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Priority Research Areas

Extension Education
Agricultural Communication
Teaching and Learning in Undergraduate and Graduate Academic Programs
Understanding the Food and Fiber System
(Agricultural Literacy)
Agricultural Leadership
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Editor's Comments

The Passing of the Reins ceremony at Texas Tech signifies the end of one Masked Rider's tenure and ushers in a new mascot and representative for the university. The new Masked Rider brings a renewed sense of enthusiasm and dedication but is acutely aware that in time, their service in the position will end as the reins are passed yet again. It is with the same sense of enthusiasm that I eagerly take the reins of the Journal of Southern Agricultural Education Research from my friend, Tim Murphy. I publically thank and praise him for five years of service to the organization and for the milestones accomplished during his time as the editor of this publication; most notably securing an ISSN number from the National Serials Data Program of the Library of Congress. I have found the organization of the Journal to be top notch and my transition a very smooth process. I can only hope that my time as editor will yield such a consistently excellent publication.

Following the procedures first implemented in 2004, articles found acceptable for publication in the Proceedings of the 2007 Southern Region AAAE Research Conference (SR-AAAERC), whose authors had indicated that they be considered for publication in the JSAER, were submitted to a second peer review process. Dr. Tom Dobbins, Clemson University, the Chair of the SR-AAAERC, also served as Co-Editor and provided information to Dr. Murphy and myself in a timely, efficient manner. The six members of the Southern Region AAAE Research Committee served as the Editorial Board for the 2007 JSAER. The members for 2007 were Anna Ball, Scott Burris, Mark Kistler, Tracy Kitchel, John Rayfield and Grady Roberts. They were great for a first-timer to work with as they were prompt to respond yet provided meaningful comments on each paper.

A total of 11 articles were submitted for consideration to the JSAER following their acceptance through the SR-AAAERC review process. Of these, nine were published. The review procedure, adopted with Volume 55, allows JSAER reviews to "Accept with Major Revision," and "Accept with Minor Revision" in addition to the "Accept" and "Reject" options available to reviewers in Volumes 53 and 54. Given these options, the following decisions were made. No articles were Accepted without Revision, eight were Accepted with Minor Revision, one was Accepted with Major Revision and two were Rejected.

At the completion of the review process, nine articles were selected for publication. The Editorial Board established a policy that the Editor would publish the total number of articles accepted in the JSAER divided by the total number of unique submissions to the SR-AAAERC. There were 56 articles submitted to the 2007 SR-AAAERC. Twenty-seven were published in the conference proceedings (48%), and nine were published in Volume 57 of the JSAER for an official acceptance rate of 16%.

As the outgoing Editor-Elect and incoming Editor, I look forward to a productive period for the Journal. All the pieces are in place to promote the JSAER as an important source of regional literature in the field.

Respectfully,

Todd Brashears, Texas Tech University
Editor-Elect, 2007

THE RELATIONSHIP BETWEEN STUDENT DEMOGRAPHIC VARIABLES AND PERFORMANCE IN A NATIONAL FFA CAREER DEVELOPMENT EVENT

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Abstract

This study examined the impact of demographic variables on participant performance in the 2005 National FFA Livestock Career Development Event. Participants were asked to respond to a wide array of demographic questions from gender to how many agricultural education teachers were in their school? The demographic variables which had the highest correlation with participant performance were: 1) Years of involvement in livestock judging, 2) Prior livestock judging experience, and 3) 4-H livestock judging experience. When looking at demographic variables for predicting team emblem based on total team score at the 2005 National FFA Livestock Career Development Event we find that: 1) Number of years involved in livestock judging, 2) Gender, 3) Grade point average, and 4) Cattle is my best specie to judge, are all significant factors in predicting gold, silver or bronze emblem placing in the 2005 National FFA Livestock Career Development Event. Examination of these demographic variables can provide insight into the recruitment and training of students for this particular career development event.

Introduction

The National FFA Organization (FFA) is committed to developing youth through premier leadership, personal growth and career success. One way FFA achieves this goal is by providing opportunities for students to showcase the knowledge and skills they have acquired in agricultural classes through a competitive venue. Career development events (CDEs) add a real world experience for students involved in agricultural education. Since 1928, FFA has worked to create CDEs that demonstrate the meaningful connections between classroom instruction and real-life scenarios (National FFA, 2006). Career development events build on what is learned through agricultural education classes and FFA activities.

These events are designed to help prepare students for careers in agriculture. Classroom instruction comes alive as students demonstrate their knowledge and skills in a competitive setting. Career development events test the abilities of individuals and teams in 23 major areas of agricultural instruction ranging from livestock evaluation to floriculture (National FFA, 2006). Currently, National FFA offers 23 different career development events and one career development activity. Regardless of the event or activity an FFA member participates in, the student will come away from this experience challenged and motivated from the experience of competing as an individual and as a team member.

Examining the demographic variables of students who participate in this event can benefit agricultural education teachers in many ways. If agricultural education teachers are aware of the demographic make-up of students who typically excel in this event, they can narrow their recruiting focus to certain students who meet these criteria. This information could be beneficial to beginning and pre-service teachers who may struggle to assemble CDE teams early in their career. Knowing how to select CDE team members based on demographic variables can lower teacher frustration and hopefully decrease burnout and teacher turnover especially with beginning teachers. This information may also be useful to other individuals such as extension agents or community volunteers who are active in the recruitment and training of youth for livestock evaluation competitions.
These demographic variables are only a point of reference for educators to focus their attention. We certainly cannot select CDE participants solely on demographic characteristics, but we can use them to our advantage as educators in making decisions that will impact students and local programs.

Conceptual Framework

Agricultural judging competitions for high school students can be traced back in history to the 1800s. According to Tenney (1977), agriculture teachers started holding judging contests soon after the Smith-Hughes Act of 1917 brought the subject of agriculture into public schools. The first state-wide contests were held in 1919 in the states of Alabama and Virginia. The first national judging competition designed specifically for secondary agriculture students was held at the 1925 National Dairy Show in Indianapolis, Indiana.

In May 1926, C. H. Lane, former Chief of the U.S. Agricultural Education Service, went to Kansas City, Missouri to meet with officials of the American Royal Livestock and Horse

Show about establishing national livestock judging contests for secondary agriculture students. In November of 1926, the National Congress of Vocational Agriculture Students held judging contests at its first convention (Tenney, 1977). Only two years later, the National FFA Organization met for the first time in 1928. The judging contests continued to be sponsored by the National Congress of Vocational Agriculture Students until 1936 (Tenney, 1977).

Judging contests continued to be a part of the National FFA Convention, but were not officially recognized as a part of the FFA program until they were renewed in 1947, after being discontinued because of World War II. Prior to 1946, contestants and teams were rated on a numerical scale and awards were given to the winners (England, 1996). After 1946, the Danish system of awards was adopted for National FFA Contests. The Danish system of awards recognizes contestants and teams with rankings of gold, silver, or bronze emblem.

The National FFA Organization has conducted judging contests at the National Convention since 1947. From 1928 until 1998, the National FFA Convention and competitions were held in Kansas City, Missouri. From 1999 to 2005, the national convention and CDEs were held in Louisville, Kentucky and were moved to Indianapolis, Indiana beginning in 2006. According to White and Christiansen (1978), the contest program has been worthwhile in regard to educational benefits received by participants. White and Christiansen (1978) also state that educational values learned in FFA contests carried over to future endeavors of contest participants.

Townsend and Carter (1983) studied the relationship between participation in FFA activities and the development of competencies in leadership, citizenship, and cooperation. They found that participation in FFA activities had a positive influence on the development of these competencies. Rathbun (1974) conducted a similar study in order to examine the relationship between involvement in vocational student organizations and student success and development. This study found that students who were heavily involved in vocational youth organizations were perceived as having higher levels of ability in leadership, citizenship, character, responsibility, confidence, and cooperation.

More contemporary literature confirms the benefits of participation in FFA contests. Vaughn, Kieth, and Lockaby (1999) found that competing in FFA provides students with a place for recognition and helps motivate students to set goals and complete tasks. Rutherford, Townsend, Briers, Cummins and Conrad (2002) found members of the FFA typically posses more leadership skills than non-FFA members. Agricultural education and FFA hold strong to the "learn by doing" method of instruction. Not only is this type of instruction practiced in the classroom and laboratory of agricultural science programs, it is supported and reinforced by activities such as career development events (CDEs) and supervised agricultural experience (SAEs) (Cepica, Dillingham, Eggenberger, and Stockton, 1988). Career development events (CDEs), formerly known as judging events are competitive FFA events that develop technical knowledge, judgment, reasoning, and sportsmanship (Cepica et al., 1988).

Career development events are a classic example of experiential learning. Conrad and Hedin (1981) defined experiential education as "educational programs taking place outside of the traditional classroom where students are in new roles featuring significant tasks with real

consequences, and where the emphasis is on learning by doing with associated reflection" (p.11). The benefits of experiential education were realized in the late nineteenth century. The movement gained support from such prominent men as Johan Pestalozzi and Frederick Froebel who argued that the most effective learning could only be achieved through doing (Weatherford and Weatherford, 1987).

Weatherford and Weatherford (1987) noted several reasons why experiential programs such as FFA and 4-H can help adolescents develop life skills. Experiential education incorporates key elements of life skills such as problem solving, critical thinking, inter- and intra- personal skills, and connecting youth with adults and the community. An effective feature of experiential education is that it incorporates the cognitive, affective, and psychomotor spheres of learning (learning by doing). The model of learning provided by experiential education is consistent with the stage of human growth, because it allows for learning to occur appropriately for the learning style and developmental level of the individual.

The benefits of participation in livestock judging have been documented for years. Livestock judging has been associated with developing a variety of employer-preferred life skills such as communication, problem solving, and decision making (Boyd, Herring, & Briers, 1992). McCann and McCann (1992) reported that the livestock judging activity provides youth with an opportunity to develop necessary life skills. Participation on livestock judging teams is credited with improved critical thinking skills, enhanced self-confidence, and development of better team skills (Smith, 1989). Rusk (2002) pointed out that when youths learn the process of evaluation through livestock judging, these same skills can be integrated into other real life situations.

Existing literature on the National FFA Livestock CDE is sparse at best. Holt (1929) conducted a study of the training of vocational agriculture judging teams. He looked at the training of livestock and dairy judging teams in Illinois and Pennsylvania. Holt found that experience in teaching vocational agriculture was not of major importance; however, he also found that a successful judging team usually required a training period of two or more years. Holt concluded that even though a small percentage of judging coaches participated in judging contests in college, a high number of those who did participate in college judging events trained successful judging teams. Holt found that many judging coaches used pictures, charts and lantern slides to train their judging teams. The coaches in Holt's study indicated that practice and drill was the most significant factor in training their judging teams (England, 1996).

Herren (1981) conducted a national study on the factors associated with success of participants in the National FFA Livestock Judging Contest. His study revealed that teams who spent more time preparing for the contest tended to score higher. Advisors who had fewer years of teaching experience tended to have higher scoring teams. Teams from states with higher populations of cattle, swine and sheep tended to score higher in the contest. Teams that participated in more contests prior to the national event tended to score higher and teams whose advisors had previous experience in the contest area performed at a higher level. Herren also concluded that teams consisting of members selected by the advisors tended to score higher.

England (1996) investigated training methods of National FFA judging teams. She found that most successful judging teams were from schools located in small towns with populations

ranging from 500 to 4,999 people. England also found that 77.5% of the advisors who trained livestock judging teams had previous experience in the livestock CDE. Experience was also a large success factor in England's study. Over 48% of students who were on a national FFA judging team were seniors in high school and reported having previous experience. Gender did not influence success of National FFA judging teams in England's study. However, over 65% of team members in her study were male.

Purpose and Objectives

The purpose of this study was to describe demographic differences between participants in the 2005 National FFA Livestock CDE and how those demographic variables influenced total team score. Total team score was then used to rank teams as gold, silver or bronze emblem. In this study there were 13 gold emblem teams, 18 silver emblem teams, and 12 bronze emblem teams. In order to accurately describe the demographic variables and how they related to team emblem, the researcher collected extensive demographic data on each participant.

Methods and Procedures

A descriptive-correlational survey design using a researcher-designed questionnaire was used to collect data for this study. The questionnaire was designed by the researchers to capture demographic information of the CDE participants. The instrument was reviewed for content and face validity by four agricultural education faculty members at a university in the southern region of AAAE. A pilot test was conducted to determine the reliability of the instrument. Seventeen undergraduate students in agricultural education and communications who had participated in livestock judging competitions participated in the pilot study. No changes were made to the instrument as a result of the pilot test.

The demographic section of the survey that was completed by the CDE participants was developed based on previous literature and from the suggestions of experts in the field of agricultural education who had trained numerous career development teams. Participants where asked to respond to:1) Gender, 2) Age, 3) Previous livestock judging experience? 4) Where did your previous experience come from? 5) Years involved in livestock judging? 6) Grade point average? 7) Which specie of livestock are you best at judging? 8) Size of FFA chapter? 9) Size of community? 10) Number of agricultural teachers are at your school? 11) Number of students who tried out for the livestock judging team at your school? These demographic variables were used to describe the participants of the 2005 National FFA Livestock CDE and helped to distinguish differences among different regions and states.

The population for this study was the participants of the 2005 National FFA Livestock CDE. In order to qualify for the National FFA Livestock CDE, teams must win their state FFA Livestock CDE which usually requires qualifying through a district or area contest format. This census study encompassed teams from 43 states with a total of 170 participants. Using the census method to collect data eliminated the threat of sampling error. Forty states consisting of 155 individuals responded to the survey yielding a 93% response rate.

Information packets regarding the study where mailed to the agricultural education teachers of the teams that registered to participate in the 2005 National FFA Livestock CDE. Each packet contained a letter explaining the purpose of the study and directions for administering the survey. The packets also contained four blank surveys with a postage paid envelope. Nineteen teams responded by mail to the initial request. The researcher followed up with the non-responders at the National FFA Livestock CDE and secured the surveys from 21 additional teams. A *t*-test was used to compare early and late responders in the survey. This yielded no significant difference. All surveys were administered by the agricultural education teacher who coached the team. This standard administration technique helped to control the threat of variation among testing conditions.

Descriptive statistics were run on the data to determine frequencies on categorical demographic data and means and standard deviations were calculated on all interval scale variables. Correlations were used to compare demographic variables among gold, silver, and bronze emblem teams. Hinkle (2003) defines correlation as the nature, or extent, of the relationship between two variables. The researcher used the Davis Convention (1971) to describe the magnitude of the correlations. Stepwise linear regression was used to describe associations among gold, silver, and bronze emblem teams based on demographic variables. An alpha level of .05 was set *a priori* in order to determine statistical significance.

Findings

Frequencies were used to describe responses on categorical demographic variables and means and standard deviations were used to describe responses to interval scale variables. Gender was divided almost equally in this study. Over half, 50.3% (n=77) reported they were male, while 49.7% (n=76) were female. More than one-half, 63.8% (n=97) reported prior livestock judging experience with 36.2% (n=55) reporting no previous livestock judging experience.

When asked to identify their prior livestock judging experience, 61.8% (n=94) stated their experience was through 4-H, while only 5.3% (n=8) reported junior FFA livestock judging experience and 7.9% (n=12) of contest participants had experience with a junior livestock breed association. Some participants reported having experience from more than one area. Participants reporting that their best specie of livestock to judge was cattle accounted for 46.1% (n= 70) of the contestants. Just 21.7% (n=33) believed their best specie to judge was sheep. The remaining 32.2 % (n=49) stated they were best at judging swine.

In regard to the size of FFA chapters these students belonged to, 17.8% (n=27) said they came from a chapter of less than 50 members. Chapters with 51-100 members accounted for 34.9% (n=53) of the survey participants, while 28.3 % (n=43) were members of chapter with 101-150 members. The 151-200 member category made up 9.2% (n=14) of survey participants and 5.3% (n=8) came from chapters with 201-250 FFA members. Only 2.6% (n=4) of the survey participants were members of chapters with 251-300 members and 2% (n=3) of the survey population reported belonging to a chapter with over 300 members.

When survey respondents answered the question "What size community is your school located in?" 5.3% (n=8) reported they lived in a community of less than 500 people. The next category of 500-2500 people yielded 28.9% (n=44) of the survey population while 35.5% (n=54) of the survey respondents stated their community had a population between 2501-10,000 people. The 10,001-50,000 people category boasted 29.6% (n=45) of the survey population and only .7% (n=1) reported living in a community of greater than 50,000 people.

Survey participants were asked to report the number of agricultural education teachers at their school. Over half 51.3% (n=77) only had one agricultural education teacher at their school. Twenty-four percent (n=36) stated there were two agricultural education teachers at their school and 14.7% (n=22) reported having three agricultural education teachers. Only 4.7% (n=7) of the survey respondents had four agricultural education teachers at their school and 5.3% (n=8) stated their school employed five or more agricultural education teachers.

The final categorical demographic variable was the number of students who tried out for the FFA livestock judging team at their school. Individuals reporting less than five members trying out for their team made up 28.9% (n=44) of the survey population. Over half 52% (n=79) of the survey respondents stated that six to ten individuals tried out for the livestock judging team at their school. Only 8.6% (n=13) reported 11-15 people trying out for their team and 10.5% (n=16) stated there were more than 15 people competing for a spot on their chapters' livestock judging team. Table 1 shows the means and standard deviations of the interval demographic variables.

Table 1
Means and Standard Deviations of Interval Demographic Variables

Variable	N	Mean	SD
Age	147	18.20	1.10
Years of Involvement in Livestock Judging	152	3.17	1.14
GPA	148	91.26	5.82

Note: Some surveys (n = 155) were missing individual responses.

Pearson's r was used to determine the correlation between demographic variables and the team's emblem at the National FFA Livestock CDE. Years of involvement in livestock judging posted a moderate correlation of .40. Prior livestock judging experience had a moderate correlation of .34 along with junior FFA livestock judging experience resulting in moderate correlation of .31. There were four demographic variables that produced negative correlations which were: I am best at judging cattle, I am best at judging swine, and the number of members in the survey participants FFA chapter, and the number of agricultural education teachers at the school reported the lowest negative correlation of
-.19. Table 2 shows the correlations between demographics and team emblem.

Table 2
Correlations between demographic characteristics and emblem based on total team score

Demographics	Pearson's *r*
Years of involvement in livestock judging	.40
Prior livestock judging experience	.34
4-H experience	.31
Jr. FFA experience	.26
Gender	.24
How many FFA members?	.21
Grade point average	.19
How many students tried out for your livestock judging team?	.18
I am best at judging sheep	.15
Jr. breed association experience	.11
Age	.05
I am best at judging swine	-.05
Your school is in what size community?	-.08
I am best at judging cattle	-.08
How many Ag teachers are at your school?	-.19

The final analysis performed in the study was to analyze the impact of demographic variables in predicting gold, silver, or bronze emblem finish at the 2005 National FFA Livestock CDE. The regression model identified four demographic predictor variables impacting a team's emblem based on total team score at the National FFA Livestock CDE. The number of years a participant had been involved in livestock judging had a positive impact. According to the model if a participant had been involved in livestock judging for four or more years, the *B* value for this predictor variable was 38.14. The model also indicated that male students had a substantial advantage at the 2005 National FFA Livestock CDE. Males had a *B* value of 70.66. A participant with a higher grade point average received a $B = 5.13$ according to the model. If participants reported cattle as their best specie to judge, the model shows them receiving -48.70 as their *B* score. The $R^2 = .321$ indicates that 32.1% of the variance in team emblem can be accounted for by: (1) number of years involved in livestock judging, (2) gender, (3) grade point average and (4) cattle is my best specie to judge. None of the other demographic variables accounted for a significant amount of the variation in team emblem earned at the 2005 National FFA Livestock CDE. Table 3 shows the regression model and reports unstandardized beta coefficients and standard errors along with standardized beta coefficients, t scores and significance.

Table 3
Regression analysis for demographic variables predicting team emblem

Variable	*B*	SE *B*	β	*t*	Sig.
Number of years involved in livestock judging	38.41	8.19	.337	4.70	.000
Gender	70.66	18.90	.268	3.74	.000
Grade point average	5.13	1.66	.220	3.08	.002
Cattle is my best specie to judge	-48.70	18.79	-.184	-2.591	.011

Note. $R^2 = .321$. Adjusted $R^2 = .296$. $F = 12.86$

The regression analysis indicates that the number of years involved in livestock judging in combination with gender and grade point average, had a great impact on participant performance in the 2005 National FFA Livestock CDE. The regression model also tells us that those participants, who perceived cattle as being their best specie to judge, actually were at a disadvantage among this group of participants.

Conclusions, Implications, and Recommendations

Male and female participation in this event was almost evenly split with 50.3% of the participants being male and 49.7% being female. In predicting team emblem, gender posts the highest *B* value in the regression analysis. We must use caution in interpreting this demographic variable. When we look at the profile of the 2005 national winning team, we find the makeup of that team to be two males and two females. This fact supports England's findings from 1996 that gender did not influence team success at a national CDE. Future research is needed to investigate the male advantage in the 2005 CDE to determine if this was a gender issue or a geographic issue.

There is no substitute for experience. The mean score for years of involvement in livestock judging was 3.17. Years of involvement in livestock judging also posted a moderate correlation with team emblem and proved to be a good predictor variable of team emblem in the regression model. These findings are in line with Holt (1929), who found that most successful judging teams usually required a training period of two or more years. England's (1996) study strengthens the argument for experience as a potential success factor. According to her study, most successful judging teams consisted of older students who had some type of judging experience.

Grade point average had some influence on team success at the 2005 National FFA Livestock CDE. The mean score for grade point average across all participants was 91.26. The correlation between grade point average and team emblem was a low positive correlation of .194. The regression model shows grade point average as a significant predictor variable of team emblem. The profile of the national winning team supports this finding by reporting a team grade point average of 95 on a 100 point scale. This is another variable that warrants future study to verify grade point average as success factor for the National FFA Livestock CDE.

On the opposite end of the spectrum, some demographic variables seem to have little or no effect on team emblem in the National FFA Livestock CDE. The size of the community, the number of agricultural education teachers at the school, and students who perceive cattle as their best specie to judge all posted negative correlations as they relate to team emblem. The more successful teams appear to come from towns of populations with less than 10,000 people. Seventy-five percent of teams surveyed reported having one or two agricultural education teachers. Having three or more agricultural education teachers did not appear to be an advantage for teams in the 2005 National FFA Livestock CDE. Students who reported cattle to be their best specie of livestock to judge actually scored lower in the contest. Further research is needed to investigate the impact of these demographic variables on team emblem.

The findings from this study have implications for all agricultural education teachers who train CDE teams. Studying the impact of demographic variables can aid teachers in their recruitment and retention of students who participate in these events. These findings can also be beneficial to extension agents as well as community volunteers who assist in preparing livestock evaluation teams for competition. We must not focus solely on demographics when recruiting and selecting students to be members of CDE teams, but we can use this information to make educated decisions in maintaining and building this integral part of the FFA program.

