Food science and nutrition* also consisted of food safety, along with nutrition and dietary studies. *Family and consumer science* also included childhood development. *Agronomy and soil sciences* contained any study of crops and soils, range management, and weed science. *Biological sciences* included biology, infectious diseases, microbiology, biochemistry and molecular biology. *Human sciences* included human ecology and rural sociology.

Respondents proposed 64 new or revised research priorities garnering over 60% consensus agreement (Tables 2 through 12). Of the 28 research objectives proposed in 2006, 15 were retained as research priorities in 2009. Of the research priorities, 38 reached consensus agreement from over 70% of the respondents.

Table 1

Respondent Demographics (n = 240).

	Valid Percentage	*n*
Discipline		
Plant science	14.6	35
Animal science	12.9	31
Agricultural economics	10.0	24
Agronomy and soil sciences	10.0	24
Natural resources and environmental science	7.1	17
Agricultural extension	7.1	17
Food science and nutrition	6.3	15
Biological sciences	5.4	13
Family and consumer sciences	4.2	10
Entomology	3.8	9
Agricultural and biological engineering	3.3	8
Administration	3.3	8
General agriculture	2.1	5
Human sciences	2.1	5
No answer or "various"	7.9	19
Primary Responsibility		
Administration	55.0	132
Research	19.2	46
Teaching	8.8	21
Extension	2.1	5
Other	7.9	19
No response	---	17
Land-Grant Institution		
1862	80.0	192
1890	11.3	27
1994	1.7	4
No response	---	17
Academic Title		
Provost	0.4	1
Dean	7.1	17
Director	17.9	43
Chair	10.8	26
Faculty	25.0	60
Other	31.7	76
No response	---	17
Geographic Region of the United States		
South	31.7	76
West	30.0	72
Northeast	18.8	45
Central	12.5	30
No response	---	17

Table 2

Identified Research Priorities with Consensus over 70% (n = 240) in the Grand Challenge Area: Develop Renewable Energy and Biofuel Systems.

Research Priority[a,b]	Consensus (% *yes*)	*N*
Develop and implement the use of alternative energy sources for agricultural purposes including, but not limited to, wind energy, biofuel, methane production, and small-scale hydroelectric, geothermal, solar, and tidal energy.	88.8	213
Develop agricultural systems that utilize inputs efficiently and create fewer waste products, especially by converting "traditional" waste products into biomass fuels and by developing secondary uses and markets for current agricultural waste products.	85.0	204
Assess the environmental, sociological, and economic impacts from the production of biofuels and co-products at local and regional levels to ensure sustainability.	77.9	187
Develop technologies to improve production-processing efficiency of regionally appropriate biomass into by-products (including biofuels).	77.5	186
Expand biofuel research with respect to non-arable land, algae, pest issues that limit biofuel crop yields, and emissions of alternative fuels.	73.8	177
Investigate the opportunity costs of biofuel production from food crops, agricultural waste, and other sources.	71.7	172
Average of research priorities for the Grand Challenge	79.1	

[a] Grand Challenges are listed in order of mean level of agreement of the priorities reaching 60% consensus under each, and the research priorities are listed according to their importance. This is the same for Tables 2 through 12.

[b] Denotes repeated research priority from 2006 *Science Roadmap for Agriculture*. These are denoted with their challenge and objective number from Table 2 of the 2006 *Science Roadmap for Agriculture*. This is the same for Tables 2 through 12.

Table 3

Identified Research Priorities with Consensus over 70% (n = 240) in the Grand Challenge Area: Manage Agricultural Water Usage.

Research Priority	Consensus (% *yes*)	*N*
Create new and/or modify existing profitable agricultural and natural resource systems that conserve use of and recycle water.	85.8	206
Develop technologies to improve production efficiencies of use distribution and quality of water.	85.0	204
Research the effects of global climate change with regard to water usage for agricultural production and processing methods.	77.1	185
Evaluate and enhance the water recharge value of agricultural and forestry production areas.	72.1	173
Examine the policy and legal issues relating to water use, distribution, and quality.	70.8	170
Average of research priorities for the Grand Challenge	78.2	

Table 4

Identified Research Priorities with Consensus over 70% (n = 240) in the Grand Challenge Area: Develop Agricultural Systems for a Changing Global Climate.