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PREPARATION LEVEL AND MENTORSHIP EXPERIENCES OF KENTUCKY BEGINNING AGRICULTURAL EDUCATION TEACHERS

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Abstract

The purpose of this descriptive study is to describe the level of preparation and identify mentors of 31 beginning Agricultural Education teachers in Kentucky. These teachers were in their first or second year and graduated from one of the five Kentucky Agricultural Education teacher education institutions. A majority were former FFA members, with some officer experience. Agricultural Education teachers were the greatest influence to pursue a teaching career in agriculture; and new agriculture teachers intended to teach 25-30 years. Beginning Agricultural Educators were most prepared to build a positive image for the program and least prepared in using advisory committees. In the classroom, most were prepared to implement technology and work with administrators; and least prepared to assist students with personal problems. New FFA advisors were prepared to conduct officer elections and least prepared in completing degree applications. Teachers were prepared to supervise projects and least prepared in completing proficiency award applications. An experienced Agricultural Education teacher mentored new teachers of agriculture most frequently for all areas of SAE, FFA, and in all but two areas of program management. No mentor was identified most frequently in the all classroom instruction and teaching technical agriculture areas. It is recommended that experienced teachers, state staff, and teacher educators collaborate with pre-service and beginning teacher programs to address these needs, such as using advisory committees, dealing with students' personal problems, and completing awards and applications. Experienced Agricultural Education teachers must continue to informally mentor beginning teachers in agriculture with the needs they encounter. Future research should include a longitudinal study to explore teachers' perceived level of preparation and mentors throughout their career and expand to others states to replicate.

Introduction

The process of becoming socialized into teaching is one of the most difficult stages in the professional development of teachers. Given comparisons to fields such as medicine and law, some have dubbed education the profession that "eats its young" (Halford, 1998). Indeed, experiences during the first year are often pivotal in the eventual success or failure of the beginning teacher. Varah, Thune, and Parker (1986) referred to teacher survival as "sink or swim." Beginning teachers must assume all responsibilities of teaching as if they were veteran teachers (Wildman, Magliaro, Niles, & Niles, 1992).

A beginning teacher must be aware of changes in technology, and must also be efficient in program planning, technical applications, classroom instruction, and classroom management (Brown, 2003). In addition, new teachers are often unaware of important deadlines, the culture of the school, and what really happens at the school (Merryman, 2006). As teachers become overwhelmed by the diverse population of students and their academic needs, an increasing number of beginning teachers leave the profession within three years (Kent, 2005).

Beginning Agricultural Education teachers are no exception. In addition to teaching an ever-changing subject of technical agriculture, additional responsibilities include advising a FFA chapter, supervising SAE programs, and managing a total Agricultural Education program (Peiter, Terry, & Cartmell, 2003; Ricketts, Duncan, Peake, & Uesseler, 2005). A well rounded prepared teacher should be able to integrate the FFA and SAE components as natural extensions of the classroom (Melodia & Meyer, 2001).

Preparing beginning teachers is very important, as under-prepared teachers are not able to fulfill the educational needs of students today. Standardized examinations are used to evaluate what a beginning Agricultural Education teacher should know, however, these tests can not assess skill level or competence in regards to what the novice agricultural educator should be able to do. With the implementation of No Child Left Behind, teacher educators face the ever increasing demand to prepare beginning Agricultural Education teachers who are prepared to excel on the first day of school.

Providing mentorship experiences, both formally and informally, are crucial in assisting beginning Agricultural Education teachers in making the transition into the profession (Peiter, Terry, & Cartmell, 2003). Positive feedback, guidance, and support from faculty and staff encourage beginning teachers to be confident efficacious teachers in Agricultural Education and Career and Technical Education (Knobloch & Whittington, 2002).

Theoretical Framework

Development of mentoring relationships is a component of the induction process. Kram's mentor theory, focusing on the career functions, serves as a theoretical framework for this study. Kram (1985) stated when a relationship provides both career and psychosocial functions "it best approximates the prototype of a mentor relationship" (p. 42).

Purpose and Objectives

The purpose of the study is to describe the level of preparation and identify those mentors who assisted beginning Agricultural Education teachers in Kentucky. To achieve this purpose, the following objectives were developed:

1. Describe the characteristics of beginning Agricultural Education teachers in this state.

2. Describe the level of preparation in areas of teaching technical agriculture, classroom instruction, supervising SAE Programs, advising a FFA Chapter, and program management.

3. Identify mentors who assisted with in areas of teaching technical agriculture, classroom instruction, supervising SAE Programs, advising a FFA Chapter, and program management.

Procedures

The population for the study consisted of beginning Agricultural Education teachers in a southern state. The sample (N = 31) was a time and place sample representing first, second and third year teachers in the 2006-2007 school year.

A three part data collection instrument was utilized to gain beginning teachers' perceptions. The instrument researchers utilized was developed by Peiter, Terry, & Cartmell (2003) and used with their permission. It was constructed to identify specific persons who assisted beginning Agricultural Education teachers during the transition from pre-service to in-service teachers. Face and content validity were established using a panel of experts. Current faculty and administrators at three institutions examined the instrument for face and content validity prior to implementing the study. Few modifications were made when focusing the instrument to meet specific topics pertaining to Agricultural Education teachers in Kentucky.

Part I consisted of 41 statements seeking the perceived level of preparation in five Agricultural Education program areas. These areas included program management (6), FFA (5), SAE (4), technical agriculture (12), and classroom instruction (13). A four-point Likert scale (1=Poor, 2=Fair, 3=Good, 4=Great) to assess respondent attitudes was used to gain respondents' opinion about each statement. The statement was general enough that all beginning teachers would have adequate knowledge and/or experience with each need to form an opinion. Part II consisted of 41 items asking respondents to identify a person that has assisted them the most with each specific need. The open response question allowed for name and/or title. The areas in parts I and II were identical. Part III consisted of reporting demographic characteristics.

Data were collected during a beginning Agricultural Education teacher seminar at the 2006 State Agriculture Teachers' Conference. In 2006-2007, respondents were beginning their first, second, or third year teaching Agricultural Education. Thirty-one of 31 beginning teachers responded, yielding a response rate of 100%. SPSS 10.0 was used to analyze data for level of preparation, mentor identification, and personal characteristics. For objectives 1 and 3, data were

analyzed and reported by percents and frequencies. In objective 2, mean scores and standard deviations were analyzed for the reported data.

Findings

Objective one described personal characteristics of beginning Agricultural Education teachers (Table 1). Respondents were a majority male (51.6%) and had no years experience (38.7%), or completed one year (38.7%) teaching Agricultural Education. Beginning teachers in agriculture graduated from five teacher education institutions, with the University of Kentucky producing nine (33.3%). Twenty-six (83.9%) respondents were former members of FFA; with officer experience held at the chapter (64.5%); regional (32.6%), and state (22.6%) levels. Respondents indicated another Agricultural Education teacher influenced them to pursue a career teaching Agricultural Education (41.9%) and beginning Agricultural Education teachers intended to teach 25-30 years (80.6%).

Table 1
Personal Characteristics of Beginning Teachers

Characteristics	*f*	%
Gender (*N* = 31)		
Male	16	51.6
Female	15	48.4
Years of Teaching Experience Completed (*N* = 30)		
None (beginning first year)	12	38.7
1	12	38.7
2	3	9.7
3+	3	9.7
University Providing Degree/Certification (*N* = 27)		
University of Kentucky	9	33.3
Western Kentucky University	8	29.6
Murray State University	5	18.5
Morehead State University	4	14.8
Eastern Kentucky University	1	3.7
Former FFA Member (*N* = 31)		
Yes	26	83.9
No	5	16.1
FFA Leadership Officer Experience (*N* = 31)		
Chapter	20	64.5
Regional	10	32.3
State	7	22.6
Influence to Teach Agriculture (*N* = 31)		
Agricultural Education Teacher	13	41.9
Interest in Agriculture	10	32.3
Teacher Educator	5	16.1
Parents	3	9.7

Table 1. Continued

Years Anticipated to Teach (*N* = 31)		
1-5	0	0
6-10	2	6.5
11-18	2	6.5
19-24	2	6.5
25-30	25	80.6

The level of preparation for teaching in the agriculture subject areas were described (Table 2). Beginning Agricultural Education teachers state they are most prepared to teach Introductory Agricultural Science (*M* = 3.53, *SD* = .57) and least prepared in teaching students in Aquaculture (*M* = 2.16, *SD* = .80).

Table 2
Mean Scores for the Level of Preparation for Technical Agriculture Content (*N* = 31)

Professional Need	*M*	*SD*
Introductory Agricultural Science	3.53	.57
Animal Science	3.35	.71
Agronomy (Plant & Soil Science)	3.20	.85
Greenhouse Production	3.03	.66
Horticulture	3.00	.63
Agri-Biology	3.00	.74
Agricultural Business/Sales/Marketing	2.86	.74
Environmental Science	2.71	.69
Equine Management	2.71	1.07
Agriculture Mechanics	2.53	.94
Wildlife Management	2.45	.77
Aquaculture	2.16	.80

Note: 1 = Poor, 2 = Fair, 3 = Good, 4 = Great

Level of preparation for classroom instruction is discussed (Table 3). Respondents perceived the area they were most prepared in, that being implementing technology (*M* = 3.52, *SD* = .57) and working with administrators (*M* = 3.48, *SD* = .57). Dealing with students' problems were identified least (*M* = 2.90, *SD* = .79).

Table 3
Mean Scores of Level of Preparation for Classroom Instruction (*N* = 31)

Professional Need	*M*	*SD*
Implementing Technology	3.52	.57
Working with Administrators	3.48	.51
Assessing Student Work	3.35	.55
Working with Parents	3.35	.49
Obtaining Teaching Materials	3.29	.53
Classroom Discipline	3.26	.51
Student Motivation	3.26	.51
Dealing with Students' Individual Differences	3.16	.45
Managing Course Load	3.13	.63
Time Management	3.03	.55
Dealing with Students' Personal Problems	2.90	.79

Note: 1 = Poor, 2 = Fair, 3 = Good, 4 = Great

Advising an FFA Chapter is a responsibility of an agricultural educator. Preparation levels for FFA responsibilities are explained (Table 4). Respondents were most prepared in conducting officer elections (*M* = 3.32, *SD* = .70), and least prepared in assisting students to prepare degree applications (*M* = 2.52, *SD* = .77).

Table 4
Mean Scores of Level of Preparation for Advising FFA (N = 31)

Professional Need	*M*	*SD*
Officer Elections	3.32	.70
Planning Conferences	3.03	.61
Planning Program of Activities	2.81	.75
Work with Alumni Groups	2.61	.96
Preparing Degree Applications	2.52	.77

Note: 1 = Poor, 2 = Fair, 3 = Good, 4 = Great

Supervising students' SAE Program preparation levels are described (Table 5). Respondents reported they were most prepared in supervising students' projects (*M* = 3.06, *SD* = .51) and least prepared for completing proficiency award applications (*M* = 2.61, *SD* = .72).

Table 5
Mean Scores of Level of Preparation for Supervising Students' SAE Programs (N = 31)

Professional Need	*M*	*SD*
Project Supervision	3.06	.51
Developing Opportunities	2.94	.63
Livestock Show Procedures	2.71	1.10
Proficiency Award Applications	2.61	.72

Note: 1 = Poor, 2 = Fair, 3 = Good, 4 = Great

Preparation levels for program management were analyzed (Table 6). Respondents perceived they were most prepared to build a positive image for Agricultural Education (M = 3.61, SD = .50), and least prepared in using advisory committees (M = 2.48, SD = 1.03).

Table 6
Mean Scores of Level of Preparation for Program Management (N = 31)

Professional Need	*M*	*SD*
Building a Positive Image for Agricultural Education	3.61	.50
Working with Colleagues	3.48	.68
Organizing Work	3.29	.53
Offering Course Variety	3.13	.43
Recruiting and Retaining Students	3.06	.57
Using Advisory Committees	2.48	1.03

Note: 1 = Poor, 2 = Fair, 3 = Good, 4 = Great

Mentors were identified with teaching technical agriculture (Tables 7a and 7b). No mentor was the most frequent for Agri-Biology (40.0%), Agricultural Business/Sales/Marketing (55.0%), Introductory Agricultural Science (38.9%), Agronomy/Plant and Soil Science (52.4%), Aquaculture (52.4%), Environmental Science (58.8%), Horticulture (47.1%), and Wildlife Management (57.9%). Respondents identified an Agricultural Education teacher most frequently for Animal Science (33.3%) and university professor was identified most frequently in Agricultural Mechanics (50.0%).

Table 7a

Mentors of Beginning Agricultural Education Teachers in Technical Agriculture Content

	Agri-Biology (*N* = 20)		Ag Business and Sales (*N* = 20)		Agricultural Science (*N* = 18)		Agronomy/Plant and Soil Science (*N* = 21)		Agricultural Mechanics (*N* = 24)		Animal Science (*N* = 20)	
Mentor Identified	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
No one	8	40.0	11	55.0	7	38.9	11	52.4	6	25.0	6	28.8
Ag Education Teacher	5	25.5	3	15.0	6	33.3	4	19.0	4	16.7	7	33.3
Teacher Educator	5	25.5	4	20.0	4	22.2	1	4.8	---	---	---	---
Professor in Content Area	1	5.0	1	5.0	---	---	5	23.8	12	50.0	6	28.8
Extension Agent	---	---	---	---	---	---	---	---	---	---	1	4.8
Family Member	---	---	---	---	---	---	---	---	1	4.2	---	---
Teacher in School (bio)	1	5.0	---	---	1	5.6	---	---	1	4.2	---	---
State Staff	---	---	1	5.0	---	---	---	---	---	---	---	---

Table 7b

Mentors of Beginning Agricultural Education Teachers in Technical Agriculture Content

	Aquaculture (*N* = 21)		Environmental Science (*N* = 17)		Equine Management (*N* = 20)		Greenhouse (*N* = 19)		Horticulture (*N* = 17)		Wildlife Management (*N* = 19)	
Mentor Identified	*f*	*%*	*F*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
No one	11	52.4	10	58.8	9	45.0	5	26.3	8	47.1	11	57.9
Ag Education Teacher	10	47.6	6	35.3	9	45.0	11	57.9	7	41.2	4	21.1
Professor in Content Area	---	---	1	5.9	2	10.0	2	10.5	1	5.9	1	5.3
Extension Agent	---	---	---	---	---	---	1	5.3	1	5.9	1	5.3
Family Member	---	---	---	---	---	---	---	---	---	---	1	5.3
Dept Fisheries & Wildlife	---	---	---	---	---	---	---	---	---	---	1	5.3

No one was identified the most frequently in all areas of classroom instruction (Tables 8a and 8b): implementing technology (43.5%), working with administrators (40.2%), assessing students work (43.5%), working with parents (51.9%), classroom management (41.7%), student motivation (47.6%), dealing with student differences (54.3%), time management (44.0%), and dealing with students' problems (45.0%).

Table 8a
Mentors of Beginning Agricultural Education Teachers in Classroom Instruction

	Implementing Technology (*N* = 23)		Working with Administrators (*N* = 22)		Assessing Student Work (*N* = 23)		Working with Parents (*N* = 27)		Classroom Management (*N* = 24)	
Mentor Identified	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
No one	10	43.5	9	40.2	10	43.5	14	51.9	10	41.7
Ag Ed Teacher	5	21.7	5	21.7	3	13.0	6	22.2	4	16.7
Teacher Educator	5	21.7	1	4.5	5	21.7	3	11.1	6	25.0
Principal	2	8.7	4	18.2	4	17.4	3	11.1	3	12.5
HS Counselor	1	4.3	1	4.5	1	4.3	1	3.7	---	---
Other Teachers	---	---	2	9.1	---	---	---	---	---	---
Expert on Subject	---	---	---	---	---	---	---	---	1	4.2

Table 8b
Mentors of Beginning Agricultural Education Teachers in Classroom Instruction

	Student Motivation (*N* = 21)		Student Differences (*N* = 24)		Time Management (*N* = 25)		Students' Personal Problems (*N* = 20)	
Mentor Identified	*f*	*%*	*f*	*%*	*f*	*%*	*f*	*%*
No one	10	47.6	13	54.3	11	44.0	9	45.0
Ag Education Teacher	4	19.0	3	12.5	3	12.0	4	20.0
Teacher Educator	4	19.0	5	20.8	5	20.0	2	10.0
Principal	3	14.3	2	8.3	4	16.0	2	10.0
High School Counselor	---	---	---	---	1	4.0	1	5.0
Other Teachers	---	---	1	4.2	---	---	2	10.0
Family	---	---	---	---	1	4.0	---	---

In all four areas of advising a FFA chapter (Table 9), beginning Agricultural Education teachers identified an Agricultural Education teacher as a mentor for each: officer elections (56.5%), planning trips and conferences (70.4%), preparing degree applications (69.2%), and planning chapter activities (45.8%).

Table 9
Mentors of Beginning Agricultural Education Teachers in Advising FFA

	Officer Elections (*N*=23)		Planning Trips and Conferences (*N*=27)		Preparing Degree Applications (*N*=26)		Planning Chapter Activities (*N*=24)	
Mentor Identified	*f*	%	*f*	%	*f*	%	*f*	%
No one	5	21.7	4	14.8	3	11.5	8	33.3
Ag Education Teacher	13	56.5	19	70.4	18	69.2	11	45.8
Teacher Educator	1	4.3	1	3.7	1	3.8	2	8.3
Principal	1	4.3	1	3.7	---	---	1	4.2
State Staff	2	8.7	2	7.4	4	15.4	2	8.3
Retired Ag Ed Teacher	1	4.3	---	---	---	---	---	---

For the four areas of Supervised Agricultural Experience (SAE) programs (Table 10), respondents identified an Agricultural Education teacher as a mentor most frequently: supervising students' projects (54.2%), developing student opportunities students (45.5%), assisting with livestock shows (34.8%), and assisting with proficiency award applications (60.9%).

Table 10
Mentors of Beginning Agricultural Education Teachers in Supervising SAE Programs

	Supervising Students' Projects (*N*=24)		Developing SAE Opportunities (*N*=22)		Livestock Show Procedures (*N*=23)		Proficiency Award Applications (*N*=23)	
Mentor Identified	*f*	%	*f*	%	*f*	%	*f*	%
Ag Education Teacher	13	54.2	10	45.5	8	34.8	14	60.9
No one	7	29.3	9	40.1	8	34.8	4	17.4
Retired Ag Ed Teacher	2	8.3	---	---	1	4.3	1	4.3
Teacher Educator	---	---	1	4.5	---	---	1	4.3
Principal	1	4.2	1	4.5	---	---	---	---
State Staff	1	4.2	1	4.5	1	4.3	2	8.7
Extension Agent/4-H Leader	---	---	---	---	3	13.0	---	---
Division of Shows & Fairs	---	---	---	---	1	4.3	---	---
Parents	---	---	---	---	1	4.3	---	---
National FFA Staff	---	---	---	---	---	---	1	4.3

Mentors are identified in areas of Program Management (Table 11). Agricultural Education teachers were identified as the greatest mentor for building a positive image (52.2%), organizing work (50.0%), offering a variety of courses (34.8%) and recruiting/retaining quality students (50.0%). Respondents indicated no one provided assistance was the most frequently for working with colleagues (61.5%) and using advisory committees (47.6%).

Table 11
Mentors of Beginning Agricultural Education Teachers in Program Management

	Building a Positive Image (*N*=23)		Working with People (*N*=26)		Organize Work (*N*=24)		Offering Course Variety (*N*=23)		Recruit/ Retaining Students (*N*=24)		Using Advisory Committee (*N*=21)	
Mentor Identified	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Ag Education Teacher	12	52.2	8	30.8	12	50.0	8	34.8	12	50.0	8	38.1
No one	4	17.4	16	61.5	8	33.3	6	26.1	3	12.5	10	47.6
Another Teacher	---	---	1	3.0	1	4.2	---	---	1	4.2	---	---
Retired Ag Teacher	1	4.3	---	---	1	4.2	---	---	1	4.2	1	4.8
Teacher Educator	4	17.4	1	3.0	---	---	3	13.0	3	12.5	1	4.8
Community	1	4.3	---	---	---	---	1	4.3	---	---	---	---
Principal	---	---	---	---	1	4.2	---	---	---	---	1	4.8
Counselor	---	---	---	---	---	---	1	4.3	3	12.5	---	---
State Staff	1	4.3	---	---	---	---	1	4.3	1	4.2	---	---

Conclusions

Beginning Agricultural Education teachers in Kentucky are in their first or second year of teaching and are graduates from one of the five teacher education institutions in Kentucky offering Agricultural Education. The majority of Kentucky beginning teachers was former FFA members, and possessed leadership experience through serving as a chapter, regional, and/or state officer. Agricultural Education teachers were the largest influence for beginning teachers to pursue a teaching career in Agriculture. Beginning Kentucky Agricultural Education teachers intend to make a career by planning to teach 25-30 years.

In managing their program, beginning Agricultural Education teachers feel they are most prepared to build a positive image and least prepared in using advisory committees. In the classroom, most beginning Agricultural Education teachers are prepared to implement technology and work with administrators. However, they feel least prepared to assist students with their personal problems. In advising an FFA Chapter, beginning Agricultural Education teachers feel prepared to conduct officer elections and least prepared to assist students prepare degree applications. For Supervised Agricultural Experience (SAE) programs, beginning Agricultural Educators are most prepared in supervising students' projects and least prepared to complete proficiency award applications.

When asked who provided assistance, beginning Agricultural Education teachers say no one mentors them in all the all areas of classroom instruction: implementing technology, working with administrators, assessing students work, working with parents, classroom management, student motivation, dealing with students' individual differences, time management, and dealing with students' personal problems.

For program management, Agricultural Education teachers mentor beginning Agricultural Education teachers for building a positive image of agricultural education, organizing work, offering a variety of courses, and recruiting and retaining quality students. No

one provides beginning Ag Ed teachers assistance when it comes to working with colleagues and using advisory committees.

Agricultural Education teachers mentor beginning teachers in agricultural education in all areas of advising FFA chapters. Areas include officer elections, planning trips and conferences, preparing degree applications, and planning chapter activities.

Agricultural Education teachers are the greatest mentor for supervising students' Supervised Agricultural Experience (SAE) programs. Agricultural Education teachers provided assistance for supervising projects, developing student opportunities, assisting with livestock shows, and completing proficiency award applications.

No one provides assistance to beginning Agricultural Education teachers in most technical agriculture areas. Specifically, class topics such as Agri-biology, Agricultural Business/Sales/Marketing, Introductory Agricultural Science, Agronomy/Plant and Soil Science, Aquaculture, Environmental Science, Horticulture, and Wildlife Management are areas beginning Agricultural Education teachers learned on their own. An Agricultural Education teacher was a mentor for the Animal Science, and a university professor in the content area provided assistance in Agricultural Mechanics.

Recommendations

Experienced teachers, state staff, and teacher educators must work together in the pre-service program, student teaching and with beginning teachers to assist these teachers to be successful. Topics such as using advisory committees, dealing with students' personal problems, and completing awards and applications should be addressed.

Experienced Agricultural Education teachers must continue to informally mentor beginning Agricultural Education teachers with the needs they encounter. Furthermore, a formal mentor program in Agricultural Education should be established. Many times no mentor was identified; therefore experienced teachers, teacher educators, state staff, national FFA staff, and school administrators must reach out to assist these teachers. Assistance could be provided through formal mentoring programs or one-on-one interaction. Personal contact via phone calls, email, and in-person conversations would provide assistance in the need areas beginning Agricultural Education teachers encounter.

Future research should encompass a longitudinal study to further explore these teachers' perceived level of preparation and mentors throughout their career. Furthermore, a qualitative study should be conducted to gain richer data to further explore this issue. Through case studies, teacher educators would gain insight to assist other Agricultural Education teachers during this important early phase career. In addition, this study should be replicated with other states to gain a broader perspective of beginning Agricultural Education teachers' level of preparation and mentors.

Discussions/Implications

Due to the outcomes of the teacher responses concerning the further need for professional development in certain preparation areas, as well as mentoring, the authors perceive there to be a need to work with state staff members and agriculture teacher's association members in establishing a formal mentorship program within the state. If this problem is not addressed among new teachers to the profession, then the implications will be very easy to identify - teachers continuing to hold a low perceived readiness to teach, and no help on the way.

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SELECTED POTENTIAL EMPLOYERS' ASSESSMENT OF COMPETENCIES TAUGHT IN THE D.E. KING EQUINE PROGRAM AT THE UNIVERSITY OF ARKANSAS

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Abstract

The purpose of this study was to determine if current competencies described in the curriculum of the University of Arkansas' D. E. King Equine Program matched the competencies desired by selected potential employers. Members of the Arkansas Thoroughbred Breeders and Horsemen's Association were asked to participate in the study, and participants responded to a traditional or electronic survey. Respondents were asked to rate curriculum competencies and to suggest competencies that they considered important in potential employees. Findings suggest that positive work ethic, honesty, and selected hands-on abilities are very important to potential employers. Over three-fourths of the potential employers indicated they would be more likely to hire a graduate of an equine science program than a non-graduate.

Introduction

This study explored which skill sets acquired by students pursuing a minor in Equine Science at the University of Arkansas matched the competencies desired by selected potential employers. A study by Shah, Pell, and Brooke (2004) determined that the student outcomes most useful in improvement of career prospects included oral and written communication, team working, personal organization, self-motivation, and subject knowledge. Areas recommended for curriculum development were subject specific practical skills (Shah et al.). This research attempted to answer the question "Do expected learner competencies in the University of Arkansas Equine Program match the competencies expected by potential employers?"

In the 1997 study, *Employer Assessment of the Skill Preparation Of Students From The University Of Nebraska-Lincoln: Implications For Teaching And Curriculum* (Andelt, Barrett & Bosshamer, 1997), it was determined that colleges must be sensitive to the needs of employers by conducting studies every three to five years to determine desirable skill sets.

This study determined if potential employers' desire competencies addressed in the Equine Program course of study at the University of Arkansas. The literature supports this problem in various other fields of study. In their 2004 study, Wilson, Flowers, Croom, and Moore stated that "Pre-service Agricultural Education departments should evaluate their academic programs to determine if the courses being taught and the instruction in these courses are adequately preparing their students to be able to perform desired program outcomes" (p.19). In matching student competencies with skill sets required by employers, educators can ensure that graduates will be employable and enrollment in the Equine Program will flourish. Proper preparation of students for the workforce ultimately will lead to higher enrollment and increased revenue for the University. The information gleaned from this study can be used to modify the curriculum at the University of Arkansas, so that it is better aligned with skill sets desired by potential employers.

Theoretical Framework

The assessment of outcomes of educational programs has been brought to the attention of educators at all levels, in part due to federal legislation such as the Carl D. Perkins Vocational and Applied Technology Education Act Amendments of 1990. Focus on accountability of educational programs has changed from a review of program inputs to an assessment of program outcomes (Wilson et al., 2004).

Regardless of career path or education, potential employers deemed certain characteristics important in potential employees. Integrity, honesty, attitude, and self-motivation are important to potential employers. This finding was recurrent, not only in recent studies conducted by Mariani (1994), but in studies by Belcher, McCaslin, and Headley (1996) and Wilson et al. (2004).

Both employers and employees described oral and written communication as important skills necessary for employability. Alumni from land-grant universities majoring in agriculture evaluated the relevance of their curriculum competencies and skills with respect to their careers. Action-based competencies, including oral communication, rated higher overall than agricultural skills-based competencies (Wheelock & Zekeri, 1988).

In 1997, Andelt and Barrett performed a study in which competencies were identified and ranked by potential employers from the College of Agricultural Sciences and Natural Resources (CASNR) at the University of Nebraska. Additionally, these authors sought to determine if graduates from the College of Agricultural Sciences and Natural Resources (CASNR) exhibited the level of competency employers desired in potential employees. The highest mean ranking of all categories of competencies were personal qualities. A positive work attitude and self-motivation were top-ranked skills. They also reported that although subject matter was important to potential employers, skills in communication, leadership, interpersonal competence, and computer literacy were described as areas recent graduates needed to be strongest in to survive in the current agribusiness environment.

In Graham's 2001 study conducted at the University of Arkansas, she found that Agricultural and Extension Education (AEED) graduates, in general, were prepared for entry-level positions. The only skill that was rated as "unprepared" by employers was the ability to speak a second language. Interpersonal skills were also reported as needing improvement (Graham). Employers rated dependability, honesty, and integrity as very important abilities. Graham stated that "when compared to the level of importance placed on the interpersonal skills and abilities, it appears that our students need to improve in the area of professionalism. Our graduates need to demonstrate the ability to work in groups, show leadership, dedication, and initiative more than they are now doing" (Graham, p.15). Employers indicated that although students are book smart, they would benefit from exposure to real-life situations. Another point that Graham discussed was the need for students to become internet savvy.

The desire of potential employers to obtain employees who are dependable, honest, and exhibit good oral and written communication skills was a recurring theme in the literature. Skill sets that were specific to a particular job were not as important to many of the employers surveyed. Sincoff and Owen (2004) addressed the issue of specific skill sets desired by potential employers, indicating that job opportunities would be limited for graduates who did not possess certain skills. They recommended that human resources curriculum focus on precise goals, and thus optimize program effectiveness. Additionally these authors stated that a 'niche' approach that provides in-depth training in specific areas, internships, and training in communication and teamwork skills is recommended.

An external group of consultants commissioned by Colorado State University (CSU) suggested revisions be made to the CSU Equine Program in 2005. These findings were presented in a PowerPoint presentation to department

heads and deans by Dr. Jim Heird, Director of Teaching and Outreach, CSU Equine Science. Applicable recommendations of this external review included a reconsideration of the importance of some courses, addition of other courses, and some courses that should remain unchanged. Additional communication courses and the requirement of an 'experience' course (internship, study abroad, or independent study) were suggested. Additionally, the development of a marketing/sales course, an introductory equine handling/behavior course, a sales prep course (using donated horses), and a show management program was recommended. Business, management and finance courses were recommended as well (Heird, 2005).

Support through the literature can be seen for employer-desired competencies with respect to specific skill sets. Shah et al. (2004) recommended that curriculum become developed for subject specific skills. Graham (2001) suggested that graduates must be able to apply the science that they have learned, and Sincoff and Owen (2004) suggested that in-depth training and internships are desirable in selected curriculum.

Although job specific skill sets are desired by potential employers, the ability to work with others, good verbal and written communication and a good work ethic were highly desired by potential employers. From the review of literature, it can be seen that regardless of the type of education and potential job, employers are more willing to hire an employee who exhibits certain qualities.

Purpose and Objectives

The purpose of this study was to determine if current competencies described in the curriculum of the University of Arkansas' D. E. King Equine Program matched the competencies desired by selected potential employers. To accomplish this purpose, the following research objectives were identified:

1. Describe selected demographic data of potential employers in the Arkansas horse industry.
2. Describe the curriculum objectives of the D. E. King Equine Program at the University of Arkansas.
3. Determine the perceptions of potential employers concerning the importance of competencies currently taught in the D. E. King Equine Program at the University of Arkansas.
4. Identify additional competencies desired by potential employers not currently included in the curriculum of the D. E. King Equine Program at the University of Arkansas.
5. Determine the likelihood of potential employers hiring a graduate of an equine science program.

Procedures

Research Design

This was a census study, employing descriptive survey research. The study proposed to ascertain if current competencies described in the curriculum of the

University of Arkansas D. E. King Equine Program matched the competencies desired by selected potential employers in Arkansas. Institutional Review Board (IRB) approval was applied for and received prior to the start of the study. All letters, postcards, and the 52 item instrument were approved by the IRB prior to contacting participants in the study.

Population

The population used for this study was derived from the 130 members of the Arkansas Thoroughbred Breeders' and Horsemen's Association (ATBHA) in the Spring of 2005, listed in the ATBHA Stallion and Farm Directory for 2005 (Echols, 2005). Members of the ATBHA were invited to participate in the survey via e-mail or traditional mail if an e-mail address was not available in the ATBHA Stallion and Farm Directory for 2005. A self-addressed stamped envelope was included with the traditional mailing, for acceptance by respondents. Of the 130 invitations sent either electronically or traditionally, only 17 prospective participants initially opted to complete the survey.

Non-respondents of traditional or electronic mail invitations were contacted by telephone, using protocol set forth by Salant and Dillman (1994), and invited to participate in the survey. Of the initial 130 members of the ATBHA, 104 had viable contact information (e-mail address, phone number or mailing address). The number of ATBHA members who opted to participate in the survey, either through initial contact or telephone contact, totaled 54. This became the accessible population used in the study.

Development of the Survey Instrument

The researcher-developed, 39-item instrument was created based on the curriculum objectives described in the syllabi of courses taught in the University of Arkansas D. E King Equine Program. The five courses offered in the Program were *Introduction to the Equine Industry* (ANSC 2003), *Horse Production* (ANSC 4283), *Horse and Livestock Merchandizing* (ANSC 3723), *Equine Behavior and Training* (ANSC 2304), and *Topics in Equine Law* (ANSC 3822). The curriculum objectives for these courses were grouped into categories: (1) General (non-equine specific); (2) General (equine specific); (3) Basic Horsemanship; (4) Equine Breeding and Foaling; (5) Horse Sales; (6) Equine Behavior and Training; and (7) 'Hands-on' Equine Skills. At the end of each category, respondents were invited to submit and rank additional competencies they deemed important, but not included in the category. Each item was measured using a 1 to 4 Likert scale (1 = not important, 2 = of little importance, 3 = somewhat important, 4 = very important). Higher mean scores indicated higher levels of importance by participants for specific items.

In addition to ranking the curriculum competencies, the respondents were asked if they would be more likely to hire a graduate of an equine science program rather than someone who is not a graduate of an equine science program.

Expert Panel

The expert panel consisted of one University of Arkansas professor who had experience as an equine nutritionist for a national equine feed company, one University

of Arkansas research assistant who owned and managed a horse boarding and training operation for 20 years, and one University of Arkansas facility manager, who had a strong teaching and livestock management background. The expert panel was contacted by phone on June, 6, 2005 and asked to participate in the study. All three agreed to participate.

After the researcher designed the instrument using the curriculum competencies and categories, the expert panel was asked to evaluate the instrument for face and content validity. Additionally, they were asked to develop a list of competencies not included in the equine curriculum that they felt should be considered as equine curriculum additions. Their list of 13 competencies was included in the instrument. The addition of competencies selected by the expert panel resulted in a 52 item instrument, adapted for a traditional mail-out survey and an electronic survey.

Pilot Test

Prior to mailing the 52 item instrument to the designated population, a pilot test was performed in order to determine instrument reliability. Subjects for the pilot test were identified through a database of horse farm owners in Arkansas who were not included in the population. The pilot test was conducted with 10 horse farm owners who were similar to those asked to participate in the main study. To determine instrument stability, the instrument was administered to the pilot-test group twice, at a two-week interval. The coefficient of stability for the 52 item instrument was .94.

Data Collection

Data used were collected from owners or managers who in 2005 belonged to the Arkansas Thoroughbred Breeders and Horsemen's Association (ATBHA), using an internet survey or traditional mail-out survey booklet.

The 19 participants who wished to participate in the survey electronically were e-mailed a link to the 52-item instrument and a letter of explanation formatted using SNAP 8 survey software. Electronic surveys were tracked using SNAP 8, and respondents were linked with corresponding demographics as reported in the ATBHA directory. Data collected from the electronic survey were automatically stored in SNAP 8 (http://www.snapsurveys.com/).

The 35 participants who wished to participate in the survey by traditional mail were sent the 52-item instrument formatted in booklet form which adhered to guidelines set forth by Salant and Dillman (1994) and a letter of explanation. A self-addressed stamped envelope was enclosed with the instrument and letter of explanation. Each survey booklet was coded to insure respondents were linked with corresponding demographics reported in the ATBHA directory. Data from surveys returned by traditional mail were manually entered into the SNAP 8 program in which the data collected electronically were stored.

A follow-up post card was mailed traditionally or via e-mail to study participants eight days after the survey was sent out, thanking those who responded and requesting a response from those who did not.

Three weeks after the instrument was sent, participants who had not returned a completed survey were contacted by phone to check on the status of their response. Duplicate instruments, if needed, were sent out traditionally or electronically. Of the 54 members of the ATBHA who agreed to participate in the study, 15 responded by e-mail and 27 responded by traditional mail, for a total of 42 respondents. Thus a 77% response rate was achieved.

Analysis of Data

Descriptive statistics were reported regarding individual farms by the farm owners. Curriculum objectives of the D. E. King Equine Program were ascertained from the 2005 syllabi of all Program courses. Analysis of survey data doesn't require complex statistical analysis as reported by Ary, Jacobs, and Razaveih (2002). Descriptive statistics were reported from responses to the survey instrument. Additional competencies not currently included in the D. E. King Equine Program curriculum, but desired by members of the ATBHA, were reported.

Findings

Findings for Research Objective One

Personal and demographic data of the selected potential employers in the Arkansas horse industry were described in the 2005 *Arkansas Thoroughbred Breeders' and Horsemen's Association Stallion and Farm Directory*. The demographics, as reported by farm owners, were listed in the catalogue as: name of farm owner; name of farm manager; physical address; contact information (phone number, FAX number, and e-mail address); location of farm by county; farm acreage; and services offered by the farm. Farm services offered as listed by farm owner were: foaling; sales preparation; breaking; lay-up and rehabilitation; boarding; breeding; and training.

The average size of farm for the 42 respondents was 71.24 acres (SD = 182.99), with a range of 5.00 – 1200.00 acres. Of the total respondents, 38.1% of the farms were located in Garland and Hot Springs Counties. Of the 16 counties represented by respondents of this survey, only five counties had greater than two respondents.

Farm owners reported services offered to the general public by their farms. Of the respondents, 54.8% reported that their farm was a boarding operation, and 28.6% reported their farm as a breeding operation. Many farm owners reported multiple services offered by their farms. The average number of services offered to the general public, per farm, was two (M = 1.52). Of the 42 respondents, only four owned farms that offered the service of breaking horses to the general public.

Findings for Research Objective Two

Curriculum objectives for the Equine Courses offered at the D. E. King Equine Program at the University of Arkansas were taken directly from the 2005 syllabi of the six courses offered within the Equine Program. Many courses had similar objectives. Most notable were those objectives in the general (non-equine) category. Many of the objectives set forth are incorporated University-wide, and are not specific to equine programs. Group participation, computer skills, oral and written communication, and honesty and integrity are desired outcomes of University coursework. Objectives taught in only one course included equine training and sales specific courses.

Findings for Research Objective Three

Competencies, as reported in the syllabi of equine courses offered in 2005 by the D. E. King Equine Program, were divided into areas or categories. Survey respondents (N = 42) ranked the competencies offered by the Equine Program on a 1 – 4 Likert scale (1 = not important, 4 = very important). Means and standard deviations for individual competencies and area competencies were reported. Individual competencies reported as very important (M = 4.0) by respondents were: safely handle horses; possess a positive work ethic (arriving to work on time, diligent, hard worker, dependable); and demonstrates honesty. Individual competencies receiving the lowest average scores (below M = 3.0) were: able to advertise, manage, and produce a purebred horse sale (M = 2.57) and able to plan horse care management a year in advance (M = 2.88). The category which resulted in the highest overall mean average was character traits and professional qualities (M = 3.90).The category which resulted in the lowest mean average was horse knowledge (M = 3.33). The complete results are reported in Table 1.

Table 1

Respondents' Rated Means (M) and Standard Deviations (SD) for Equine Curriculum Objectives (N = 42).

Objectives Listed by Group	*M*	*SD*
Hands-on abilities		
Safely handle horses	4.00	0
Know basic pre-foaling signs, and can monitor pregnant mares for foaling	3.79	.47
Can give vaccs and routine health care under the direction of a veterinarian	3.76	.48
Can keep proper health, financial and training records	3.74	.50
Able to safely train all ages of horses, using non-traumatic, proven methods	3.67	.53
Be able to show-prep' or sale-prep' a horse	3.52	.55
Overall mean for hands-on abilities	3.75	.42
Horse knowledge		
Is able to determine when vaccs and standard veterinarian care are needed	3.74	.59
Knows that keeping good horse management records is important	3.71	.60
Knows that keeping good financial records is important	3.64	.62
Determine feeding and health care programs for various ages of horses	3.64	.62
Use of proper terms when discussing horses	3.52	.55
Knows structure of horses' hooves & legs and relate to soundness/movement	3.45	.80
Knows what criteria are important when selecting breeding horses	3.33	.87
Knows various horse breeding methods, and the pros and cons of each	3.29	.86
Is able to create a training program to increase a horse's value or it's ability	3.29	.71
Can make judgments about the effectiveness of different training methods	3.29	.67
Knows the legal issues associated with owning horses and the horse business	3.24	.98
Knows different methods of training a horse	3.24	.69
Knows the different types of horse sales for various classes of horses	3.07	.78
Is able to plan horse care management a year in advance	2.88	.74
Able to advertise, manage, and produce a purebred horse sale	2.57	.86
Overall mean for horse knowledge	3.33	.73
Leadership and organizational skills		
Shows initiative when accomplishing tasks	3.86	.35
Demonstrates effective time management skills	3.83	.38
Demonstrates effective organizational skills	3.81	.40
Demonstrates effective problem solving skills	3.76	.43
Demonstrates effective decision making skills	3.71	.46
Demonstrates effective management skills	3.71	.46
Demonstrates effective leadership skills	3.67	.48
Overall mean for leadership and organizational Skills	3.76	.42
Communication and interpersonal skills		
Demonstrates ability to listen and carry out instructions	3.88	.33
Demonstrates effective verbal communication skills	3.71	.46
Works cooperatively in groups (team player)	3.67	.48
Demonstrates effective written communication skills	3.40	.59
Demonstrates computer skills (word processing, spreadsheets, Internet, etc.)	3.02	.64
Overall mean for communication and interpersonal skills	3.54	.50
Character traits and professional qualities		
Possess a positive work ethic (diligent, hard worker, prompt, dependable)	4.00	0
Demonstrates honesty	4.00	0
Demonstrates integrity	3.95	.47
Demonstrates fairness	3.93	.26
Dresses appropriately for various situations	3.69	.47
Overall mean for character traits and professional qualities	3.90	.23

Note. Based on a 4 point Likert-type scale (1 = not important, 2 = of little importance, 3 = somewhat important, 4 = very important).

Findings for Research Objective Four

The 13 competencies which were not currently in the D. E. King Equine Program, and deemed as potential inclusions in the curriculum by the expert panel, were rated on a 1 – 4 Likert scale (1 = not important, 4 = very important) by the respondents (N = 42). Means and standard deviations are reported for these competencies in Table 2.

Table 2
Respondents' Rated Means (M) and Standard Deviations (SD) for Potential Equine Curriculum Objectives (N = 42).

Additional competencies considered	*M*	*SD*
Can visualize a "perfectly healthy horse"& recognizes illness/lameness	4.00	.22
Can identify various types of equine specific equipment and knows the proper use (twitches, bits, martingales, leg wraps, etc.)	3.93	.26
Has basic knowledge of facilities (safe fencing, size of stall, etc.)	3.64	.48
Demonstrates ability to 'plan ahead'	3.64	.48
Has the knowledge/ability for basic farm equipment use	3.48	.74
Knows proper pasture management (soils report, planting, etc.)	3.36	.79
Demonstrates the ability to successfully hand-breed a mare	3.21	.92
Demonstrates effective teaching skills	3.12	.86
Demonstrates ability to ride	3.07	1.02
Demonstrates the ability to successfully collect a stallion	2.81	1.02
Demonstrates the ability to evaluate semen/sperm quality	2.81	1.09
Demonstrates the ability to artificially inseminate, or infuse a mare	2.81	.94
Demonstrates the ability to properly extend and ship semen	2.60	1.01

Note. Based on a 4 point Likert-type scale (1 = not important, 2 = of little importance, 3 = somewhat important, 4 = very important).

Of the 13 competencies rated, "Can visualize a perfectly healthy horse, and therefore recognizes the early onset of illness or lameness" was rated by the respondents as very important (M = 4.00). The ability to identify various types of equine specific equipment and knows the proper use (twitches, bits, martingales, leg wraps, etc.) was rated high (M = 3.93) by respondents. The demonstrated ability to successfully collect a stallion (M = 2.81), evaluation of semen/sperm quality (M = 2.81), artificially inseminating or infusing a mare (M = 2.81), and properly extend and ship semen (M = 2.60), were the lowest rated by respondents.

Respondents were given the opportunity to suggest competencies they deemed important for possible inclusion in the D. E. King Equine Program curriculum. These suggestions were broken down by specific category. Respondents made 22 suggestions for the area of hands-on abilities. A total of five suggestions were made for desirable character traits and professional qualities, four suggestions were made for additional horse knowledge, and one suggestion was reported for leadership and organizational skills desired.

Findings for Research Objective Five

Respondents were asked if they would be more likely to hire a graduate of an equine science program than someone who was not a graduate of an equine science program. Of the 42 respondents, 33 (79%) indicated that they would be more likely to hire a graduate of an equine science program than a non-graduate.

Conclusions

Conclusions Related to Research Objective One

The typical respondent had a 71-acre horse farm within a two-hour drive of the racetrack in Hot Springs, boarded horses, and offered one additional service to horse owners. Over 25% of the respondents stood a breeding stallion on their farm. Unlike the large thoroughbred farms seen in other parts of the country, most of the thoroughbred farms in Arkansas are small, and offer few services to outside cliental. Demographics suggest that most are 'mom and pop' operations.

Conclusions Related to Research Objective Two

Curriculum objectives of the D. E. King Equine Program at the University of Arkansas, like other fields of study, incorporate general University objectives. Curriculum specific objectives incorporate teaching equine science with an eye on practicing hands-on skill sets.

Conclusions Related to Research Objective Three

Based on the results of this study, it can be concluded that many of the employer-desired skill sets are currently taught in the University of Arkansas' D. E. King Equine Program. Safe horse handling techniques, knowledge and administration of routine vaccinations and health care, and knowledge of basic pre-foaling signs and ability to monitor pregnant mares for foaling are specifically addressed in coursework, internships, and laboratories. Obviously, internships and laboratories in which students can practice horse-related skills are advantageous to students seeking employment in the horse industry. This conclusion supports the findings by Sincoff and Owen (2004) who recommended a 'niche' approach that provides in-depth training in specific areas, internships, and training in communication and teamwork skills.

Conclusions Related to Research Objective Four

A majority of the potential employers in the surveyed population were interested in hiring an employee with practical horse experience. This reoccurring theme suggests the desire of potential employers to have employees with horse experience, and those who know how to properly assess and treat routine equine herd health issues, and issues associated with farm management.

Conclusions Related to Research Objective Five

The respondents of this survey indicated that they were three times more likely to employ a graduate of an equine program to manage and care for their horses than someone who was not a graduate. In order to best prepare the D. E. King Equine Program graduates for equine farm related job opportunities, students must have the opportunity to practice skills and apply information gained in the classroom. Coordinating veterinarian and farrier appointments with student internships and laboratories would prove beneficial to student's knowledge of proper assessment and treatment of equine lameness' and health problems.

Recommendations

Recommendations for Practice

A graduate's demonstration of hands-on abilities and applied horse knowledge, coupled with positive character traits, were the desired competencies deemed important by the population of selected potential employers. Recommendations for retention, practice, or inclusion into the D. E. King Equine Program, as a result of this study are:

1. Equine Program students should be taught to visualize a perfectly healthy horse, and recognize the early onset of lameness or illness.
2. Students should be taught proper identification and application of various types of equine specific equipment.
3. Students should continue to be given an opportunity to practice horse-related skills in equine laboratories and internships, under the supervision of industry professionals.
4. Students should have the opportunity to be exposed to various aspects of the horse-farm management, and should have the opportunity to master hands-on skills.
5. Students should be exposed to 'real-life' horse-farm experience through off-campus internships.
6. Initiative when accomplishing tasks, ability to listen and carry out instructions, effective time management, organizational, and problem solving skills are sought by potential employers, and should continue to be emphasized in equine related coursework.
7. Possession of a positive work ethic, demonstration of honesty, integrity and fairness should continue to be developed in equine studies.