Research Priority	Consensus (% *yes*)	*N*
Explore relationships between global climate change, climate variability, invasive species, native species, and crop and livestock responses.	79.2	190
Develop biotechnologies that enable enhanced production of food, adaption of animal and plant food systems to face global climate change, utilization of integrated pest management, and negotiation of socioeconomic challenges to the food system.	78.3	188
Explore production systems that enhance the economic viability, improve efficiency, and/or reduce emissions of methane or other greenhouse gasses.	74.2	178
Research breeding programs, local practices, and pest and disease management systems that help animal and plant agriculturalists adapt to global climate change.	73.8	177
Average of research priorities for the Grand Challenge	75.0	

Table 5

Identified Research Priorities with Consensus over 70% (n = 240) in the Grand Challenge Area: Develop New Plant Products, Uses, and Crop Production Systems.

Research Priority	Consensus (% *yes*)	*N*
Improve crop productivity with limited inputs of water and nutrients through enhanced efficiencies, plant biology, and innovative management systems.	90.8	218
Develop strategies to enhance energy efficiency in agricultural production systems.	83.8	201
Develop technologies to improve processing efficiency of crop bioproducts (eg. biofuels, pharmaceuticals, functional foods).[5b]	74.6	179
Investigate the interdependency of multiple land use decisions, including food, fiber, biofuels, and ecosystem services.	71.7	172
Average of research priorities for the Grand Challenge	74.4	

Table 6

Identified Research Priorities with Consensus over 70% (n = 240) in the Grand Challenge Area: Enhance Production of Safe and Abundant Food.

Research Priority	Consensus (% *yes*)	*N*
Develop methods to prevent, detect, monitor, control, and respond to potential food safety hazards in the production and processing of food crops and livestock grown under all production systems.	86.3	207
Develop food systems and technologies that improve the nutritional values, diversity, and health benefits of food.[1b]	82.9	199
Develop strategies to detect and eliminate food-borne illnesses, bioterrorism agents, invasive species, and pathogens affecting plants, humans, and animals.[1d]	80.8	194
Decrease dependence on chemicals with harmful effects to people and the environment by optimizing effective crop, weed, pest, and pathogen management strategies.	71.3	171
Average of research priorities for the Grand Challenge	73.0	

Within the grand challenge area named, *Develop New Animal Production Practices, Products, and Uses*, one priority surfaced with greater than 70% consensus. It was to promote animal health and well-being in all production systems through enhanced nutrition, efficiency, utilization of non-traditional feeds, genetics, and disease reduction (77.5% consensus from 186 respondents). The overall average of research priorities for this grand challenge was 72.1%.

Within the grand challenge area named, *Improve the Economic Return to Agricultural Producers*, two priorities surfaced with greater than 70% consensus. They were (a) develop sustainable production systems that are profitable, productive, and include integration of crop and livestock production systems[3a] (81.7% consensus from 196 respondents), and (b) provide evidence-based recommendations for alternatives to the current price support system that encourage agricultural production (76.7% consensus from 184 respondents). The overall average of research priorities for this grand challenge was 71.8%.

Table 7

Identified Research Priorities with Consensus over 70% (n = 240) in the Grand Challenge Area: Maintain a Sustainable Environment.

Research Priority	Consensus (% *yes*)	*N*
Develop efficient and sustainable farming and food processing systems that rely on renewable energy systems and decrease the carbon footprint, particularly those systems that convert agricultural wastes into biomass fuels that further improve the efficiency of production.	83.8	201
Develop environmentally friendly crop and livestock production systems that utilize sustainable feeding and pest management strategies.[2c]	76.7	184
Develop methods to protect the environment both on and beyond the farm from any negative impacts of agriculture through optimum use of cropping systems including agroforestry, phytoremediation, site-specific management, multicrop polyfarms, and perennial crops.[2a]	73.8	177
Develop innovative technologies for reducing the impact of animal agriculture on the environment.	72.9	175
Average of research priorities for the Grand Challenge	71.7	

Within the grand challenge area named, *Enhance the Uses of Biotechnology*, two priorities surfaced with greater than 70% consensus. They were (a) develop and assess the impact of nanotechnology for pathogen and pest identification, detection, and eradication, with the overall goal of improving human health (78.3% consensus from 188 respondents), and (b) assess the safety and effectiveness of genetically-engineered organisms on human and environmental health (77.1% consensus from 185 respondents). The overall average of research priorities for this grand challenge was 71.8%.

Table 8

Identified Research Priorities with Consensus over 70% (n = 240) in the Challenge Area: Increase Public Awareness of Food, Fiber and Fuel Production.