Many of the aforementioned recommendations for hands-on abilities are taught in equine internships in the D. E. King Equine Program curriculum. Educators should make students aware of the importance potential employers place on these skills as well as positive character traits.

Recommendations for Further Research

Further research is needed in the area of curriculum assessment for the D.E. King Equine Program. Recommendations for further research as a result of this study are:

1. Further research is needed to determine if the desired competencies, as reported by the surveyed population, are desired by other potential employers of graduates with a minor in equine science from the D. E. King Equine Program at the University of Arkansas.
2. Other horse breed or discipline organizations should be surveyed on a state, regional or national level, to determine what competencies they deem necessary in a potential equine employee with a minor in equine science.

3. A more effective way to collect data should be explored. Suggestions from this researcher include the use of focus groups or collecting data at horse discipline or breed meetings or functions.
4. An on-going assessment by employers of D. E. King graduates should be conducted to determine what areas of knowledge and hands-on abilities should be included in the D. E. King Equine Program curriculum to maximize graduate employability.
5. Practical horse experience and hands-on skills learned by D. E. King graduates should be documented and made available to potential employers.

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PERCEPTIONS OF IMPORTANT COMPETENCIES FOR EARLY-CAREER AND ESTABLISHED 4-H AGENTS

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Abstract

Many competencies are thought to contribute to success as a 4-H agent (Boyd, 2004; Cooper & Graham, 2001; Gregg & Irani, 2004). The purpose of this study was to identify the competencies thought to be the most important for 4-H agents, depending on career stage, and compare those competencies to the official 4-H Professional Research, Knowledge and Competency Model (National 4-H Professional Development Task Force, 2004). To accomplish this, interviews were conducted with agents serving in leadership roles within their state and national professional associations. Participants had specific expectations for the competencies they would need going into their first jobs as 4-H agents. They prepared through internships, previous 4-H experience, and academics. Each remembered important lessons learned during the early days of work and those lessons helped shape their advice for incoming agents. Many of the same competencies recommended for early career agents continued to be relevant for established agents, but those competencies were chosen based upon experience, not because of the 4-H PRKC. Important competencies included conflict management, communication, multi-tasking, managing volunteers, and youth development.

Introduction

4-H is a community of young people across America learning leadership, citizenship, and life skills. It is the official youth development organization of the United States Department of Agriculture and the land-grant university system, administrated by Cooperative Extension. Nationwide, 4-H reached almost seven million youth in a single year, through traditional 4-H clubs, school enrichment, summer camps and other outreach programs (USDA, 2003).

With so many youth and families involved in 4-H, the importance of having capable professionals leading the program cannot be overstated. One of the best ways to ensure 4-H professionals (also known as agents or educators) are equipped to handle the demands of the job is through the use of competencies (Stone, 1997). According to Stone and Bieber (1997), "competency development is a highly participative process" wherein "Extension professionals have the opportunity to identify the knowledge, skills and behaviors they will need to get the best results as well as skills and functions that are no longer effective" (¶ 6). The use of competencies is helpful for making important decisions for the future (Stone & Bieber).

Several different state-based competency models have been developed (Boyd, 2003; Cooper & Graham, 2001; Gregg & Irani, 2004), as well as a national framework (National 4-H Professional Development Task Force, 2004). The result of these research efforts is a lengthy list of competencies, which can be overwhelming for the time-crunched 4-H professional looking to improve his/her skills. The 4-H program needs to consider taking a more practical approach to the use of competencies, focusing on the most critical areas. To do this, 4-H professionals must be provided the opportunity to have a strong voice in determining what competencies are most necessary for the continuance of a successfully administrated 4-H program in the future.

Theoretical/Conceptual Framework

The most comprehensive of the 4-H competency models is the 4-H Professional Research, Knowledge and Competency Model, which is the official professional development model for
4-H (National 4-H Professional Development Task Force, 2004). The 4-H Professional Research, Knowledge and Competency Model (4-H PRKC), is the result of a collaborative effort by a task force of 4-H experts, who synthesized research applicable to youth development into one comprehensive model. The 4-H PRKC was developed as a multi-layer model: (a) domain, (b) topic, (c) component and (d) competency. The 4-H PRKC attempts to address both the academic and practical sides of work in youth development, with the domains representing subject matter, and the competencies representing job skills and behaviors.

Six domains of knowledge are designated in the 4-H PRKC, in the areas of youth development, youth program development, volunteerism, partnerships, organizational systems, and equity, access and opportunity (National 4-H Professional Development Task Force, 2004). Each of the primary domains contains multiple topics, components, and competencies. For example, youth development theory is one of the topics for the domain of youth development. Under this topic are three components: positive youth development, ecological model, and resiliency theory. Each component is then broken down into competencies, such as "intentionally

designs programs to promote positive outcomes for youth through the provision of opportunities, relationships, and supports" (National 4-H Professional Development Task Force, 2004, p. 8).

While the 4-H PRKC is extremely detailed, it does not necessarily reflect the same competencies agents themselves feel are necessary for a successful performance. Boyd (2003) conducted a Delphi study to determine the competencies essential for managing 4-H volunteers in the year 2010. A panel of volunteer administrators, Extension specialists and university faculty members reached consensus on five constructs, containing 33 competencies in total. Organizational leadership, systems leadership, organizational culture, personal skills, and management skills were all found to be important constructs for volunteer management. In comparison, the 4-H PRKC lists personal readiness, organizational readiness, engagement of volunteers, and sustainability of volunteer efforts as topics for volunteerism (National 4-H Professional Development Task Force, 2004).

Boyd's (2003) findings were adopted for use by Stedman and Rudd (2006) to evaluate the leadership styles and volunteer administration competence of 4-H county extension agents. In addition to the constructs developed in the Delphi study, Stedman and Rudd included accountability and commitment to the profession as additional constructs. Their work found that leadership style was influenced by several of the constructs, including commitment to the profession, organizational leadership, and systems leadership.

Also contributing to the understanding of key competencies for agents is a study of county agents and their supervisors in Arkansas (Cooper & Graham, 2001). This study encompassed all Extension disciplines, not only 4-H, but yielded remarkably similar results to the work of Boyd (2003) and Stedman and Rudd (2006). Constructs developed in this study were categorized as program planning, public relations, personal and professional development, faculty/staff relations, personal skills, management responsibilities, and work habits.

Moore and Rudd (2004) developed a model of the necessary leadership competencies for Extension leaders. Competencies identified as important were clustered into domains labeled Human, Conceptual, Communication, Emotional Intelligence, Industry Knowledge and Technical Skills. A follow-up study by Moore and Rudd (2005) investigated the perceived importance of six leadership domains, as well as the perceived proficiency of Extension leaders in those domains. Respondents indicated they both valued and had at least average proficiency in every domain but Technical skills. Emotional Intelligence was found to be the most important domain.

Finally, Gregg and Irani (2004) addressed a unique competency construct unmentioned in any of the previous studies, examining the use of information technology by Extension agents in Florida. A strong argument can be made for the inclusion of information technology as a competency. Gregg and Irani noted: "the ability of Extension agents to use computers, software, and associated peripheral devices for purposes of serving clientele, research, and in support of Extension's administrative infrastructure, has become an essential job-related skill" (¶ 2).

It is evident many competencies are considered to be important for Extension agents to master. Yet it remains unclear which of these competencies will be most critical for sustaining 4-

H in the future; which competencies should new and hopeful Extension agents focus on early in their careers and what skills need to be covered in professional development for experienced agents? A more in-depth look at the subject is needed to better understand this problem.

Purpose

The purpose of this study was to investigate the practical competencies necessary for success as a 4-H agent, and compare those competencies to the 4-H PRKC. Specific objectives included reflection of necessary competencies before employment, during the first year of employment, and after years of experience.

Procedures

Qualitative research is context-specific and uses the human instrument for data collection and analysis. This study most closely aligns with qualitative case study and cross case analysis in comparing results to an existing framework (Merriam, 1998).

There are many different competency models addressing the ideal skills that a 4-H agent should possess. To get a more practical perspective, expert agents from the Western region of the United States were purposively selected for an interview. Participants were selected based upon their role as an elected regional, state or national leader during the years 2004-2006. Elected leaders are often opinion leaders in their own social system, influencing the beliefs of followers (Rogers, 2003). Therefore, understanding the opinions of the elected leaders can provide greater insight into the organization as a whole.

The agents selected for this study had served in such roles as regional director, president, president-elect, treasurer, vice president, and secretary within the state and national levels of the National Association of Extension 4-H Agents. There were two male and two female agents. Together, the participants represented forty-seven years of 4-H experience, ranging from six to twenty-five years. Although each agent had a significant percentage of his/her time devoted to 4-H, each also had additional responsibilities in areas such as family and consumer sciences, livestock, natural resources, and county administration.

Phone interviews were conducted in June 2006 to collect the data. A semi-structured interview guide provided a framework for the conversations. The researcher used handwritten notes to record each conversation. The notes were then typed by the researcher to create an electronic record. To establish credibility, each participant was e-mailed a copy of the electronic record for verification. This informal member check provided participants with the opportunity to verify the researcher accurately recorded their interviews and gave them the opportunity to clarify any ambiguity. According to Lincoln and Guba (1985), “the member check … is the most crucial technique for establishing credibility” (p. 314). Lincoln and Guba also asserted a more formal member check is necessary to establish credibility. This was accomplished by sharing a copy of the reported findings with the participants and soliciting their input.

This study consisted of five individual cases, comprised of the interviews with the experts (4) and the 4-H PRKC document analysis (1). According to Merriam (1998), a cross case

analysis is appropriate when analyzing multiple cases. This type of analysis is defined by two stages; a "within-case" analysis and a "cross-case" analysis (p. 194). The first stage allows the researcher to understand the contextual variables of each case, while the second stage may result in the identification of commonalities between the cases. For the research reported here, the within-case analysis for each interview was conducted by the researchers, while the 4-H PRKC was treated as a within-case analysis conducted by the National 4-H Professional Development Task Force (2004). Following the within-case analysis, the contextual variables of the individual cases were compared in the cross-case analysis stage. The results of the cross-case analysis are reported in the findings.

Findings

The findings from the four cases (interviews) were compiled to provide an overview of the emerging themes (in italics for emphasis). Following is the cross-case analysis section.

Experienced Agents' Perceptions of Necessary Job Competencies

To investigate the practical competencies necessary for success as a 4-H agent, the interview questions were divided into three categories of perceptions: before employment, during the first year of employment, and as an experienced agent.

The interviews began by asking participants to discuss the competencies they thought were going to be most important before they began their first Extension job, as well as how prepared they felt they were in actuality. Competencies such as *communication*, *organization*, and *people skills* were unanimously perceived as important. Two of the participants mentioned *subject matter skills*, but only one of them thought "subject matter expertise was going to be most important for me." Another agent, having had the opportunity to intern for her predecessor, commented "because I was told, I knew conflict management was important." However, no other participant included *conflict management* as an expected competency prior to starting the job.

Experience, both on the job and in the classroom, was designated as the best preparation for learning the skills needed as a 4-H agent. *Academics* played a key role for two participants, both of whom mentioned their graduate work in extension education as a leading contributor for career preparation. In fact, three of the four participants had earned a Master's of Agriculture with an emphasis in extension education (and, in fact, were graduates of the same program) and all four had a degree from at least one land-grant university. For the three graduates of the extension education program, the practical experience gained from completing a required twelve-week *internship* in an Extension office helped to increase their confidence as new agents. One graduate of the program said: "my two internships I had…prepared me the most."

For the fourth agent, experience was gained through the *4-H program* itself. As a youth member, he learned life skills that would help prepare him for an eventual career in Extension. Later, the experience continued through involvement with collegiate 4-H, including a term as president and work as a 4-H camp counselor. Time as a residence hall director supplemented his 4-H experience, teaching him "additional management and personnel skills."

Despite having valuable prior experiences with Extension, the participants were in agreement that starting as an agent was challenging. Responses to how prepared they felt varied from "I would say I was fairly well prepared but there were some things that surprised me" to "not very, because in a little county…, you're doing all of it; working with volunteers, clubs, summer outreach." The difference between types of experience was noted by one participant, who stated that in terms of education, she was "very prepared…but in life experience…[trails off]." The same participant went on to say that "it took three years before I felt really good about doing my job."

Perhaps the most experienced of the participants had worked both in and outside of Extension. A job in customer service provided the opportunity to practice *conflict management skills*, "but in 4-H, it's a different kind of conflict management." A similar sentiment was echoed in reference to the *ability to multi-task*; the participant "had done it on some level, but not the same as an agent." The most valuable knowledge was learned during roles as an intern and interim agent, rather than as a result of industry experience. Without the internship and interim agent experiences, the participant felt starting as an agent would have been "a lot more challenging."

Many jobs have a learning curve, and working as a 4-H agent is no exception. Each participant was able to recall an important lesson they learned during their first months as an agent. It was during the job interview that one participant learned his first lesson. The interview panel provided the opportunity for him to ask them questions after they had concluded theirs, and he asked "so what happens if I don't know all the answers?" Their response resonated with him and he has remembered the essence of it ever since; "there is no way you can know all the answers. That's why universities have specialists – to help field staff or county Extension agents."

The importance of *conflict management* was mentioned again. One participant said "the biggest lesson I learned was that…if you're doing your job right, then someone is going to be upset and disappointed. You can't please everyone." Continuing along the same vein, the participant added "you just have to make tough choices that aren't always going to make everyone happy…if you accept that, it's a lot easier to do your job." Another found that he was surprised by the "amount of conflict that there was, particularly in the 4-H program."

Sometimes, conflict was the result of not knowing how to work with different personalities. One participant felt that learning about *managing different personalities* in her graduate class was very different than actually doing it in the real world. She recounted a time when she "cancelled" a 4-H contest when the word she should have used was "postponed." After enduring angry phone calls, she quickly realized that it would have been helpful to know "what words to use;" what she also described as "the political stuff."

The participants also discussed which competencies were important for agents starting their careers now. Some of them, such as *organizational skills* and *communication skills* were repeats of the same competencies the participants had expected to need when they started. But with the benefit of having survived their own first years in Extension, they offered additional advice for newcomers to the profession. They recommended having a solid understanding of

what it meant to provide *youth development through 4-H*, versus just knowing how to create a program. It was mentioned that "having a background in *adult education* is just as important as [having a background in] youth" because "You spend more time working with adults than you do with kids." That participant felt this was particularly true in larger counties, where volunteers are relied upon more heavily to meet the needs of hundreds of 4-H members. Because of the high degree of involvement with volunteers, another agent included knowing the ISOTURE [*volunteer management*] model as a possible competency, but felt more strongly that new agents had "to do a better job [than their predecessors] of *work/life balance*."

Earlier, a participant mentioned a lesson learned about the difficulty in making everyone happy. The same topic was brought up again as advice for new agents:

> I guess [another agent] is the one who taught me this in a roundabout way. There's going to be things that frustrate you and you have to let them go. He sent me this e-mail once and I still have it because it's so true. People are going to criticize you no matter what you do. Some people are going to love it, some people are going to hate it, and that's just how it is.

As experienced agents, the participants continued to utilize many of the competencies that they perceived to be important for new agents. *Conflict management, multi-tasking, communication, volunteer management, developing partnerships and collaborations*, and an *understanding of youth development* were key themes. It is no surprise that one participant felt that there were "a bazillion" competencies required to do the job! Time on the job contributed to the development of practical knowledge and behaviors, such as "being able to do preventative things when you know something is going to come back and bite you." Despite the challenges of the occupation, the participants felt the reward was worth their continued efforts. One participant reflected, "it's a different kind of enjoyment now that I know the job and know what to do…just being able to make a difference in the lives of kids."

Cross-Case Analysis of Agent Perceptions and the 4-H PRKC

After being given the opportunity to discuss the competencies the participants perceived to be important for early career and established agents, they were asked to share their opinions about the 4-H PRKC model. Two participants felt they were "pretty familiar" with it, one because of a national leadership role and the other through interactions with one of the state 4-H specialists. However, the other two participants had far more frank replies to the question, "How familiar are you with the 4-H PRKC model?" One laughed, and said "I know it exists" and the other remarked "I know where to look it up."

All the participants, even those who were familiar with the model, expressed a certain amount of skepticism about its practical usefulness. The PRKC was described as "a good place to start" and interesting for evaluation purposes. Unfortunately, it was also stated that the PRKC is "too long" and that "if you could do it all, you could have Cathann Kress' job [as National 4-H Headquarters Director of Youth Development]." Overall, participants agreed it was not a factor in the way they did their jobs or pursued professional development opportunities.

A comparison of the competencies identified as most important for 4-H agents revealed similarities with the 4-H PRKC (see Table 1). An audit trail was included for trustworthiness. The competencies mentioned by participants were largely included in the domain of organizational systems. However, the 4-H PRKC model contains many more competencies than were identified by participants. In addition, there were competencies identified by participants that were not a part of the 4-H PRKC, such as conflict prevention and coping with difficult decisions.

Table 1
A Division of the Competencies Identified by Participants into the Domains of the 4-H PRKC

Youth Development -Understanding of 4-H Youth Development (BW, DL, AH, CJ)	**Youth Program Development** -Youth Program Development (BW, CJ)	**Volunteerism** -Volunteer Management/Adult Education (BW, DL) -Multi-generational Learning (BW, DL)
Equity, Access and Opportunity -Equity, Access, and Opportunity (BW)	**Partnerships** -Youth/Adult Partnerships (BW) -Organizational Alliances (BW)	**Organizational Systems** -Communication (BW, DL, CJ) -Conflict Management (DL, CJ, AH) -Organizational Skills (BW, DL, AH) -Interpersonal Relations (DL, AH) -Time Management (DL, CJ) -Work/Life Balance (DL, CJ) -Multi-tasking (DL, AH)

Conclusions, Recommendations, and Implications

Prior to starting their careers as Extension agents, each participant had expectations for what the job would entail and what competencies they would need in order to be successful. These expectations were formed as a result of personal experiences with 4-H, academic preparation for a career in Extension, and internships. It is interesting to note the importance assigned by participants to having an internship experience prior to starting as a 4-H agent. The participants clearly valued the opportunity it gave them to develop job-related insight. It is possible this experience helped to hasten the learning curve, making it easier to progress more rapidly as a new agent.

There is another unique similarity between three of the participants, which was their successful participation in the same extension education graduate program. Was it coincidence that three out of four of the participants were graduates of this program? What role did their

academic career have in developing their leadership capabilities? During the same time span that the participants for this study were serving as state and national association leaders (2004-2006), there were several other program graduates in leadership roles in the state association. Future research should consider exploring the potential relationship(s) between a graduate degree in extension education and future engagement as a leader within 4-H.

Several competencies were considered necessary for early career agents, most of them residing in the 4-H PRKC domain of organizational systems. The competencies tended to cluster under the topic of personal effectiveness. From this, it may be hypothesized that mastering the topic of personal effectiveness must occur before success can be maximized in the other 4-H PRKC domains. Of these, conflict management was most often mentioned by participants, indicating its essential role as a competency for 4-H professionals. This finding supports Moore and Rudd's (2005) finding that Emotional Intelligence was the most important leadership domain for Extension leaders. Skills residing in the equity, access, and opportunity domain and the partnerships domain were rarely mentioned by the participants. These domains may be less relevant in the everyday activities of a 4-H professional.

Also, the 4-H PRKC failed to capture some of the respondents' more practical competencies learned through experience. For the participants, these lessons were of equal, if not greater, importance than any competency listed in the model. These competencies served as solutions for dealing with the realities of the job. They helped the participants to overcome obstacles and challenges in ways that are not prescribed by any model.

There was little difference between the competencies considered important for early career agents versus established agents. Although the participants perceived themselves to be more competent than when they first started, they felt overwhelmed when trying to pinpoint exactly what skills were needed to be competent. The 4-H PRKC did not help them feel any less overwhelmed by the expectations of the job, due to its rather lengthy nature. Instead, experience, rather than any professional development model, was credited for improved performance as an agent. While the participants did seek out professional development opportunities, they did not select them with the 4-H PRKC in mind, but rather due to personal interest. If the 4-H PRKC was intended for agents to use on a regular basis, a more concerted effort needs to be made to get agents to do so.

The results of this study bring into focus several topics worthy of further investigation, such as the impact of internships on early-career preparation and the challenges faced by early-career agents. The findings indicated a positive relationship between competency in the organizational systems domain and professional success. Future research should examine this relationship more closely. Conversely, it may be useful to determine why the participants chose not to value competencies in the other domains as highly. Finally, the honest feedback from the participants about the 4-H PRKC may be indicative of a more widespread lack of use by 4-H agents. Revisions may be necessary to create a more practical model.

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ASSESSING MISSISSIPPI AEST TEACHERS' CAPACITY FOR TEACHING SCIENCE INTEGRATED PROCESS SKILLS

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Abstract

The purpose of this study was to determine AEST teachers' capacity to teach science integrated process skills. Twenty teachers attending a summer workshop completed three instruments to assess their capacity to teach integrated process skills, determine their preferred learning styles, and determine their confidence (self-efficacy) to teach science. Overall, AEST teachers exhibited a satisfactory level of ability in their capacity to teach integrated process skills. AEST teachers also had a high self-efficacy as far as their capacity to teach science concepts to their students. While AEST teachers preferred to learn through reflection, through the use of visuals, through sequential activities, and by sensing, those teachers that were reflective learners had a higher capacity to teach science integrated process skills than those teachers who were active learners.

Introduction

The pressure of increased state standards in education, particularly in science, has generated concern among many agricultural educators leading to the re-evaluation of the local high school agricultural education curriculum. Increased high school graduation requirements have put pressure on these programs by limiting opportunities for students to enroll in elective courses. Furthermore, because of the increased demand for improved science education, new and innovative methods of presenting scientific materials have been sought out and implemented in public schools throughout the nation (Connors & Elliot, 1995).

There is also a need to make today's society more scientifically literate. Project 2061 (American Association for the Advancement of Science (AAAS), 1989) defined scientific literacy as the connection among ideas in the natural and social sciences, mathematics, and technology. Many jobs require workers to know and apply math and science concepts to be able to properly fulfill the duties set before them. To make students more scientifically literate, more academic subjects must be joined together to give students more knowledge of the world (National Research Council (NRC), 1988). Integrating science and agriculture was one way to help students become more literate.

In 1988 the report *Understanding Agriculture: New Directions for Education* concluded that there was a need for scientific subject matter to be integrated into the agricultural education curriculum (NRC, 1988). While some agricultural educators have attempted to incorporate more science into their courses, others have been reluctant to change traditional agriculture programs because of the belief that too much science would threaten the program (Whent, 1992). However, research findings (Chiasson & Burnett, 2001; Thompson & Balschweid, 2000) have supported the claim that integration of science into the agriculture curricula was a more effective way to teach science.

The agricultural education profession has responded to societal pressures by offering courses in which students could earn science credit towards high school graduation. While many states are starting to offer more agriculture courses for elective science credit (Dormody, 1993; Connors & Elliott, 1995), there is a concern about the not only the quality of such courses, but also with the preparation of agriculture teachers teaching such courses. Enderlin and Osborne (1992) commented that "In order for students to receive quality science instruction from an agriculture course taught by an agriculture instructor, a systematic statewide effort must be made to develop scientifically literate secondary agriculture teachers who are competent in inquiring learning techniques in science" (p. 42).

Many benefits exist for integrating science concepts into the agricultural education curricula. Students taught by integrating agriculture and scientific principles have demonstrated higher achievement than did students taught by traditional approaches (Chiasson & Burnett, 2001; Roegge & Russell, 1990). Educators hoped that integrating science into vocational programs would not only help students acquire more options and achieve higher state standards, but that it would support the growth in the vocational classes as well (Thompson & Balschweid, 2000). The importance of integrating science into vocational courses would help students retain knowledge and utilize complex problem-solving skills learned through analysis and application (Connors & Elliot, 1994). The American Association for the Advancement of Sciences (1993) recommended that what students learn in school should be connected through interdisciplinary links, real-world connections and connections to the world of work.

Agriscience teachers have positive attitudes towards integrating science into agriculture classes. Balschweid and Thompson (2002) found that most agriculture teachers were prepared to integrate biological and physical science concepts into agriculture, but that lessons required more preparation than before they integrate scientific concepts into the curriculum. Thompson (1998) found that agriscience teachers believed that integrating science into curriculum assists students in better understanding science concepts and their applications to agriculture. Balschweid and Thompson (2002) also found that teachers thought students were better prepared in science after they completed an agricultural education course that integrated science.

The fact that the integration of science and agriculture helps students expand their knowledge motivates most teachers to work at integrating the two subjects into their curriculum (Balschweid & Thompson, 2002). Thompson (1998) concluded that agriscience teachers perceived that program enrollment could increase as agriscience teachers integrate more science into their curriculum. Teachers listed increased program credibility as an important benefit for integrating science into programs. This supported findings made by Johnson (1995) that offering science credit for agriculture courses would increase enrollment, benefit students, and enhance program image.

If high school students are to gain more knowledge in science through the completion of agricultural education classes, and if theses classes are to count as elective science credits towards high school graduation, then agriscience teachers must help students to achieve these skills. Furthermore, agriscience teachers must possess these science skills themselves and be confident in their ability to teach science concepts if they are to be successful in preparing students to be more scientifically literate.

Mississippi has been leading the charge in promoting the integration of science into high school agriculture courses through a program called Agricultural and Environmental Science and Technology (AEST). This program consists of one introductory course called Concepts of Agriscience Technology, four specialized elective courses (Science of Agricultural Plants, Science of Agricultural Animals, Science of Agricultural Environments, and Science of Agricultural Mechanization), and a capstone course in Agribusiness. Schools having an AEST program offer two of the four specialized courses based on local needs. It is possible for students to earn up to three elective science credits upon completing AEST courses, depending on which courses a local school offers. This will allow student to earn more science credits not only towards high school graduation, but towards entrance in a state university in thus Southern state.

Conceptual and Theoretical Framework

The conceptual framework for this study was based in the process skill approach (Chiappetta & Koballa, 2002) that stresses the acquisition of investigative skills that are often associated with scientific inquiry. Process skills are defined as a set of broadly transferable abilities that are appropriate to many science disciplines and reflective of the behavior of scientists (Padilla, 1990). Process skills can be either basic or integrated. Basic process skills include observing, inferring, measuring, communicating, classifying, and predicting. Such basic skills help provide a foundation for integrated process skills. Integrated process skills, the primary focus of this study, include controlling variables, defining operationally, formulating hypotheses, interpreting data, experimenting, and formulating models (Padilla, 1990). These skills and their definitions are presented in Table 1.

Two theoretical frameworks were used in this study. One theoretical framework was based on Bandura's Theory of Self Efficacy (1997). Self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives. Self-efficacy beliefs determine how people feel, think, motivate themselves, and behave (Bandura, 1997). There are those people who have strong self-efficacy and those who doubt their capabilities in difficult situations. People with strong self-efficacy tend to approach difficult task as challenges to be mastered. These people approach threatening situations with assurance in themselves and little doubt about their capabilities to over come the problem. This type of outlook is seen to produce personal accomplishments, reduce stress, and lower vulnerability to depression. Those people who have low self-efficacy tend to have low aspirations and weak commitment to the goals they choose to pursue. These people easily develop stress and depression (Bandura, 1997).

A second theoretical framework was based on the Felder-Soloman (1993) Learning Styles Model and the Index of Learning Styles (ILS). A learning style is defined as a "cognitive, affective, and physiological trait that serves as relatively stable indicators of how learners perceive, interact with, and respond to the learning environment" (Keefe, 1982, p. 44).

The agricultural education profession has started looking at teachers' capacity to teach integrated process skills. A study by Myers, Washburn, and Dyer (2004) investigated Florida's agriscience teachers' capacity to teach science integrated process skills in the classroom and the influence of learning styles on the teaching of integrated process skills. While the researchers found that teachers had acquired the knowledge to perform and apply integrated process skills, learning styles had little to no influence on their capacity to teach such skills. However, the researchers did not examine teacher's confidence (self-efficacy) in teaching science related concepts. As more states are allowing agriculture classes to count for science credit, agriculture teachers will be responsible for ensuring that agriculture lessons contain sufficient science concepts and that students have the science skills to pass standardized state tests. Yet little is known about the teachers' confidence to teach science concepts in agriculture classes. It is not known if agriculture teachers have the capacity to teach integrated process skills, skills that high school students need to achieve higher science achievement levels.

Table 1
Basic and Integrated Science Process Skills

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

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

Purpose and Objectives

The purpose of this study was to determine Mississippi AEST teachers' capacity to teach science integrated process skills. The following research objectives guided this study:

1. Determine the knowledge level of science integrated process skills of AEST teachers.
2. Determine the self-efficacy for teaching science of AEST teachers.
3. Determine the influence of self-efficacy in AEST teachers on teaching science integrated process skills.
4. Determine the learning styles of AEST teachers.
5. Determine the influence of learning style on science integrated process

Methods and Procedures

A descriptive-correlational research design was utilized for the study. Borg and Gall (1996) define descriptive studies as studies used to find out "what is". Correlational studies include research that attempts to discover or clarify relationships through the uses of correlation coefficients. Correlational studies tell the research the relationship between two variables but they cannot be used to determine whether A causes B, B causes A, or whether a third variable causes both A and B (Borg & Gall, 1996).

The target population of this study was all Mississippi AEST teachers at the end of the 2005-2006 school year. A current list of teachers provided by the Mississippi Department of Education identified 51 potential participants. The accessible sample for this study consisted of those AEST teachers who participated in the GIS/GPS Applications in Agriculture Workshop June 11- 14, 2006 at Mississippi Delta Community College. Short notice of the workshop was given so only half of the teachers that were supposed to attend were able to participate in the workshop. Twenty four teachers attended the workshop and were considered the accessible sample for the study.

Three instruments were utilized for data collection. Okey and Dillashaw's Test of Integrated Process Skills (TIPS) (1980) was administered to each AEST teacher. The TIPS instrument is a 36 multiple choice question exam developed to measure integrated process skills along five objectives. These objectives are identifying variables, identifying and stating hypotheses, operationally defining, designing investigations and graphing and interpreting data. Reliability of the TIPS instrument was established by Dillashaw and Okey and reported to be 0.89 (Cronbach's alpha).

A second instrument, the Index of Learning Styles (Felder & Solomon, 1993), was administered to assess the preferred learning styles of each teacher. The ILS separates learning styles into four dimensions:

- "*sensing* (concrete, practical, oriented toward facts and procedures) or *intuitive* (conceptual, innovative, oriented toward theories and underling meanings);

- *visual* (prefer visual representations of presented material, such as pictures, diagrams, and flow charts) or *verbal* (prefer written and spoken explanations);
- *active* (learn by trying things out, enjoy working in groups) or *reflective* (learn by thinking things through, prefer working alone or with one or two familiar partners);
- *sequential* (linear thinking process, learn in incremental steps) or *global* (holistic thinking process, learn in large leaps)."

The instrument consists of 44 questions designed to access preferences on the 4 dimensions. Each learning style dimension has associated with it 11 forced-choice items, with each option corresponding to one or the other categories (Felder & Spurlin, 2005). Felder and Spurlin (2005) found that reliability and validity data justified a claim that the ILS is a suitable instrument for assessing learning styles. The principal results that bear on the reliability and validity of the Felder-Solomon ILS are as follows:

- Test retest correlation coefficients for all four scales of the instrument varied between 0.7 and 0.9 for an interval of four weeks between test administrations and between 0.5 and 0.8 intervals of 7 months and 8 months. All coefficients were significant at the 0.05 level or better.

- Cronbach alpha coefficients were all greater than the criterion value of 0.5 for attitude surveys in three of four studies and were greater than that value for all but the sequential-global dimension in the fourth study. The values of the coefficients for each dimension in all but the latter study were remarkably consistent with one another.

The final instrument used in this study is the Science Teaching Efficacy Belief Statement developed by Riggs and Enochs (1990). This instrument contains 25 items that were rated on a 5-point Likert scale, ranging from strongly disagree (1) to strongly agree (5). Construct validity was determined based on the established correlation with teaching efficacy beliefs or their hypothesized relationship with science teaching efficacy beliefs. Validity coefficients were significantly correlated with at least one scale in the study and were positive, supporting construct validity of the scales (Riggs & Enochs, 1990). Reliability of the instrument was determined on two separate factors, one called personal science teaching efficacy (PSTE) (with a Cronbach's alpha of .92) and the second factor labeled science teaching outcome expectancy (STOE) (with a Cronbach's alpha of .77).

Data were collected at the GIS/GPS Applications in Agriculture workshop conducted at Mississippi Delta Community College June 11-14, 2006. A packet consisting of an informed consent form and the three coded instruments were given to each teacher upon registration at the workshop. Teachers returned the completed instruments to the workshop coordinator at the conclusion of the workshop, who then returned the completed instruments to the researcher. The total number of returned instruments was 20 out of 24 teachers who attended the workshop. This yielded an 83 percent response rate.

Data were analyzed using SPSS 13.0. Frequencies, percentages, means, and standard deviations were used to categorize and organize data. Pearson correlation coefficients and t-test were used to determine relationships between selected variables in the study.

Findings

The first objective was to determine the knowledge level of science integrated process skills of AEST teachers based on the results of the TIPS instrument (Okey & Dillashaw, 1980). Descriptive statistics were analyzed for the overall exam as well as by objectives. Results are presented in Table 2.

The mean overall score out of 36 total possible points on the TIPS instrument was 26.65, or 74 percent correct (s.d. = 6.01), with a range from 17 to 34 correct responses. AEST teachers in the sample performed best on the objectives "Operationally Defining" with a 79.2 percent correct response rate and "Identifying Variables" with a 75.8 percent correct response rate. The objective "Designing Investigations" had the lowest correct response rate of 66.7 percent.

Table 2
Mean TIPS Scores by Objective (n = 20)

Objective	Total Possible	Minimum Correct	Maximum Correct	Mean Correct	SD	Percent Correct
Identifying variables	12	4	12	9.10	2.34	75.8
Identifying and stating hypotheses	9	4	9	6.75	1.55	75.0
Operationally defining	6	2	6	4.75	1.37	79.2
Designing investigations	3	0	3	2.00	1.02	66.7
Graphing and interpreting data	6	2	6	4.05	1.27	67.5
Total Score	36	17	34	26.65	6.01	74.0

The second objective was to determine the self-efficacy of AEST teachers for teaching science based on the results of the Science Teaching Self-Efficacy Belief Statement (Riggs & Enoch, 1990). Table 3 shows the range of efficacy scores of AEST teachers. Scores range from 79 to 107, with the overall mean being 90.3 (s.d. = 6.73).

The third objective was to determine the influence of self-efficacy on teaching science integrated process skills. Using a Pearson correlation coefficient, the correlation was calculated to be r = -.13. According to Davis (1971), there is a low, negative relationship between teachers' self efficacy scores and their capacity to teach science integrated process skills.

Table 3
Science Efficacy Scores of Mississippi AEST Teachers (n = 20)

Scores	Frequency	Percent
79.00	2	10.0
84.00	1	5.0
86.00	2	10.0
88.00	3	15.0
89.00	4	20.0
91.00	1	5.0
92.00	2	10.0
94.00	1	5.0
96.00	1	5.0
98.00	1	5.0
101.00	1	5.0
107.00	1	5.0

The fourth objective was to determine the influence of learning styles on integrated process skills. Table 4 shows that 60 percent of the respondents' scores indicated a reflective learning style while 40 percent indicated an active learning style. Ninety percent of the respondents' scores indicated a visual learning style while 10 percent indicated a verbal learning style. Sixty-five percent of the respondents' scores indicated a sequential learning style while 35 percent indicated a global learning style. Ninety percent of the respondents' scores indicated a sensing learning style while 10 percent indicated an internal learning style.

Table 4
Number of Active/Reflective, Sensing/Intuitive, Visual/Verbal, and Global Sequential Learning Styles of Mississippi AEST Teachers

Learning Style	Frequency	Percent
Active/Reflective		
Active	8	40
Reflective	12	60
Sensing/Intuitive		
Sensing	18	90
Intuitive	2	10
Visual/Verbal		
Visual	7	35
Verbal	13	65
Global/Sequential		
Global	2	10
Sequential	18	90

Significant differences were found in one of the four groups (Table 5). There was a significant difference between teachers' scores on the TIPS and having an active/reflective learning style ($t = -2.50$).

Table 5
t- test for TIPS scores by Learning Style

Learning Style	n	Mean	SD	t
Active/Reflective				
Active	8	23.0	6.26	-2.50*
Reflective	12	29.1	4.64	
Sensing/Intuitive				
Sensing	2	29.0	1.41	.572
Intuitive	18	26.4	6.30	
Visual/Verbal				
Visual	18	26.5	6.30	-.205
Verbal	2	27.5	3.53	
Global/Sequential				
Global	7	23.4	6.24	-1.87
Sequential	13	28.4	5.35	

* $p < .05$

Conclusions and Recommendations

Mississippi AEST teachers responded correctly to 74 percent of the questions on the Test of Integrated Process Skills (TIPS), exhibiting a satisfactory level of ability in their capacity to teach integrated process skills. The percentage of correct responses in this study, both overall and on each objective, were lower than the results reported by Myers, Washburn, and Dyer (2004) in the study on Florida agriscience teachers. These results suggested that AEST teachers have some of the knowledge required to instruct their students in the integrated process skills.

Mississippi AEST teachers scored higher on the TIPS objectives "Identifying Variables", Operationally Defining", and "Identifying and Stating Hypotheses." Teacher scores were lower on the objectives dealing with "Designing Investigations" and "Graphing and Interpreting Data". These results are somewhat similar to those as reported by Myers, Washburn, and Dyer (2004). In their study, teachers scored higher on "Identifying and Stating Hypotheses." In both studies, teachers were weaker on "Graphing and Interpreting Data." It can be inferred that more time needs to be spent in professional development workshops and specialty classes on designing, graphing and interpreting data so that AEST teachers can be better equipped to teach their students in these areas.

Regarding their capacity to teach science to students, Mississippi AEST teachers have a high self-efficacy as far as their capacity to teach science to their students. However, there is a low negative relationship between teacher self-efficacy and their capacity to teach integrated process skills.

Regarding the preferred learning styles of AEST teachers, Mississippi AEST teachers prefer to learn through reflection, through the use of visuals, through sequential activities, and by sensing. Furthermore, Mississippi AEST teachers that are reflective learners have a higher capacity to teach science integrated process skills than those teachers who are active learners.

Based on the conclusions of the study, the following recommendations are offered:

1. Colleges preparing teachers for high school agricultural education programs should investigate incorporating more science based courses in instruction to enhance agricultural teachers' effectiveness.

2. This study should be replicated in five years as more agricultural programs in the state are turning to a more science based program with more courses being offered that will allow students to earn elective science credits by completing agricultural education courses and programs.

3. This study should be replicated in other states that are using programs similar to AEST or who are offering agricultural education courses for elective science credits to compare results.

4. A study should be conducted to evaluate the knowledge level of AEST students to conclude if they are learning the science skills needed to graduate from the AEST program.

5. Results from this study should be presented to agriculture teachers at workshops and/or conferences, posted on the agriculture teachers' website, and used to plan teacher professional development workshops. This should help teachers realize that they have the capabilities, confidence, and capacity to teach their students science concepts.

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SUCCESSFUL CHARACTERISTICS IN STATE 4-H FOUNDATION FUNDRAISING

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Abstract

In many states, Cooperative Extension is struggling to survive with budget cuts and changing legislative priorities (Hammond, 2004). These cuts and changing priorities will continue to have a direct impact on state 4-H program funding. Thus, seeking private dollars has become a necessity for state 4-H programs. The purpose of this study was to identify successful characteristics and activities of state 4-H foundations which appear successful in fundraising. This study focused on state 4-H foundations associated with Land Grant Universities in the United States. These foundations have had to secure alternative funding sources in a period of declining financial resources from local, state and federal sources. The population for this study consisted of state 4-H foundation executive directors (n=42), who held their position in spring 2005, and a random sample of state 4-H foundation trustees (n=300) in the United States. The response rate for the 4-H executive directors' survey was 92.87 percent with 39 questionnaires being completed. The response rate for the 4-H foundation trustees was 82.66 percent with 248 usable questionnaires being gathered. Results revealed several significant correlations that positively affect state 4-H foundation fundraising and a fundraising model was derived from these results.

Introduction

Cooperative Extension, in many states, is struggling to survive under budget cuts and changing legislative priorities (Hammond, 2004). These cuts and changing priorities will continue to have a direct impact on state 4-H program funding. Seeking private dollars has become a necessity for state 4-H programs due to decreasing local, state and federal monies and increasing competition for private resources.

The emphasis of this study was directed toward 4-H foundation executive directors (or persons in charge of state 4-H foundations) and boards of trustee. When compared with university foundations, 4-H foundations are still considered in their infancy. However, they are very similar to community college foundations in their developmental time line. Since no prior formal studies had been published about state 4-H foundations, research for 4-H foundations was drawn from research on community college foundations since both are considered in their infancy.

Theoretical Framework

Since no prior formal research had been conducted on state 4-H foundations, this study analyzed literature primarily from community college foundations since both are considered in their infancy. Universities have conducted fundraising activities for many years, but community colleges have only recently begun to carry out fundraising efforts. Community colleges have typically participated in fundraising campaigns during times of financial crisis. Before the 1960's, there were few attempts at development in community colleges. Their major funding sources were state and local taxes and tuition and fees. Community colleges had not considered the idea of private source fundraising as a revenue source (Glass & Jackson, 1998).

Strong board members are the keys to the success of any organization, according to Mentesti, (1998). Since board members generally set the tone and lead the way, this is especially true in fundraising. O'Connell (1993) confirmed that the success of good development directors is directly rated to the commitment and involvement of the board and staff. He differentiated board involvement by fundraising complexity and amount of gifts. If an organization conducted several programs using several techniques and had a yearly goal of more than $75,000, they usually needed a staff function. The rule of thumb is that the board will do everything possible on its own and only hire a staff when that will help their volunteers attain even higher results. Consultants, he maintained, can substitute for staff for most function except the annual giving program. However, he advised trustees that to achieve and sustain momentum, they would need to employ a good, full-time individual.

According to Kelly (1998), boards of trustee generally serve as the volunteer committee for the major gifts program. The staff manager, having full access to trustees, directs the board’s participation in all fundraising steps. In larger groups, a fundraising committee, headed by the board's chair, spearheads the work. Howe (1991) emphasized that development committee members are directly involved in fundraising activities unlike other board responsibilities that adhere to a policy-only role.

The role of trustee has three parts: lead by example, endorse objectives, and provide a network to reach prospective donors. For Murray (1995), there is only one standard for board participation as donors: 100 percent. Board members cannot ask people to give without first

expressing their own commitment. Trustees must also make gifts at a level proportionate to their involvement which sets appropriate gift levels for other donors. Trustees are the most involved, therefore, they must give the most. Indeed, the board is expected to donate many of the largest gifts raised through the major gifts program.

Interviewing thirty persons who gave $1 million or more, Panas (1984) reported that two-thirds (20) of them were on the receiving organization's board of directors. Trustees have an obligation to be actively involved in fundraising because their involvement lends legitimacy to the programs, argued Murray (1995). He admitted that although trustees might not participate in all steps of the process, they must be willing to help in some. Participation is their stamp of approval, which can be powerful in motivating others to support the organization. Trustees must use their knowledge and contacts to identify, cultivate, and solicit prospects for major gifts.

Similarly, Rosso (1991) suggested four ways—none of which involve solicitation—in which trustees make themselves valuable in fund raising. Trustees attest to the worth of the organization's services, attract other volunteers to work, identify and help cultivate potential donors, and serve as door openers. He explained that the personal contacts many trustees have with major prospects are valuable assets for the fund raising program.

Although no single formula for fundraising exists, Mentesti (1998) believes there are usually seven key elements present in any type of successful fundraising effort.

1. Know your mission.
2. Become an effective slaver in the economic development arena. Build relationships in a wide area.
3. Build from within. Strong members are the keys to the success of any organization.
4. Remember who will be the biggest beneficiary of the campaign. Typically, banks and utility companies are natural partners in economic development.
5. Optimize your operating environment..
    A. What other regional or non-regional organizations are involved in fundraising activities in your area?
    B. Are you working with them synergistically rather than working against them territorially?
6. Give donors a good return on their investment.
7. Simplify things. Today, too many fund raisers are focusing on technological issues, forgetting that their job is to speak and help on a personal level.

In the ten most successful community college foundations that he studied, Ryan (1998) found several characteristics present:

1. They had highly respected academic programs, high community profiles, large enrollments, and significant preexisting corporate support.
2. The college president's involvement in fundraising was necessary for success.
3. The existence of a full time development person with an office was essential for success.
4. They ascribed to the 'it takes money to make money' theory.

He found frequent citations in existing literature describing four characteristics of successful community college foundations:

1. A defined plan of activity that relates specific programs to specific development prospects,
2. A well organized active, influential, and community based board of directors,
3. A committed and active president and
4. College resources are dedicated to the effort– most importantly the presence of a chief development officer.

Strategic planning is a continual process which includes renewal of the mission, formulation of basic purposes and goals, and the development and implementation of the policies and programs necessary to achieve those goals (Buchholz, Evans, & Wagley, 1989). As indicated by J. E. Grunig (1992), the use of strategic planning is widespread as it occupies a chapter or section in almost every book on basic management. He concluded that excellent organizations plan strategically and excellent departments are integrated in the strategic planning process.

Strategic planning requires participation by key representatives throughout the organization. Not only is comprehensive input critical, but as Mixer (1993) explained, the parties most affected by the plan will be more likely to support it if they are consulted and involved during its creation. Widespread participation and the resulting plan enables an organization to integrate all its components, according to Robert Simmons (1990). Every decision made and action taken should agree with the organization's mission.

There is increasing consensus in the literature that effective fund raising is inseparable from strategic planning. For example, McNamee (1993) linked it to multimillion dollar gifts, and said that a good strategic plan—with input by practitioners—will operate as a fundraising blueprint for several years. Strategic planning is mandatory for effective fundraising management according to Block, Leduc, and Carroccio (cited in Herman & Block, 1990). Steele and Elder (1992) stated that strategic planning articulates where you are now and where you hope to be in the future. It provides the rationale for your development program. Broom and Dozier (1990), take that theory one step further to say that strategic planning is determining where you want to be in the future (the goal) and how to get there (the strategies). This directs the organization proactively, avoiding 'drift' and routine repetition of activities.