Research Priority	Consensus (% *yes*)	*N*
Increase public awareness of agricultural production and processing – including traditional and organic methods — and the societal and environmental benefits and consequences of agriculture.	74.2	178
Discover effective educational methods to help individuals make informed and healthy food choices.	73.3	176
Understand the behavioral and educational dimensions (personal, consumption, and policy) that influence personal and family dietary and health decision-making to reduce public health issues, such as obesity.	70.4	169
Average of research priorities for the Grand Challenge	70.6	

Within the grand challenge area, *Improve the Productivity of Organic and Sustainable Agriculture*, two priorities surfaced with greater than 70% consensus. They were (a) research

feasibility and sustainability of organic and non-organic systems, especially as related to population growth and future food needs (72.5% consensus from 174 respondents), and (b) develop improved pest, weed, and disease control and management strategies for organic production (72.1% consensus from 173 respondents). The overall average of research priorities for this grand challenge was 70.1%.

Within the grand challenge area, *Develop Human Capital and Capacity in Agriculture*, one priority surfaced with greater than 70% consensus. It was to Develop farming systems that increase economic viability, social acceptability, and environmental quality of all participants in the agricultural system (73.8% consensus from 177 respondents). The overall average of research priorities for this grand challenge was 65.4%.

Table 9

Identified Research Priorities with Consensus over 60% (n = 240) in the Grand Challenge Area: Sustain Individual, Family, and Community Resilience.

Research Priority	Consensus (% *yes*)	*N*
Determine strategies to enhance the well-being of families and individuals, including those strategies that ensure access to high-quality food, health care, education, social services, and a clean, healthy environment.[4d]	75.4	181
Explore ways to introduce and measure the impact of rural and urban agricultural education, natural resources education, and food literacy education in all high schools across the nation.	66.3	159
Increase assistance to 4-H programs, FFA, and private sector youth programs that integrate environmental and agricultural topics into their curriculum.	65.8	158
Examine the economic impact of entrepreneurship and business development on rural communities, and develop new forms of economic activity built around regional trade associations, rural cooperatives, and local production networks.[4a]	62.1	149
Assess strategies for building coalitions among agricultural, environmental, academic, governmental, labor, and community development groups to facilitate scientifically sound social change in rural communities.[4b]	61.7	148
Investigate means of enhancing the problem-solving capacities of rural communities through developing leadership, implementing action plans which strengthen family and community resilience, and negotiating urban-rural interface issues.[4c]	61.3	147
Develop strategies for integration of local, regional, national, and global food systems to maximize the benefits to both U.S. and global agriculture, particularly in underserved and immigrant populations.[3b]	60.8	146
Average of research priorities for the Grand Challenge	64.8	

Research priorities with the highest group mean were related to *renewable energy and biofuel systems*, followed closely by the *management of agricultural water usage*. The two groupings of research priorities with a group mean less than 70% were (a) *development of human capital and capacity in agriculture*, and (b) *sustainment of individual, family and community resilience*. Recent developments with increasing petroleum prices and decreasing supplies of fresh potable water in certain areas have altered scientists' views of important agricultural research priorities.

Entirely new grand challenge problem areas arose from the culmination of research priorities in the areas of (a) *development of renewable energy and biofuel systems*; (b) *management of agricultural water*; (c) *development of agricultural systems for a changing global climate*; (d) *enhancement of biotechnology use*; (e) *increased public awareness of food, fiber, and fuel production*; (f) *improvement of the productivity of organic and sustainable agriculture*; and (g) *development of human capital and capacity in agriculture*. While new priorities were generated in all areas, the most new research priorities were developed in *development of renewable energy and biofuel systems*. The fewest new research priorities were developed in the *development of new animal production practices, products, and uses*. This last grand challenge problem area also garnered the fewest overall research priorities. Grand challenge problem areas with the most research priorities included (a) *enhancement the production of safe and abundant food*; (b) *maintenance of a sustainable environment*; and (c) *sustainment of individual, family and community resilience*.

Conclusions/Implications/Recommendations

The objective of this research was to help establish the research priorities for ESCOP to be addressed over the next decade. After consulting over 240 experts in agricultural research from across the nation, 64 new or revised research priorities emerged from the Delphi process. Of the 28 research objectives from the 2006 *Science Roadmap*, only 15 were retained in this current Delphi research. This finding alone supports the notion that agriculture has undergone substantial changes in the past four to five years. It also should be noted that the two grand challenge areas receiving the highest overall average relate to resource management. This indicates the changing role of agriculture.

The data collected through this study supports the increased awareness of agricultural researchers of the public's concern for agricultural production systems (i.e. sustainable, organic, etc.) and their desire to make food decisions based upon those methods of production. Further, these new priorities reflect increased concern for sustainability of our planet and the significant role that the agriculture industry has in increasing sustainability.

Overall, the research priority garnering the highest level of agreement as to importance was "improve crop productivity with limited inputs of water and nutrients through enhanced efficiencies, plant biology, and innovative management systems," followed closely by "develop and implement the use of alternative energy sources for agricultural purposes including, but not limited to, wind energy, biofuel, methane production, and small-scale hydroelectric, geothermal, solar, and tidal energy." These indicate that water conservation and alternative energies are important to research scientists in agriculture.

Of note for agricultural education, broadly defined, is the general lack of support for research priorities that most closely align with the interests of the field. As a group, *increasing the public awareness of food, fiber, and fuel production* garnered only 70.6% support, and *sustain individual, family, and community resilience* garnered only 64.8% support. Clearly, among these research scientists, the human dimensions of agriculture were only moderately important as research priorities. What can be done to enhance the importance of our critical issues among

colleagues in colleges of agriculture? Which, among these research priorities, can be used as leverage to improve the food and fiber industry?

While most (71.4%) of the respondents' disciplines would be categorized as "bench sciences," only 56.3% of the priorities could be classified as "bench sciences." This give rise to the proposition that researchers involved in agriculture are increasingly concerned with the social aspects and human dimensions of food, fiber, forestry, and fuel production. It would be expected to see increased requests for proposals from USDA related to the human dimensions of agriculture in future years. This may be the most exciting finding arising out of this research for scientists in agricultural education, communications, extension, and leadership. It is hoped that the research priorities of our current *National Research Agenda: Agricultural Education and Communication* (Osborne, 2007), and future research agendas, would also align with these ESCOP research priorities.

The impact of respondents' demographics on their notions of the importance of various research topics must be questioned, especially with the limited analyses conducted in this manuscript. It can be assumed that social scientists would consider that research in the human dimensions of agriculture to be more important than the non-human dimensions. Further, one would expect that an animal scientist, for instance, would concur that research priorities related to animal science would have the highest importance. What differences exist among the perceptions of importance of the research priorities from faculty, administrators, and extension faculty? Are there differences in the perceptions of importance among the geographic regions of the United States? If so, what are they? How do faculty from the various classifications of land-grant universities differ in their perceptions of importance of the research priorities? It would be interesting to conduct further analyses with the data set to determine how accurate these predictions are.

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A Review of Current Special Education Research in Agricultural Education

Chair/Discussant Comments by
Robert A. Martin, Iowa State University

The authors of this paper have conducted a thorough review of various manuscripts related to special needs education in agricultural education. It is logical to assume that all agricultural educators have had and continue to have special needs students enrolled in their agricultural education courses. These special needs students present some unique challenges for agriculture teachers but it can be argued that special needs learners can also present unique opportunities for teaching and learning. The study was based on the premise that summarizing the research on special needs in agricultural education will lead to developing a more clearly articulated research agenda in this topic area. Was this articulation of a research agenda in special needs in agricultural education achieved? I wonder if an agenda for research in this area should be limited to agricultural education. Wouldn't a broader context add depth to the research and lead to a greater understanding of the issues involved in addressing the problems and challenges faced by teachers?

The authors outlined the procedures used in their synthesis of research. These procedures appear to be thorough and accurate. The literature review was thorough although focused only on agricultural education. All of the studies appear to be focused on teacher perceptions. While this may be understandable, this fact alone points to the great need to design studies that could generate more powerful information. It was refreshing to note one recommendation that would take research in special needs to a new level. The authors noted that "the review of literature did not identify any studies that utilized qualitative, quasi-experimental or experimental methods to measure teacher proficiency in teaching students with special needs." I would encourage fewer perceptions studies and more analysis of what works.

This paper generates several questions.

1. So what is the specific research agenda you are proposing? A brief summary list of the specific research questions would help, although the reader has some idea from reviewing the recommendations.

2. Is a preservice approach to training teachers the best way to equip teachers to deal with special needs students? Could a combination of preservice and inservice work best? It is questionable whether or not preservice is the best approach.

3. Should experienced agriculture teachers teach these preservice/inservice courses or should special needs professionals teach them or a combination of both? When is the best time to learn how to work with special needs students?

4. It appears much of the special needs effort has been placed on how to separately address the special needs students with out-of-the mainstream strategies. How about dealing with these students as a part of the mainstream through cooperative learning, group work and other selective approaches?

I recommend the authors continue to develop the research agenda and begin the process of taking the research to a new level.