Based on systems theory, Lord (1983) sees the organization as trying to design its own future—based on the external environment including its opportunities and constraints. Strategic planning looks at forces outside the organization's control, forces like rising expectations for health care or a declining industrial base. With a fundraising plan drawn from this process, Lord felt that an organization could be seen as a quality operation—an intelligently managed enterprise, aware of its purpose and its environment, and ready to take advantage of opportunities as they arise. While Gagen McCarthy (1993), connects strategic planning to autonomy and accountability. She argues that the ultimate measure of success for an organization is a balance between donor needs and community needs as determined by the organization. She felt these dual and sometimes conflicting roles could be kept in appropriate balance with effective strategic

planning which gives control and direction to an organization.

Purpose and Objectives

The purpose of this research was to identify characteristics and activities of state 4-H foundations appearing to have successful fundraising. The study surveyed state 4-H foundation executive directors and trustees. This purpose was achieved by meeting the following research objectives: Objective 1 described the components critical to successful fundraising in state 4-H foundations. Objective 2 develop a fundraising model for state 4-H foundations to be successful in their annual fundraising efforts.

Methods and Procedures

The research design consisted of two instruments: one for 4-H executive directors and one for 4-H foundation trustees. The two instruments were determined to be the best method for data collection from each group. The two instruments were both descriptive and the design was correlative. The population for the 4-H executive director survey consisted of 42 recipients, thus a census survey was employed. The response rate for the 4-H executive directors' survey was 92.87 percent with 39 questionnaires being completed. Contact information for 375 trustees was gathered. According to Krejcie and Morgan (1970) a sample size of 162 would be needed for a population of 375. However, the researcher had enough postage available to survey a greater number of 4-H trustees than the level recommended by Krejcie and Morgan (1970) . This provided a higher confidence level and a lower margin of error. The confidence level was 99 % and the margin of error was 3.33 % with the sample size of 300, rather than a confidence level of 95% and a margin of error of 5.80% with a sample size of 162 as suggested by Krejcie and Morgan. The response rate for the 4-H foundation trustees was 82.66 % with 248 usable questionnaires being gathered.

Questions for the 4-H executive director survey instrument and the 4-H foundation trustees' survey instrument were designed using information from the literature review. Questions were formulated to discover which development components encouraged successful fundraising and which components limited fundraising in state 4-H foundations. The questions targeted key functions of state 4-H executive directors' daily job activities and their development offices, state 4-H programs' fundamental missions, perceptions of the executive director, perceptions of the state 4-H trustee, and functions of trustees. To assure the validity of questions for the state 4-H foundation director's instrument, it was administered to former state 4-H foundation directors and other development officers familiar with 4-H foundation work. The trustees' survey instrument was pilot tested with a group of state 4-H foundation trustee members to assure accuracy and understandability. Both questionnaires were also reviewed by agricultural education faculty members from two universities. Modifications were made to both instruments to increase validity and reliability.

Alpha reliability coefficients are calculations using the overall relationship among the answers to determine a reliability coefficient for an instrument (Frey, Botan, & Kreps, 2000). The internal consistency of the instrument in this study was determined by using Cronbach's alpha for reliability. Both questionnaires had an alpha coefficient of 0.96 while 0.90 is

considered excellent. Since reliability coefficients of 0.80 or greater are generally considered high (Vierra, Pollock, & Golez, 1998), and reliability coefficients of 0.70 or greater could be considered acceptable when measuring complex variables (Kirk, 1999), it was concluded that the instrument used in this study was reliable.

All statistical data analyses were completed using Statistical Package for the Social Sciences, SPSS®, Version 11.0 for Microsoft Windows®. The data collected were both descriptive and comparative. Numerical values were given to each variable. Data were assigned names and values based on statistical treatment. The collected information was compiled by comparing similarities and differences among 4-H state foundation fundraising styles. This determined the characteristics of the foundations success in fundraising.

Frequency distributions and descriptive statistics were used to make frequency tables for all questionnaire items. Frequency counts, percentages, cumulative percentages, mean, median, mode, sum, standard deviation, range, minimum and maximum values, standard error of mean, skewness and bivariate correlations were calculated with this analysis. Davis (1971) descriptors were used to describe strength of association.

Table 1 outlines the total data collection methodology. The researcher asked the Texas 4-H office to send an e-mail to state 4-H leaders encourage their state's participation in the study. Initial contact with state 4-H foundation executive directors concerning the research project was made via an email which asked if they would participate in an online survey to reduce the cost of mailing the questionnaire. The following week, personalized emails were sent to executive directors who did not respond to the initial email. Also, questionnaires were mailed to individuals who either didn't respond to the e-mail or requested that the survey be mailed.

Table 1
Contact Procedures Time Line

Time line	Action
October 7, 2004	Initial Contact with Executive Director
March 7, 2005	Electronic Notification of study
March 7-15, 2005	Email with Survey Link and Respondent Numbers
March 8, 2005	Encouragement of Participation
March 11-14, 2005	Personalized emails - followup
March 11, 2005	Mailed surveys to those that requested a hard copy or didn't have email
March 16, 2005	Mailed all surveys to those that did not respond to email
March 16-17, 2005	Emailed respondent numbers and appropriate internet link to all that had not completed online survey

Time line	Action
March 25, 2005	Emailed response status of survey and encouragement of participation
March 30-31, 2005	Reminder of deadline
April 1, 2005	Scheduled Deadline
April 12, 2005	Called non-responsive executive directors
April 12, 2005	E-mail to non-responsive executive directors

Findings

Table 2 shows the total support received by individual state 4-H foundations in 2004 or their most recent fiscal year. None reported total support over $2,000,000 and only four (10.5%) received between $1,000,000 to $1,999,999 in the most recent fiscal year.

Table 2
Total Support Received in 2004 by State 4-H Foundations (n=39)

Total Support	Frequency	Percent (%)
Less than $100,000	6	15.8
$100,000 to $299,999	9	23.7
$300,000 to $499,000	8	21.1
$500,000 to $999,999	11	28.9
$1,000,000 to $1,999,999	4	10.5
$2,000,000 to $4,999,999	0	0.0
$5,000,000 or greater	0	0.0
Total	38*	100.0

*Note. Value does not equal 39 due to missing data.

Objective 1 described the components critical to successful fundraising in state 4-H foundations.

When asked if their foundation had a written strategic plan with projected goals, 21 (53.8%) executive directors indicated their 4-H foundation has a strategic plan, while 18 (46.2%) reported not having a strategic plan. One hundred sixty-five (68.5%) trustees stated that their state 4-H foundation has a strategic plan and 76 (31.5%) reported there was no strategic plan.

The correlation coefficients between total support in the most recent fiscal year and the strategic plan were significant at the .01 level. The result of the correlation analysis presented in Table 3 was significant at 0.534. The correlation of the strategic plan and total support in the most recent fiscal year was significant at a substantial level (Davis, 1971). 4-H foundations with

a strategic plan indicated a higher level of total support.

The 39 responding 4-H foundations indicated their full time support staff ranged between one and six. Twenty-nine (74.4%) 4-H foundations had one full-time support person, five (12.8%) had two full-time support staff, one (2.6%) had three full-time support staff, two (5.1%) had four full-time support staff and two (5.1%) had 6 full-time support staff. The mean was 1.59 (SD = 1.292).

The correlation coefficients between the number of full time foundation staff and total support in the most recent fiscal year were significant at the .01 level. The result of the correlation analysis presented in Table 3 was significant at 0.443. The correlation of the number of full time foundation staff and total support in the most recent fiscal year was significant at a moderate level (Davis, 1971). 4-H foundations with higher number of full time staff reported a higher level of annual total support.

Nineteen (50%) of 38 4-H foundations responding reported they have previously or are currently conducting a capital campaign and 19 (50%) indicated they have not ever conducted a capital campaign. Of those with capital campaigns, nine (47.4%) reported monetary goals greater than or equal to $ 1,000,001, five (26.3%) reported goals of $500,001 to $1,000,000, and five (26.3%) had as their goal $500,000 or less.

The correlation coefficients computed conducted a capital campaign and total support in the most recent fiscal year was significant at the .01 level. The result of the correlation analysis presented in Table 3 was significant at 0.424. The correlation of the number conducted a capital campaign and total support in the most recent fiscal year was significant at a moderate level (Davis, 1971). 4-H foundations that have conducted capital campaigns indicated a higher level of total support each year.

State 4-H foundation executive directors were asked how many major donors, those who would make gifts greater than $20,000, and potential donors they personally worked with each year. The largest group (44.4%) only worked with 1 to 5 potential major donors. The mean of the response was 2.750 (SD = 1.9766).

The correlation coefficient between the number of major or potential major donors that executive directors had visited and total support in the most recent fiscal year were significant at the .01 level. The result of the correlation analysis presented in Table 3 was significant at 0.453. The correlation of the number of major or potential major donors that executive director had visited and total support in the most recent fiscal year was significant at a moderate level (Davis, 1971). The more major donors and potential major donors that the 4-H executive director visited indicated a higher level of total support.

State 4-H executive directors were asked “Does your state 4-H foundation have an annual giving program in place and if so, what is the monetary goal of the annual fund?”. Twenty-nine (74.4%) of the state 4-H foundations responding have an annual giving program and ten (25.6%) did not. Of those with an annual giving program in place, twenty-two (75.9%) have a monetary goal of $500,000 or less, four (13.8%) have a monetary goal between $500,001 and $1,000,000, and three (10.3%) have a monetary goal of $1,000,001 or more.

The correlation coefficients between monetary goal of annual fund and total support in the most recent fiscal year were significant at the .01 level. The result of the correlation analysis presented in Table 3 was significant at 0.672, according to the Davis, 1971. The correlation between the monetary goal of annual fund and total support in the most recent fiscal year was significant at a substantial level. 4-H foundations which have higher monetary goals for their annual fund had a higher level of total support.

Half (19) of 38 4-H foundations responding reported they have or are currently conducting a capital campaign and the remainder (19) indicated they have not ever conducted a capital campaign. Of those who conducted capital campaigns, nine (47.4%) reported monetary goals greater than or equal to $ 1,000,001, five (26.3%) reported goals of $500,001 to $1,000,000, and five (26.3%) had as their goal $500,000 or less.

The correlation coefficients between the monetary goal of annual fund and total support in the most recent fiscal year were significant at the .01 level. The result of the correlation analysis presented in Table 3 was significant at 0.829. The correlation of the monetary goal of the capital campaign and total support in the most recent fiscal year was significant at a substantial level (Davis, 1971).

Table 3
Correlation of Successful State 4-H Foundation Characteristics and Total Annual Support

Characteristic	Total Support
Strategic plan	0.534**
Number of full time fundraising staff	0.443**
Conducted a capital campaign	0.424**
Donors with gifts greater than $20,000	0.453**
Monetary goal of annual fund	0.672**
Monetary goal of capital campaign	0.829**

**p<.01

Executive directors were asked to identify major sources of gifts to their 4-H foundation as depicted in table 4. Foundation board members ranked as the number one source of gifts for state 4-H foundations with a mean of 3.67 (SD = .577). Businesses ranked second with a mean of 3.56 (SD = .552). Philanthropic foundations ranked the lowest with a mean of 2.85 (SD = .875).

Table 4
State 4-H Foundation Ranking of Gift Sources (n=39)

Funding Source	Rank	Mean	Standard Deviation
Foundation Board Members	1	3.67	.577
Businesses	2	3.56	.552
4-H Alumni	3	3.41	.715
Individuals affiliated with 4-H Program	4	3.33	.621
Large Corporations	5	3.23	.810
Administration	6	3.00	.698
Faculty (Extension)	7	2.947	.769
Philanthropic Foundations	8	2.85	.875

Note. Rating scale was 1 = Never a source, 2 = Seldom a source, 3 = Sometimes a source, 4 = Often a source.

The correlation coefficients between foundation board members, as a major source of gifts and donations, and total support in the most recent fiscal year were significant at the .05 level. The result of the correlation analysis presented in Table 5 was significant at 0.376. The correlation of foundation board member donations and total support in the most recent fiscal year was significant at a moderate level (Davis, 1971). 4-H foundations that had trustees who made major donations indicated a higher level of annual support.

The correlation coefficients between the satisfaction of trustees' involvement in donor prospect referrals and total support in the most recent fiscal year were significant at the .05 level. The result of the correlation analysis presented in Table 5 was significant at 0.345. The correlation of satisfaction of trustees' involvement in donor prospect referrals and total support in the most recent fiscal year was significant at a moderate level (Davis, 1971). 4-H foundation executive directors that were satisfied with their trustees' donor prospect referrals had a higher level of annual total support.

The correlation coefficients between keeping donors informed and involved and total support in the most recent fiscal year were significant at the .05 level. The result of the correlation analysis presented in Table 5 was significant at 0.354. The correlation of keeping donors informed and involved and total support in the most recent fiscal year was significant at a moderate level (Davis, 1971). States that had donors who were informed and involved in the state 4-H program had a higher level of annual total support.

Table 5
Correlation of Successful State 4-H Foundation Characteristics and Total Annual Support at the .05 Level

Characteristic	Total Support
Trustees donations	0.376*
Donor prospect referrals	0.333*
Donors informed and involved	0.354*

*p<.05

Objective 2. Develop a fundraising model for state 4-H foundations to be successful in their annual fundraising efforts.

Based on the review of literature and findings from this study, a model for 4-H foundations was conceptualized to aid state 4-H foundations in successful annual fundraising (see Figure 1). The Davis Fundraising Model has 11 unique elements that all lead to successful fundraising for an annual giving program. These elements were identified by the 4-H foundation research results significant at the .01 and .05 levels and/or review of literature. Six elements were significant at the .01 level and three of those had supporting literature. Four elements were significant at the .05 level and all had supporting literature. One element, active trustee recruitment and training, was identified by a review of the literature.

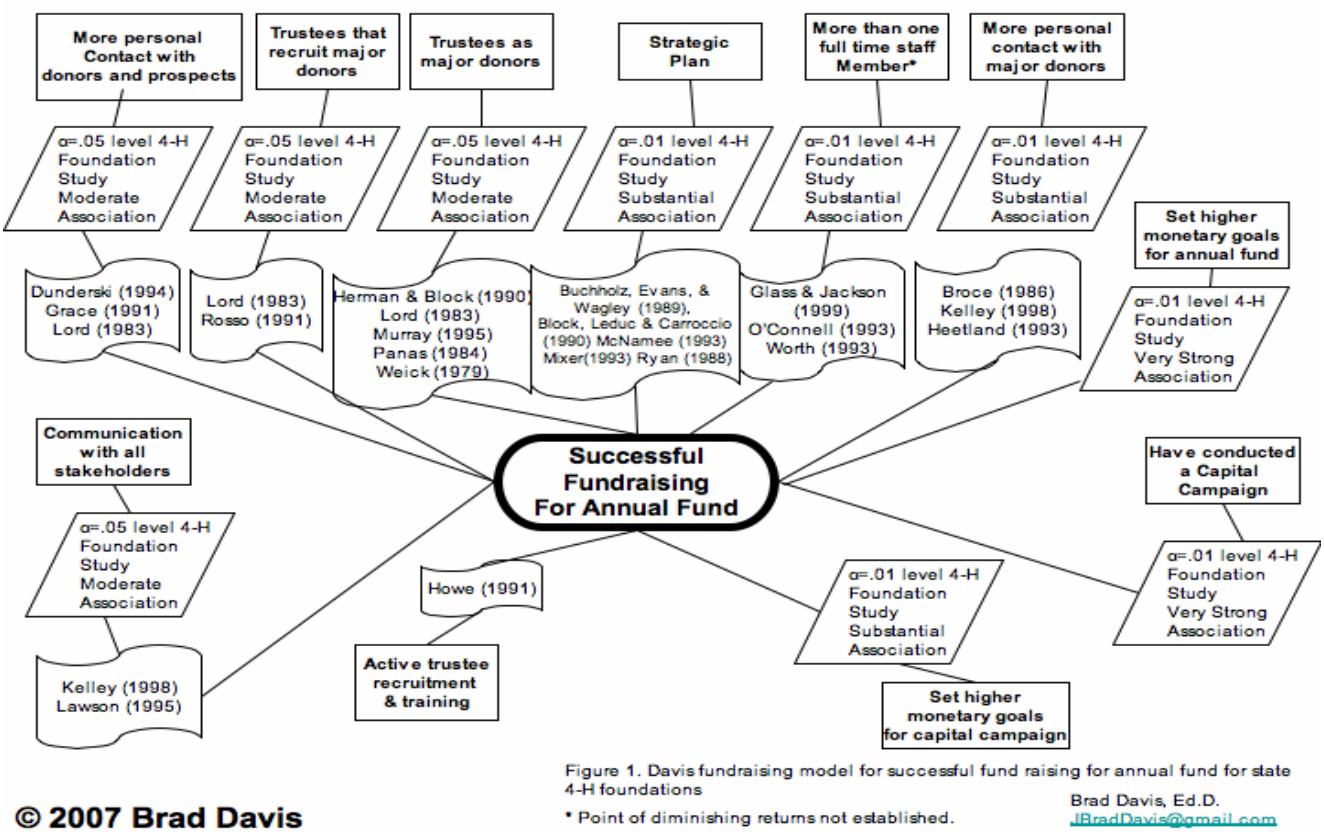

Figure 1. Davis fundraising model for successful fund raising for annual fund for state 4-H foundations

* Point of diminishing returns not established.

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Conclusions and Recommendations

Based on the results of this study, eleven conclusions to enhance higher levels of annual support were made.

1. State 4-H foundations must have a strategic plan in order to garner higher levels of annual support This finding is strongly supported by previous studies of Buchholz, Evans, and Wagley (1989), Block, Leduc, and Carroccio (cited in Herman and Block, 1990), McNamee (1993), Mixer (1993), and Ryan (1988).
2. State 4-H foundations must have more than one full time staff member (no point of diminishing returns was established) in order to obtain higher levels of annual support. Those foundations with more than one staff member exhibited an ability to raise more money. This finding reiterates those of Glass and Jackson (1999), O'Connell (1993), and Worth (1993) demonstrating the impact of more than one full time staff member invested in this organizational structure.
3. Executive directors of state 4-H foundations must more have personal contact with major donors. This supports past research of Broce (1986), Kelley (1998) and Heetland (1993) in supporting that personal contact with major donors is beneficial to the fundraising organization. Personal relationships with major donors must be implemented by state 4-H foundations in order to maximize fund development efforts.

4. Setting higher goals for annual fund drives was essential to raising more money. These goals need to be reachable and attainable, but should be challenging. An easily achievable goal which is not challenging for the organization can hamper the ability to raise funds over the long run. This finding was apparent in this study, but not reported in other studies.
5. Setting higher goals for the capital campaign was also essential to raising more money for the annual fund drive. These goals also need to be challenging. This finding was also apparent in this study, but not reported in other studies.
6. State 4-H foundations that have conducted a capital campaign were more successful in annual fundraising. This could be a result of experience and history of the organization in fundraising. This was apparent in this study, but was not reported in other studies.
7. State 4-H foundations must have trustees who are major donors to the foundation. This finding also supports the studies of Herman and Block (1990), Lord (1983), Murray (1995), Panas (1984), and Weick (1979). State 4-H Foundations must identify board members that have the ability to be major donors.
8. Having trustees who personally recruit major donors for the state 4-H foundation is essential to the success of annual fundraising. Results of previous studies of Lord (1983) and Rosso (1991) also agree that trustees must recruit major donors.
9. Having more personal contact and communications with major donors and prospects is essential to the success of the state 4-H foundation effort in annual fundraising. This is also supported by findings of Dunderski (1994), Grace (1991) and Lord (1983) in previous studies.
10. Having more communication with all stakeholders is necessary for state 4-H foundations to be successful. All stakeholders need to understand the reason for fundraising and why it is essential to the success of the 4-H program. This also strongly supported by the research of Kelley (1998) and Lawson (1995). It is essential that all stakeholders, including 4-H members, 4-H volunteers, 4-H parents, county extension agents, all extension specialist, and others understand the purpose and value of fundraising.
11. Having active trustee recruitment and training is crucial to the success of the fundraising organization according to Howe (1991).

Using these elements as a foundation for improving fundraising efforts provides a structural base for enhancing external funding for the 4-H program. This study revealed significant information for the success for state 4-H foundations in fundraising. It is essential that personal relationships be established and nurtured by executive directors, other development staff and board members with potential and major donors. A relationship is how money is raised, not through telemarketing, letters and proposals.

Trustees play a vital role in the success of the state 4-H foundation or any other non-profit entity. Trustees must have an understanding of their role and some of the roles they must play for the organization to be successful are: they must be donors to the organization, personally recruit major donors, serve as door openers, they must inform prospective donors and other stakeholders about the organization and its mission and vision, act as an ambassador for the organization. It is critical that board members be provided a job description of what is expected of them in order for the organization to be successful.

Implementing these eleven strategies can empower 4-H foundation directors and 4-H administrators in the development of successful fundraising strategies. These recommendations are specific to state 4-H foundations, program leaders or department heads in improving fundraising. The results should assist state 4-H foundation executive directors and state 4-H leaders or department heads identify fundraising strategies to implement. While these recommendations are specific to and suited for state 4-H foundations, other youth serving organizations may also benefit from the findings and suggestions.

Implications

These findings have implications for state 4-H foundations, state 4-H programs, and cooperative extension. The Davis fundraising model is a beginning model to be utilized by state 4-H foundations when planning for annual fundraising. It is necessary that there is buy in from all stakeholders in order for the model to be utilized for successful fundraising. With increasing pressure on obtaining private funding to sustain and advance our state 4-H programs, it is essential that all stakeholders understand the reason for fundraising and understand that 4-H is federally, state, and locally supported, but is not totally funded by those sources. In today's environment, it is critical that outside funding be garnered for the success of any non-profit youth serving organization.

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EFFECTS OF AN INTRODUCTORY AGRICULTURAL EDUCATION COURSE ON AGRICULTURAL LITERACY AND PERCEPTIONS OF AGRICULTURE IN URBAN STUDENTS

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Abstract

Urban agriculture education classrooms may differ physically and culturally from the traditional rural agriculture education classroom. Urban students have little interaction with agriculture, which inhibits their knowledge of agriculture compared to their rural counterparts (Ellibee, 1990). In Understanding Agriculture: New Directions for Education the National Research Council asserts that there are still too many Americans who are unaware of the social and economic value of agriculture in the United States (National Research Council, 1988). However, both rural and agricultural education students should possess an understanding and appreciation of the agricultural industry. This study examined the effects of an introductory course on the agricultural literacy and perceptions of urban students regarding the agriculture industry. Introductory agriculture classes may provide the foundation of agricultural literacy and change students' stereotypes and views of agriculture. In this study, a literacy and perception questionnaire was administered to students before and after they took an introductory agricultural education course. Upon completion of the introductory agricultural education course, students did increase their agricultural literacy; however, their literacy rates were still low after completing the course. The students showed greatest improvement in agriculture literacy regarding public policy whereas the least improvement was in career related literacy. Differences in the pre-test and post-test course perception scores of students regarding agriculture were not statistically significant. However, students possessed slightly positive attitudes regarding agriculture before and after taking the course. State curriculum decision makers should consider revising the current introductory course to possess more competencies in the affective domain. Other suggestions include creating a middle school course based on building the literacy and positive perceptions of agriculture for students before they attend high school.

Introduction

High school agricultural programs currently exist in both rural and urban communities throughout the United States. Regardless of location, programs share the same objectives: provide classroom instruction that promotes agricultural literacy, develop skills enabling career success, and foster leadership skills among students (National FFA Organization, 2005). Urban agriculture classes may differ physically and culturally from the traditional rural agricultural education classroom. Differences in the urban classroom are due to the distinction in cultural capital between urban and rural students (Raven & Cano, 1990). Raven and Cano stated that females and students of diverse socioeconomic and ethnic backgrounds tend to make up an urban agricultural education classroom, greatly diverging from the often typical white, male dominated rural agricultural education classroom. As stated by Ellibee, fewer than 10% of these urban students have a farming background; and they have had little interaction with agriculture, which inhibits their knowledge of agriculture compared to their rural counterparts (Ellibee, 1990).

According to the 2000 Census Bureau report, only 21% of United States citizens were living in rural areas (U.S. Census, 2000). And in agriculture classrooms around the country, 60% of students lack farming backgrounds (Helsel & Hughes, 1984). Urbanization and technology have forced society to distance itself from its deep agricultural roots (Leising, Pense, & Igo, 2001). Americans, urban or otherwise, have little knowledge of what agriculture is and what it does for people, society, and the economy. The majority of citizens identify agriculture only as farming and ranching (Blackburn, 1999). The typical American does not realize the value or the impact of agriculture on their daily life (Richardson, 1990).

Urban students need knowledge of agriculture as an essential enterprise. As the world's population continues to increase, the agricultural industry must meet the needs of this growing population. Students, whether urban or rural, need to be given the opportunity to understand the relationships between science and the food and fiber industry. The students should also be made aware of the many opportunities and careers in the agricultural industry and recognize that these careers are not limited to production agriculture (Sutphin, 1990). The future of the agricultural industry depends on allowing students to believe that their education will allow them to become active participants in the food and fiber industry in some manner (Helsel and Hughes, 1984).

The urban agricultural education program has made and continues to strive to meet the needs of educating students about agriculture. The urban programs must teach its students what rural students take for granted… personal and interactive experience with agriculture throughout their lives (Gless, 1993). Emphasizing career opportunities in agriculture, the urban program should provide SAE opportunities within the community, demonstrating how agriculture impacts and is impacted upon by the community. Although many people may feel an agriculture program is not appropriate for an urban setting, there are numerous opportunities for SAE's, career sites, and other hands on experiences (Sutphin, 1990). These work and classroom experiences and opportunities aid in developing agricultural literacy and promoting sound agricultural choices.

The need to provide students with sound agricultural knowledge is imperative as these students' choices will assist in the development and implementation of public policy. Aside

from understanding basic agricultural knowledge, Americans have little idea how their consumer choices affect farming practices or food security (Richardson, 1999). In "Understanding Agriculture: New Directions for Education" the National Research Council asserts that there are still too many Americans unaware of the social and economic value of agriculture in the United States (National Research Council, 1988).

According to Frick, Kahler, and Miller's definition of agricultural literacy, a person should be able to understand the food and fiber system to such a level that he/she "can communicate and understand the economic impact of agriculture, its societal significance, and agriculture's important relationship with natural resources and the environment" (1991, p. 52). Yet in a study of Oklahoma students, only 30% could correctly answer questions that pertained to these issues (Horn & Vining, 1986).

High school graduates should have a working knowledge of what agriculture is and what it does, as well as, the career opportunities and importance of agriculture within their communities. This is especially true of individuals from urban settings, who have little hands on experience with agriculture. Teachers must help urban students develop an understanding of the importance and the significance of agriculture in their world (Frick, Birkenholz, Gardner, Machtmes, 1995). The National Council for Agricultural Education's vision for the year 2020 states, "all students are to be conversationally literate about the agriculture, food, fiber, and natural resources systems" (National Council for Agricultural Education, 1999, p. 4).

Agricultural education programs can ensure that urban students, who would otherwise have little or no agricultural literacy, will gain invaluable knowledge, understanding, and improved perceptions of agriculture. Introductory agriculture courses provide the foundation of agricultural literacy and change students' stereotypes and views of agriculture. These courses typically have the highest enrollments and reach a variety of students with different career interests. These students, who are future decision making citizens, must realize the impact their decisions will have on agriculture and ultimately their health and the health of the environment.

Theoretical/Conceptual Framework

Duncan and Biddle (1974) presented a model for classroom teaching and learning that provides the foundation for this research. In the model, four major variables are proposed that result in student learning. These variables are: presage, context, process, and product. Each of these variables is a separate entity, but work together to change student knowledge.

The presage variable explains those factors and characteristics associated with a teacher. This variable relates to a teacher's past and present experiences that together define who the teacher is and how the teacher teaches. In this study, this variable was not of concern to the researcher.

The context variables are those that are not controlled by the teacher. Variables include who the pupil is, and explain what the classroom and community factors are. These variables were of particular interest in this study; the student's knowledge and attitudes about agriculture would be evaluated before the student interacted with information presented regarding

agriculture. The demographics relating to residency in an urban setting also played a major role in studying the classroom teaching experience.

Process variables explain what actually takes place in the classroom, the exchange and interaction between the presage variables and the context variables. This was of particular interest in this research, as the study was to determine if urban agricultural education students' knowledge of agriculture and their perceptions of agriculture would change once they were exposed to the introductory agricultural education course work. The study of the exposure to agricultural knowledge and the changes associated with that exchange would then be further studied in product variables.

The product variables are the final category of variables in the model. This variable is the outcome of the educational exchange in the process variables. The model suggests that there would be change as a result of the interaction between the presage and context variables. The research of this study proposed that the students would gain agricultural literacy and an improved perception of agriculture after taking an introductory agricultural education course. Within this variable, there are immediate and long-term effects that can be measured. In this study, the author was solely concerned with immediate pupil growth upon conclusion of an introductory agricultural education course.

Purpose and Objectives

The purpose of this study was to determine what influence an introductory agricultural education course administered to students in urban schools has upon those students' agricultural literacy and their perceptions of agriculture. An instrument developed by Frick, et.al (1995) was used to measure the agricultural literacy and perceptions of high school students before and after taking an introductory agricultural education course.

This study determined if introductory agricultural education classes in urban schools achieved the objectives of providing knowledge about the food and fiber industry, career opportunities, and the impacts of agriculture upon their lives, and the environment. This study attempted to answer the following questions:

1. Does an introductory agricultural education course increase students' agricultural literacy in an urban agricultural education program?

2. Does an introductory agricultural education course increase student literacy of agricultural careers and opportunities for employment?

3. Does an introductory agricultural education class increase student literacy of agriculture's relationship with public policy?

4. Does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources?

5. What influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry?

Procedures

The methodology of this study was descriptive research design. The population of the study included urban high school students enrolled in an introductory agricultural education course during the fall semester of 2005. According to the U.S. Census Bureau, an urbanized area consists of densely settled territory with 50,000 or more people within counties of at least 200,000 people (U.S. Census Bureau, 2000). In the state where this study took place, there are six counties that contain an urbanized area.

Of the many (26) schools that were located in urban counties, several did not qualify for the study. Many of the programs did not offer the introductory agricultural education course. Some schools chose not to participate in the study or had circumstances relative to their program that made it difficult for them to participate. Of the potential six counties in the state, three were able to be involved. Due to the inability for some schools to contribute, a random sampling of the schools was not feasible. According to Wiersma and Jurs (1995), a purposive sampling method was used to achieve the sample for the study. Of the 26 schools eligible, six schools offered the introductory agricultural education course and volunteered to participate in the study and completed all components of the study.

A total of 173 students were enrolled in the introductory agricultural education course in these six schools. Data were collected from 135 of the students in the sample (78% response rate). Some surveys were not included due to incompletion of the entire survey process (both pre-test and post-test), insufficient completion of the survey (completing the survey in less than ten minutes) or failure to follow instructions.

An agricultural literacy survey that was constructed by Frick et.al (1995) was used to evaluate student agricultural literacy and perceptions. Reliability and validity of the Frick, et al. instrument used in their study of inner city and rural high school students was reviewed. The agricultural knowledge section of the instrument had been assessed using a Kuder-Richardson 20 (KR-20) coefficient of internal consistency. The KR-20 computed for the knowledge section was .85. The perception section of the instrument had been reviewed using a Cronbach's alpha coefficient as a measure of internal consistency. The Cronbach's alpha coefficient for the items related to perception was .90. In 1994, a national panel of experts examined the instrument and determined it was a valid tool for measuring agricultural literacy concepts.

The agricultural literacy section of the instrument (general knowledge, career knowledge, policy knowledge, and environmental and natural resource knowledge) directed respondents to answer "True," "False," or "Don't Know" for each of the 35 statements. The second section, the perception instrument, included 35 perception statements to which respondents used a Likert-type response scale ranging from Strongly Agree to Neutral to Strongly Disagree.

The demographic section of the instrument contained questions that would better acquaint the researcher with the respondent's background in agriculture. This section consisted of questions asking respondents about their individual gender, race, home location, population of nearest town, if parents farm- the acreage, if relatives worked on a farm or in an agribusiness,

agricultural courses taken, membership in FFA, involvement in raising animals or pets, involvement in raising gardens or crops, news sources read, highest grade level completed, and if any agricultural courses were taken prior to the introductory agricultural education.

Two identical instruments for each respondent were provided to the lead teacher at each participating testing site. One of the instruments was to be used as a pre-test and the other as a post-test. The pre-tests were distributed in early August so that teachers would be able to administer them during the first week of the fall 2005 semester. The post-tests were administered the final week of the same semester. The teachers were instructed not to include the student's first or last name on the tests, but students were given identification numbers.

The lead teachers at the individual schools administered the pre-test and post-testing at the appropriate times. Prior to the test, lead teachers introduced the instrument and read all instructions pertaining to answering and finishing the instrument. Each student worked independently to mark all answers on a general purpose NCS® answer sheet. Students were expected to answer questions to the best of their ability. Therefore, surveys that were returned in less than ten minutes were deemed ineligible to eliminate skewed results.

When the tests were returned to the surveyor, the data were recorded with the identification number; and no correlation was made to the identity of the student. This identification number was known by the student and used for both the pre-test and post-tests. Additionally, respondents marked a two-digit code on the answer sheet to identify the school.

Once the answer sheets were returned they were scanned and data entered into a SPSS 11.5 data file. The data were entered according to each section of the instrument. Depending upon the data gathered various methods of analysis were employed. The first and second sections of the instrument were based upon questions measuring the respondents' knowledge of agriculture and their perceptions of agriculture. To compare the scores of the pre-test to the post-test, a correlated t-test was employed. The differences in the mean scores of the pre-test and post-test were compared.

The data collected from the third section of the instrument dealt with demographics of the respondents. Descriptive statistics were employed to state frequencies, numbers, percentages, standard deviations and means.

Findings

The gender of those surveyed in this study were 44% (n=60) female and 56% (n=75) male. The racial breakdown of the group was 4 %(n=5) Asian, 18% (n=25) Black, 7% (n=10) Hispanic, 68 %(n=68) White, and 3% (n=4) were other races.

The students participating in this test were considered to be attending urban schools according to the studies' definition of an urban school. Of the students surveyed, 7% (n=10) resided on farmland, 43% (n=58) resided in a rural area not on a farm, and 46% (n=64) lived in what they considered a town or city, 4% (n=20) did not respond to this question.

The introductory course studied was intended for freshmen students beginning a scope and sequence of high school agricultural education courses. However, the students in this study included 51% (n=70) freshmen, 30% (n=42) sophomores, 13% (n=17) juniors, and 6% (n=8) seniors.

Some students described having an agriculturally related experience at some point in their lives. Fifty-six percent (n=77) of the students have relatives who live or work on a farm, 55% (n=59) have relatives who work in an agricultural business. Of the students, 16% (n=74) had previously taken agricultural courses in high school and 84% (n=115) had not. Additionally, 86% (n=112) of the students had been involved in raising plants, while 14% (n=14) did not help raise gardens or crops. Finally, 89% (n=115) of the students had been involved in raising animals or pets, while 11% (n=15) did not help in raising an animal or pet.

The findings for each study question are as follows:

Question 1: Does an introductory agricultural education course increase students' agricultural literacy in an urban agricultural education course?

The overall mean Literacy of Agriculture score was 20.99 out of 35 before taking the introductory agricultural education course and 24.13 out of 35 after taking the introductory agricultural education course. The difference in means between the pre-test and post-test was statistically significant $\alpha \leq .05$ ($t = 5.31$, $df = 134$, $p = .001$) and is shown in Table 1. The increase in pre-test to post-test scores was a 9% gain in agricultural literacy.

Table 1
Overall Agricultural Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	20.99	5.95	5.31	134	.001
Post Score	24.13	6.84			

* $\alpha \leq .05$
Maximum score= 35

Additionally, the literacy scores were further studied and broken down into subgroups to respond to the questions posed by the study. These subgroups were general agricultural literacy, career literacy, public policy literacy, and environmental and natural resources literacy. The general agricultural literacy subgroups included questions that had a sense of overall agricultural literacy and could not be grouped into careers, public policy, or environmental and natural resources.

Questions in the general agricultural literacy subgroup also had a pre-test and post score. There were 12 questions that were included in this subgroup. The original general agricultural literacy test scores were 7.37 out of 12 and the post-test agricultural literacy knowledge scores were 8.64 out of 12.

The analysis of the data illustrates that the general agricultural literacy of urban students subjected to the introductory agricultural education course did increase by 10.6%. As illustrated in Table 2, the difference in means between the pre-test and post-test was statistically significant $\alpha \leq .05$ ($t = 5.35$, $df = 134$, $p = .001$).

Table 2
General Agricultural Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	7.37	2.56	5.35	134	.001
Post Score	8.64	2.53			

* $\alpha \leq .05$
Maximum score= 12

Question 2: Does an introductory agricultural education course increase student literacy of agricultural careers and opportunities for employment?

There were five questions in the agricultural careers literacy subgroup. The difference in mean scores for literacy of agricultural careers was statistically significant at the $\alpha \leq .05$ level ($t = 2.35$, $df = 134$, $p = .001$). Mean literacy of agricultural careers and opportunities was 2.8 out of 5 before students took the introductory agricultural education course and was 3.1 out of 5 after taking the course. This was a 6% increase in agricultural career literacy.

Table 3
Agricultural Career Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	2.80	2.55	2.35	134	.001
Post Score	3.10	2.53			

* $\alpha \leq .05$
Maximum score= 5

Question 3: Does an introductory agricultural education class increase student literacy of agriculture's relationship with public policy?

There were ten questions in the agricultural public policy literacy subgroup (government policy, trade, supply, food prices, and exportation and food distribution). The difference in mean scores for the agricultural public policy literacy was statistically significant at the $\alpha \leq .05$ level ($t = 3.81$, $df = 134$, $p = .001$). Mean literacy of public policy was 5.97 out of ten before students took the introductory agricultural education course and was 7.0 out of ten after taking the course. As indicated in Table 4, the literacy of public policy did increase by more than one point upon completion of the introductory agricultural education course. This was a 10.3% increase in literacy of agricultural policy.

Table 4
Agricultural Public Policy Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	5.97	2.25	3.81	134	.001
Post Score	7.00	2.77			

* $\alpha \leq .05$
Maximum score= 10

Question 4: Does an introductory agricultural education class change a student's understanding of agriculture's relationship with the environment and natural resources?

There were seven questions in the environment and natural resource agricultural literacy subgroup (how agriculture effects the environment and how these effects relate to society). The difference in mean scores for agricultural environment and natural resources literacy was statistically significant at the $\alpha \leq .05$ level ($t=3.69$, $df=134$, $p=.001$). The difference in mean scores between the pre-test and post-test scores of the environmental and natural resources literacy portion of the instrument increased. There was a change in score from 4.87 out of 7 on the pre-test to 5.39 out of 7 on the post-test. This was a 7% increase in test scores related to agricultural literacy of the environment and natural resources.

Table 5
Agricultural Environmental and Natural Resources Literacy Scores

	Mean	Std Deviation	T	df	P
Pre Score	4.87	1.60	3.69	134	.001
Post Score	5.39	1.67			

* $\alpha \leq .05$
Maximum score= 7

Question 5: What influence does an introductory agricultural education class have upon students' perceptions of the food and fiber industry?

The perception portion of the instrument used to determine if the introductory agricultural education course impacted perceptions of agriculture was composed of 35 items. The respondents were directed to use a Likert-type scale ranging from Strongly Agree (1), to Neutral (3), to Strongly Disagree (5). Lower perception scores reflected a more positive perception of agriculture. Negatively stated items were reverse coded for analysis.

Urban high school students' perceptions of agriculture before and after taking the course were not statistically significant at the $\alpha \leq .05$ level. The pre-test and post-test scores ($t=.109$, $df=127$, $p=.913$) are found in Table 6. The mean pre-test score was 92.98 out of 175 and the post-test mean score was 92.84 out of 175.

Students' scores on the perceptions scale were approximately 93 out of 175. This would place their overall perceptions of the agriculture, food, and fiber industry in the slightly positive range.

Table 6
Agricultural Perception Scores

	Mean	Std Deviation	T	df	P
Pre Score	92.98	7.37	.209	127	.913
Post Score	92.84	13.26			

* $\alpha \leq .05$
Maximum score= 175

Conclusions

The conclusions of this study are not intended to be generalized for other populations. The major findings offered in the study sustain the subsequent assumptions.

1. Urban high school agricultural education students enrolled in an introductory agricultural education course did increase their knowledge of the food and fiber industry while taking the course. However, a post-test course score of 69% indicates they are still not agriculturally literate after taking the course.
2. Urban high school agricultural education students slightly increased their literacy of careers in the food and fiber industry upon completion of the introductory agricultural education course.

3. Urban high school agricultural education students increased their literacy of agricultural public policy upon completion of the introductory agricultural education course. Urban high school agricultural education students increased their literacy of agricultural environment and natural resources upon completion of the introductory agricultural education course.

4. The introductory agricultural education course did not change the students' perceptions of agriculture. There was no significant difference between the student's perception of agriculture prior to taking the course and after taking the course. However, students enrolled in the introductory course did maintain slightly positive perceptions of the agricultural industry throughout the course.

Recommendations

The following recommendations were made based upon the researcher's opinions while accomplishing the study, assessment of the major findings of the study, and the conclusions of the overall research project.

1. The introductory agricultural education course examined in this study was intended for freshmen students. The demographic data illustrates that only half of the students in the course

were freshmen and 16% of the students had taken an agricultural education course prior to this course. School counselors, teachers, and administrators should have students follow the proper scope and sequence of courses in agricultural education.

2. Low pre-test and post-test course scores in agricultural literacy suggest that agricultural education in this state is not succeeding in producing students who are agriculturally literate. This suggests a need for a literacy course in this state. Supplemental literacy materials such as Ag in the Classroom could also be integrated throughout subjects in K-8 to increase student agricultural literacy rates.

3. Further research should be conducted to update agricultural literacy standards and measurements that could be used at the state and national levels.

Discussion/Implications

While 69% correct answers on an agricultural literacy knowledge test may not be the desired outcome for an introductory agriculture course, the results do represent an improvement in agricultural literacy over the Horn and Vining (1986) study in which only 30% of the students responded correctly to agricultural literacy questions. Pense and Leising (2004) also concluded that neither rural nor urban students were found to be agriculturally literate.

Regarding students' perceptions of agriculture, no change resulted from completion of the introductory course. Perhaps this is due to the possibility that urban students who enroll in an agricultural course already have a generally positive perception of agriculture prior to enrolling. The results in this study related to agricultural perceptions could have been influenced by the 16% of the participants who had already completed an agriculture course before enrolling in the introductory course. Frick et al. (1995) also found both rural and urban students to have slightly positive perceptions of agriculture.

Currently, the introductory agricultural education course in this state is written by a team of teachers and members of the agriculture industry. The focus of the course is to prepare students for a job in agriculture and includes content in welding and machinery, animal care, plant culture, and agronomy. At present, this course is expected to give students skills that will prepare them for the workforce and may not necessarily be intended to make them agriculturally literate. Perhaps there is a better means of helping all students become agriculturally literate; by offering an entirely new course completely outside of a career preparatory course of study. A well-suited environment for teaching a course in agricultural literacy course might be the middle school. An agricultural literacy course would be an opportunity for students to explore the agriculture industry in a number of respects. The curriculum team that creates this new course should review the national agricultural literacy objectives and standards (Frick, et al. 1995) and develop a course that will meet the criteria needed to help today's students become agriculturally literate.

Along with new courses and the integration of literacy topics into science and agricultural education, there is a need for improving and providing new standards and instruments for

measuring agricultural literacy. As our student population becomes more urban and this urbanization increases questions about agricultural issues, agricultural education must continue to reflect and address the need for agricultural literacy and the objectives that the National Research Council suggested in 1988.

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IDENTIFYING THE EMPLOYABILITY SKILLS NEEDED IN THE WORKPLACE ACCORDING TO SUPERVISORS OF COLLEGE OF AGRICULTURE, FOOD AND NATURAL RESOURCES GRADUATES

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Abstract

Graduates are entering the workforce without the necessary skills demanded in industry (Atkins, 1999; Peddle, 2000). Because of this, supervisors of College of Agriculture, Food and Natural Resources graduates at the University of Missouri were surveyed to determine the employability skills most important to their careers and the perception with which they were able to perform those skills. Supervisors perceived the three most important employability skills for graduates to possess were: "working well with others," "functioning well in stressful situations" and their "ability to work independently." Supervisors perceived graduates to be most competent at: "maintaining a positive attitude," "relating well with supervisors" and their "ability to work independently." The Borich (1980) needs assessment model revealed that 23 items could be employed to modify and enhance the existing college curriculum. The employability skills most in need of curriculum enhancement included problem solving, while the employability skills least in need of curriculum enhancement included written communications.

Introduction/Theoretical Framework

According to supervisors, graduates are entering the workforce without the skills needed for career success (Atkins, 1999; Peddle, 2000). A disparity exists in the types of skills taught at university and those that are demanded in industry (Andrews & Wooten, 2005; Askov & Gordon, 1999; Atkins, 1999; Evers, Rush, & Berdrow, 1998; Kivinen & Aloha, 1999; Kivinen & Silvennoinen, 2002; Morley, 2001; Robinson, 2000; Shivpuri & Kim, 2004). Atkins (1999) posited that "there is currently a skills gap between what employers need and what universities are producing" (p. 271). Evers et al. (1998) echoed that "the skills most in demand are least in supply" (p. 16). Specifically, the types of skills in demand include those that are transferable to a variety of situations (Billing, 2003). These transferable skills, also known as employability skills, include the ability to "solve complex, multidisciplinary problems, work successfully in teams, exhibit effective oral and written communication skills, and practice good interpersonal skills" (Schmidt, 1999, p. 31).

While it is assumed that most, if not all, companies provide employees with some form of technical training needed for fulfilling their respective jobs, far less offer training in employability skill development. Surmacz (2005) studied 1,420 informational technology companies and found that approximately half of the respondents acknowledged that they had taught some form of employability skill development to their employees. Surmacz opined that those who do provide such training are failing "because they do not improve individual comprehension, understanding, insight, or motivation" (p. 15).

Fuhrmann and Grasha (1983) concluded that colleges could better meet the needs of their students by adjusting how and what they teach. Therefore, higher education must assess its curriculum and evaluate its purpose in helping students attain employment. Shivpuri and Kim (2004) suggested that higher education should listen to the needs of its stakeholders in industry:

> Although employment of their graduates is not the only goal of colleges, it is still important for college administrators and employers to strive for open channels of communication and continuous dialogue in order to recognize, discuss, and resolve these outstanding discrepancies and more effectively serve their common link: the students (p.44).

A possible reason for higher education institutions failing to address the employability skills of its students could be because college faculty have do not understand what the lacking skills are and do not possess the necessary resources to teach them (Hofstrand, 1996). While higher education faculty may not know what the lacking skills are, corporate employers do, and as such, can have an influence on the enhancement of these skills in education (Taylor, 1998). Further, corporations are willing to partner with higher education institutions in an effort to teach the necessary skills for industry success (Paulson, 2001).