Bouncing Back: A Research Synthesis on the Role of Teacher Resilience in High School Agricultural Educator Burnout

Chair/Discussant Comments by
Robert A. Martin, Iowa State University

The authors of this synthesis of research focused on teacher resilience make a strong case for further research in the broader areas of educator burnout and teacher retention. However, I would hope that the research they are proposing takes us to a new level of inquiry instead of rehashing what we have been doing over the last 20 years. Describing the situation is a good start in the research cycle but we have done little more than that for much of the time focused on this topic. Why not attempt to experiment with different strategies and test methods to see what really works? Why not propose a model and actually test it? Why not define more carefully the first five years of teaching and the various phases teachers go through rather than placing unrealistic expectations on beginning teachers? Describing "what is" can only go so far. When are we going to "test" what works?

The authors of this paper have done a good job of describing and synthesizing some of the research on this topic. The authors cite several studies and have tightly woven the information around the references they have used. Their methods were well designed and explained. Many resources outside of agricultural education were used and I found this to be refreshing. Not that literature in agricultural education deserves criticism, but we need to mesh our research findings and literature with those of educators in the broader context of education and not be so narrowly focused. The extensive literature reviewed for this study was impressive.

This paper generates several questions that deserve some attention.

1. Don't we already know the issues of burnout? Do we really need another "burnout" study? Frankly, I'm burned up about burnout studies that simply identify the situation. Does this synthesis of research really tell us anything new?

2. Is resilience really measurable? The authors suggest an "admission test" for resilience? What would such a test contain and how would it help?

3. The authors make some references to <u>good</u> stress and <u>bad</u> stress. How could this help us teach future teachers develop a strategy for coping? What would such a strategy look like?

4. Some reference was made to "resiliency and/or effectiveness." Does resiliency equal effectiveness as a teacher? I really question this inference. I believe one could be resilient without being effective as a teacher.

5. The conceptual model on Ag Ed Stress is interesting but the question is: Are people in one or the other category or could there be a person who might be in both "camps" on any given day? I would submit that categorizing where people are in any given situation is difficult. How do we deal with that phenomenon?

I recommend the researchers take on the challenge of the next level of discovery: experimentation. Now that the basic framework has been identified it seems reasonable to expect that these researchers will move us to the next level of inquiry.

Research Priorities Within the Science Roadmap for Agriculture: Revisions 2009

Chair/Discussant Comments by
Robert A. Martin, Iowa State University

The authors of this paper provide an interesting overview of the priorities for research in agriculture conducted through the Experiment Station. The concept behind the term "grand challenges" presents a fascinating and exciting environment for developing a research agenda that promises much but demands greater collaboration across all disciplines if we are to be successful at solving real problems. Agricultural education needs to accept the prospect of developing research that fits the "grand challenges" definition presented in this paper. The paper seems to be based on a brief review of the literature and a framework that appears to be more conceptual than theoretical. In addition, for such an important topic it was surprising to find the final response rate of just over 50% for the fourth round of the Delphi. I was also surprised to find that only 12.5% of the respondents were from the central region of the United States while the other regions had much higher responses. Also, over half (55%) of the respondents indicated their primary responsibilities were administration. The results of this study appear to feed the notion that agriculture is not being broadly defined by these respondents. Social issues are not well defined in this study and readers are again left with the prospect of searching for relevance in an agenda that is still being set mainly by the agriculture traditionalists not the progressives.

This paper generates several questions that require attention.

1. How can Agricultural Education as a discipline become an active collaborator in the agricultural research agenda? What strategies should be used to become active participants in the research of the future? How can the findings of this study help in that process?

2. The tables and accompanying narrative did not appear to match and this was confusing to this reader. The researchers need to clarify the data and the explanation of these tables.

3. The research agenda to be developed out of this data appears to be very broad so as to encompass nearly every aspect of agriculture. How can this information be condensed to reflect the <u>major</u> research efforts, or is that even possible?

4. It appears that crop productivity, water and resource management as well as alternative energy are the "hot button" topics for agriculture research. What can agricultural educators do to be a part of the research in these areas? It appears that what we need in agricultural education is a research collaboration strategy rather than just a research agenda.

5. The authors suggest massaging the data further to understand what it means. Perhaps what is needed is less massaging and more creativity in finding ways to be a member of the agriculture research teams that will be developing around the major research topics.

I challenge the researchers to move beyond the perception studies on the topic and find ways to research the teaching and learning processes related to the social dimensions of the technical agriculture research highlighted by this new agenda.