Carnevale, Gainer, & Villet (1990) stated that "Employers depend on educators to provide job-ready and training-ready entry-level employees" (p. 236). Teichler (1999) concluded that higher education institutions should serve three functions when preparing students: the educational function, based on the cognitive and intellectual capabilities needed to conceive

broad knowledge; the training function, based on the competencies needed to assist students in specific, specialized work; and the socialization function, based on the "values, attitudes, social behavior and the communication skills relevant for action in socio-communicative contexts" (p. 183).

The human capital theory serves as a theoretical lens for assessing skill development in an effort to achieve success in the workplace. Kivinen and Silvennoinen (2002) stated that "for any given individual, skills are the single best source of escaping from underprivelege" (p. 53). In its purist form, human capital is an investment in the skills and knowledge of people (Swanson, 2001; van Loo and Rocco, 2004). Institutions of higher education can enhance human capital by focusing on the skill sets of its graduates (Knight & Yorke, 2003). Becker (1993) stated that education is one of "the most important investments in human capital" (p 17). A focus on human capital allows for an investment in enhancing the knowledge, skill level, and productivity of the workforce (Swanson, 2001; van Loo & Rocco, 2004).

Swanson (1994) conceptualized a Systems Model for Performance Improvement (SMPI) to serve industry personnel as they assess employees on their performance within the organization (Figure 1). The SMPI was designed to increase individual performance and productivity. The factors affecting the model consist of the environment, organization, and performance improvement of the individual within the organization. Specifically, environmental factors (i.e., economic, political, and cultural forces) are those derived from the environment that have a direct impact on the organization. Organizational factors consist of the mission and strategy of the organization, which can assist in defining the organization.

The performance improvement factor includes both inputs (i.e., graduates) and outputs (i.e., level of competency) and is designed to provide quality services to the customer by increasing productivity of the employee and maximizing financial gains of the organization. For the model to work effectively, a systematic process consisting of five phases has to be carried out. The five phases consist of: analysis, design, development, implementation, and evaluation. Attending to these five phases ensures performance of employees will be maximized to its fullest potential.

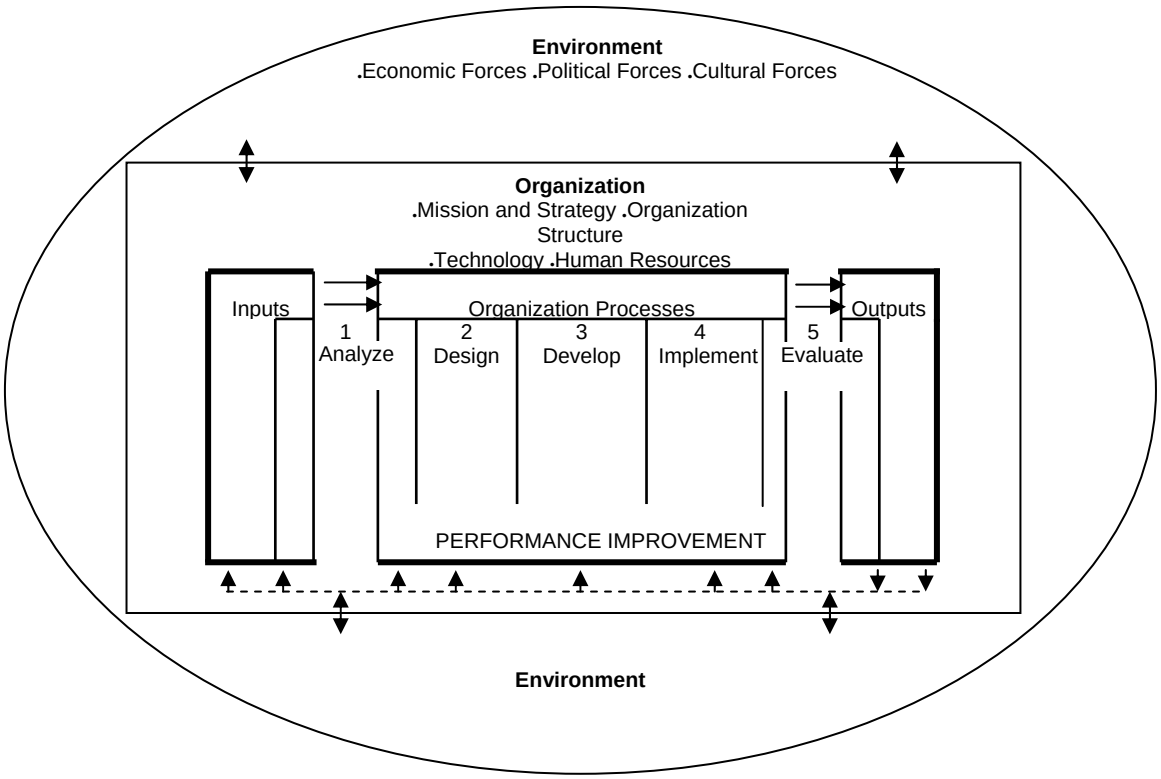

Figure 1. Swanson's (1994) Systems Model for Performance Improvement (SMPI).

According to Swanson (1994), the most critical phase to the success of an organization is the first phase (analysis). In this phase, developers and managers determine the needs of the organization based on its goals and standards. They determine what people should know and ". . . be able to do to perform in the workplace" (p. 19-20) and which actions should be addressed in an effort to assist people in meeting the goal.

The remaining four phases build on the information gathered in the analysis phase. According to Finch and Crunkilton (as cited in Swanson, 1994):

> The *design* phase includes both program and training design, whereas the *development* phase focuses on materials development and pilot testing. In the *implementation* phase, program plans and training are incorporated into the organization. And last, the *control* phase includes evaluating programs and training as well as deciding whether or not to continue these efforts (p. 31).

For the purpose of this study, College of Agriculture, Food and Natural Resources graduates were considered inputs and were analyzed according to which employability skills supervisors believed was important for them to be able to perform (Swanson, 1994).

Methods

The purpose of the study was to assess the employability skills needed by graduates of the College of Agriculture, Food and Natural Resources (CAFNR) at the University of Missouri as perceived by graduates' supervisors. The following objectives guided the study:

1. Assess supervisors' perceptions of the importance of the employability skills needed by graduates in industry.

2. Assess supervisors' perceptions of the competence level of their graduate employees at performing the employability skills.

3. Prioritize the employability skills, according to supervisors, in need of curriculum enhancement using the Borich needs assessment model.

The design of this study was survey research. A need existed to determine the employability skills desired in industry from the immediate supervisors of college of agriculture graduates. Because CAFNR has no frame for such supervisors, 290 randomly selected graduates were contacted to solicit the name and contact information of their immediate supervisor. Upon contacting the graduates, seventy-five willingly provided the information needed to serve as the frame for the supervisors, which comprised the population for this study ($N = 75$).

The Dillman (2004) Tailored Design Method was employed to collect data from the supervisors. A postcard was sent to all seventy-five supervisors informing them that a study was being conducted to assess the perceptions of the employability skills most in demand for graduates entering industry. Questionnaires were mailed two weeks after the postcards. The questionnaires were accompanied with a cover letter and pre-paid return envelope. Follow-up procedures consisted of a postcard sent to non-respondents ten days after the initial mailing of the complete package. A second complete package was mailed to non-respondents ten days after the follow-up postcard. After the initial mailing and follow-up procedures, 42 usable questionnaires were received from the supervisors for a 56% response rate.

A questionnaire was developed to collect the data and consisted of 67 employability skills identified through the literature by Evers, Rush and Berdrow (1998). Supervisors responded to their perception of how important the employability skills were to the success of the graduates in his/her employment and how competent they perceived the graduate to be at performing the skills. The 67 skills were measured on a 4-point response scale consisting of: 0 – no importance (or competence), 1 – minor importance (or competence), 2 – moderate importance (competence), and 3 – major importance (or competence). The importance and competence skills were further analyzed using the Borich (1980) needs assessment model. The nature of the model is to determine if and where discrepancies exist. Borich (1980) noted the importance of calculating a discrepancy score, weighted discrepancy score, and a mean weighted discrepancy score in an effort to emphasize areas in need of curriculum enhancement and modification.

A panel of experts consisting of CAFNR faculty established face and content validity on the instrument. To account for reliability, a pilot study was performed on CAFNR graduates not randomly selected to the study and resulted in a Cronbach's alpha of .94. Non-response error was

handled by comparing early and late respondents (Miller & Smith, 1983) on the variables of interest. No differences were found to exist. Therefore, non-response error was accounted for.

Results and Discussion

Objective one sought to assess supervisors' perceptions of the importance of the employability skills needed by graduates in industry. Working well with fellow employees (*M* = 2.93) was the employability skill perceived to be the most important by supervisors (Table 1).

Table 1
Supervisors' Perceptions of the Importance of the Employability Skills (n = 42)

Rank	Employability Skill	*M*	*SD*
1.	Working well with fellow employees	2.93	.26
2.	Functioning well in stressful situations	2.90	.30
3.	Ability to work independently	2.90	.30
4.	Solving problems	2.88	.34
5.	Maintaining a positive attitude	2.88	.40
6.	Setting priorities	2.85	.36
7.	Allocating time efficiently	2.85	.36
8.	Meeting deadlines	2.83	.38
9.	Identifying problems	2.80	.40
10.	Recognizing the effects of decisions made	2.80	.40
11.	Responding positively to constructive criticism	2.80	.41
12.	Adapting to situations of change	2.78	.57
13.	Functioning at an optimal level of performance	2.76	.44
14.	Listening attentively	2.76	.44
15.	Prioritizing problems	2.73	.45
16.	Managing/overseeing several tasks at once	2.73	.50
17.	Gaining new knowledge from everyday experiences	2.73	.51
18.	Conveying information one-to-one	2.71	.46
19.	Relating well with supervisors	2.71	.51
20.	Responding to others' comments during a conversation	2.68	.47
21.	Identifying essential components of the problem	2.68	.52
22.	Sorting out the relevant data to solve the problem	2.66	.48
23.	Keeping up-to-date on developments in the field	2.66	.53
24.	Maintaining a high energy level	2.66	.53
25.	Decisions on the basis of thorough analysis of the situation	2.63	.54
26.	Establishing the critical events to be completed	2.63	.54
27.	Recognizing alternative routes in meeting objectives	2.61	.54
28.	Communicating ideas verbally to groups	2.59	.63
29.	Understanding the needs of others	2.58	.50
30.	Identifying potential negative outcomes of a risky venture	2.54	.60
31.	Knowing ethical implications of decisions	2.54	.60
32.	Using proper grammar, spelling, and punctuation	2.54	.75
33.	Making decisions in a short time period	2.51	.60

Table 1 (Continued)

Rank	Employability Skill	*M*	*SD*
34.	Assessing long-term effects of decisions	2.49	.60
35.	Initiating change to enhance productivity	2.49	.71
36.	Combining relevant information from a number of sources	2.46	.75
37.	Gaining new knowledge in areas outside the immediate job	2.45	.68
38.	Contributing to group problem solving	2.41	.63
39.	Resolving conflicts	2.41	.84
40.	Identifying sources of conflict among people	2.37	.77
41.	Keeping up-to-date with external realities of a company's success	2.37	.77
42.	Establishing good rapport with subordinates	2.34	1.02
43.	Monitoring progress toward objectives in risky ventures	2.33	.77
44.	Revising plans to include new information	2.29	.75
45.	Taking reasonable job-related tasks	2.28	.65
46.	Monitoring progress against the plan	2.28	.72
47.	Reconceptualizing your role to changing corporate realities	2.25	.81
48.	Providing novel solutions to problems	2.24	.70
49.	Empathizing with others	2.20	.79
50.	Applying information to new or broader contexts	2.15	.82
51.	Integrating information into more general contexts	2.15	.88
52.	Giving direction and guidance to others	2.07	.96
53.	Making effective business presentations	2.05	.97
54.	Integrating strategic considerations in the plans made	2.02	.69
55.	Coordinating the work of peers	2.00	.95
56.	Writing reports	2.00	1.04
57.	Supervising the work of others	2.00	1.16
58.	Providing innovative paths for the company for future development	1.97	.99
59.	Identifying political implications of the decisions to be made	1.95	.87
60.	Making impromptu presentations	1.93	.85
61.	Assigning/delegating responsibility	1.93	.88
62.	Conceptualizing a future for the company	1.90	1.01
63.	Writing internal business communication	1.85	.99
64.	Coordinating the work of subordinates	1.82	1.10
65.	Delegating work to peers	1.80	1.04
66.	Delegating work to subordinates	1.79	1.13
67.	Writing external business communication	1.68	1.08

Note. Scale: 0 = No Importance, 1 = Important, 2 = Moderate Importance, 3 = Major Importance

In addition to "working well with fellow employees," six other employability skill items were found to possess a mean importance of 2.85 or higher. The remaining skills were "functioning well in stressful situations" (*M* = 2.90), "ability to work independently" (*M* = 2.90), "solving problems" (*M* = 2.88), "maintaining a positive attitude" (*M* = 2.88), "setting priorities" (*M* = 2.85), and "allocating time efficiently" (*M* = 2.85). Four employability skill items had means lower than 1.85. These items consisted of "coordinating the work of subordinates" (*M* = 1.82), "delegating work to peers" (*M* = 1.80), "delegating work to subordinates" (*M* = 1.79), and "writing external business communication" (*M* = 1.68).

Objective two sought to assess supervisors' perceptions of the competence level of their graduate employees at performing the employability skills. "Maintaining a positive attitude" (*M* = 2.73), "relating well with supervisors" (*M* = 2.68), "ability to work independently" (*M* = 2.63), "working well with fellow employees" (*M* = 2.61), and "meeting deadlines" (*M* = 2.54) rounded out the top five employability skills supervisors perceived their employees to be most competent at performing (Table 2).

Table 2
Supervisors' Perceptions of the Competence of their Employee at Performing the Employability Skills (n = 42)

Rank	Employability Skill	*M*	*SD*
1.	Maintaining a positive attitude	2.73	.59
2.	Relating well with supervisors	2.68	.61
3.	Ability to work independently	2.63	.58
4.	Working well with fellow employees	2.61	.74
5.	Meeting deadlines	2.54	.55
6.	Conveying information one-to-one	2.54	.67
7.	Maintaining a high energy level	2.51	.60
8.	Responding to others' comments during a conversation	2.51	.60
9.	Listening attentively	2.46	.67
10.	Functioning at an optimal level of performance	2.46	.71
11.	Making decisions in a short time period	2.44	.60
12.	Responding positively to constructive criticism	2.43	.75
13.	Allocating time efficiently	2.41	.67
14.	Adapting to situations of change	2.41	.84
15.	Identifying problems	2.40	.59
16.	Gaining new knowledge from everyday experiences	2.40	.67
17.	Keeping up-to-date on developments in the field	2.39	.67
18.	Recognizing the effects of decisions made	2.39	.77
19.	Establishing the critical events to be completed	2.38	.71
20.	Functioning well in stressful situations	2.38	.74
21.	Knowing ethical implications of decision	2.37	.73
22.	Managing/overseeing several tasks at once	2.37	.77
23.	Using proper grammar, spelling, and punctuation	2.37	.80
24.	Combining relevant information from a number of sources	2.34	.73
25.	Gaining new knowledge in areas outside the immediate job	2.33	.76
26.	Setting priorities	2.32	.69
27.	Identifying essential components of the problem	2.30	.61
28.	Sorting out the relevant data to solve the problem	2.29	.68
29.	Empathizing with others	2.28	.78
30.	Establishing good rapport with subordinates	2.27	1.02
31.	Prioritizing problems	2.25	.59
32.	Communicating ideas verbally to groups	2.24	.80
33.	Solving problems	2.23	.62
34.	Monitoring progress against the plan	2.21	.62

Table 2 (Continued)

Rank	Employability Skill	*M*	*SD*
35.	Understanding the needs of others	2.20	.82
36.	Making thorough decisions by thorough analysis of the situation	2.17	.70
37.	Contributing to group problem solving	2.15	.70
38.	Keeping up-to-date with external realities of a company's success	2.15	.73
39.	Initiating change to enhance productivity	2.13	.79
40.	Providing novel solutions to problems	2.12	.68
41.	Assessing long-term effects of decisions	2.12	.71
42.	Identifying sources of conflict among people	2.12	.75
43.	Applying information to new or broader contexts	2.12	.78
44.	Integrating information into more general contexts	2.12	.78
45.	Writing reports	2.10	.75
46.	Taking reasonable job-related risks	2.08	.66
47.	Revising plans to include new information	2.08	.69
48.	Recognizing alternative routes in meeting objectives	2.07	.72
49.	Resolving conflicts	2.05	.82
50.	Reconceptualizing your role in response to changing corporate realities	2.05	.83
51.	Coordinating the work of peers	2.03	.64
52.	Monitoring progress toward objectives in risky ventures	2.03	.75
53.	Writing external business communication	2.03	.79
54.	Making effective business presentations	2.03	.80
55.	Identifying potential negative outcomes of a risky venture	2.00	.63
56.	Writing internal business communication	2.00	.80
57.	Supervising the work of others	2.00	.91
58.	Giving direction and guidance to others	1.98	.85
59.	Delegating work to peers	1.97	.83
60.	Providing innovative paths for the company to future development	1.97	.83
61.	Integrating strategic considerations in the plans made	1.93	.62
62.	Making impromptu presentations	1.93	.83
63.	Coordinating the work of peers	1.92	.87
64.	Assigning/delegating responsibility	1.84	.75
65.	Conceptualizing a future for the company	1.84	.93
66.	Delegating work to subordinates	1.81	.89
67.	Identifying political implications of the decision to be made	1.75	.84

Note. Scale: 0 = No Competence, 1 = Competent, 2 = Moderate Competence, 3 = Major Competence

Seven employability skill items possessed mean scores less than 1.95. These skills consisted of "integrating strategic considerations in the plans made" (*M* = 1.93), "making impromptu presentations" (*M* = 1.93), "coordinating the work of peers" (*M* = 1.92), "assigning/delegating responsibility" (*M* = 1.84), "conceptualizing a future for the company" (*M* = 1.84), "delegating work to subordinates" (*M* = 1.81), and "identifying political implications of the decision to be made" (*M* = 1.75).

Objective three sought to prioritize the employability skills, according to supervisors, in need of curriculum enhancement using the Borich needs assessment model. A discrepancy score was calculated by taking the summated mean importance rating minus the summated mean competence rating of each employability skill (Table 3).

Table 3
Supervisors' Perceptions of the Importance of the Graduates' Employability Skills and their Competence at Performing the Skills (n = 42)

Category	Employability Skill	MWDS
I	Solving problems	1.78
	Setting priorities	1.49
	Functioning well in stressful situations	1.45
	Recognizing alternative routes in meeting objectives	1.37
	Identifying problems	1.33
	Identifying potential negative outcomes when considering risky venture	1.33
	Prioritizing problems	1.24
	Allocating time efficiently	1.22
	Making decisions on the basis of thorough analysis of the situation	1.19
	Recognizing the effects of decisions made	1.13
	Responding positively to constructive criticism	1.00
	Adapting to situations of change	.99
	Managing/overseeing several tasks at once	.98
	Identifying essential components of the problem	.96
	Sorting out the relevant data to solve the problem	.95
	Understanding the needs of others	.92
	Working well with fellow employees	.91
	Assessing long-term effects of decisions	.89
	Initiating change to enhance productivity	.89
	Communicating ideas verbally to groups	.86
	Gaining new knowledge from everyday experiences	.85
	Meeting deadlines	.81
	Resolving conflicts	.80
II	Functioning at an optimal level of performance	.79
	Listening attentively	.79
	Keeping up-to-date on developments in the field	.70
	Ability to work independently	.76
	Monitoring progress toward objectives in risky ventures	.67
	Relating well with supervisors	.65
	Contributing to group problem solving	.63
	Establishing the critical events to be completed	.63
	Identifying sources of conflict among people	.56
	Revising plans to include new information	.55
	Keeping up-to-date with external realities related to company's success	.51

Table 3 (Continued)

Category	Employability Skill	MWDS
III	Conveying information one-to-one	.45
	Responding to others' comments during a conversation	.45
	Taking reasonable job-related risks	.43
	Reconceptualizing your role in response to changing corporate realities	.43
	Knowing ethical implications of decisions	.42
	Identifying political implications of the decision to be made	.42
	Using proper grammar, spelling, and punctuation	.42
	Maintaining a positive attitude	.41
	Maintaining a high energy level	.38
	Assigning/delegating responsibility	.37
IV	Supervising the work of others	.29
	Combining relevant information from a number of sources	.29
	Gaining new knowledge in areas outside the immediate job	.29
	Establishing good rapport with subordinates	.28
	Conceptualizing a future for the company	.27
	Providing novel solutions to problems	.27
	Integrating strategic considerations in the plans made	.24
	Coordinating the work of peers	.24
	Monitoring progress against the plan	.22
	Delegating work to subordinates	.21
	Giving direction and guidance to others	.20
	Providing innovative paths for the company for future development	.19
	Making decisions in a short time period	.18
	Making effective business presentations	.10
	Coordinating the work of subordinates	.09
	Making impromptu presentations	.05
	Applying information to new or broader contexts	.05
	Integrating information into more general contexts	.05
	Writing reports	-.05
	Delegating work to peers	-.04
	Writing internal business communication	-.10
	Empathizing with others	-.16
	Writing external business communication	-.32

[a]0 = No Importance, 1 = Minor Importance, 2 = Moderate Importance, 3 = Major Importance
[b]0 = No Competence, 1 = Minor Competence, 2 = Moderate Competence, 3 = Major Competence
[c]Mean Weighted Discrepancy Score

A weighted discrepancy score was then calculated by multiplying the discrepancy score by the mean importance rating of each independent employability skill. Lastly, a mean weighted discrepancy score was calculated by taking the sum of the weighted discrepancy score for each

employability skill and dividing by the number of observations (n = 42). To prioritize the skills for curriculum enhancement, four categories were defined as a result of the mean weighted discrepancy scores.

Category I was comprised of the highest discrepancy scores (MWDS = < .80). Category II was comprised of more moderate discrepancy scores (MWDS = .50 to .79). Category III was comprised of the lower discrepancy scores (MWDS = .30 to .49). Category IV was comprised of the items that had a negligible amount of discrepancy (MWDS > .30).

Items with the greatest need for curriculum enhancement were identified in category I due to possessing the highest discrepancy scores. Three of the skills had a MWDS equal to or greater than 1.45. These three skills consisted of "solving problems" (MWDS = 1.78), "setting priorities" (MWDS = 1.49), and "functioning well in stressful situations" (MWDS = 1.45). In all, twenty-three employability skills had a high discrepancy score and comprised category I.

Eleven items had a more moderate discrepancy score and comprised category II, indicating a more moderate need for curriculum enhancement. The top five items in category II were: "functioning at an optimal level of performance" (MWDS = .79), "listening attentively" (MWDS = .79), "keeping up-to-date on developments in the field" (MWDS = .70), "ability to work independently" (MWDS = .76), and "monitoring progress toward objectives in risky ventures" (MWDS = .67).

Ten items comprised category III due to possessing lower discrepancy score which indicated a lower need for curriculum enhancement. The top five skills in category III consisted of: "conveying information one-to-one" (MWDS = .45), "responding to others' comments during a conversation" (MWDS = .45), "taking reasonable job-related risks" (MWDS = .43), "reconceptualizing your role in response to changing corporate realities" (MWDS = .43), and "knowing ethical implications of decisions" (MWDS = .42).

Twenty-three items fell into category IV and were perceived by supervisors to possess negligible discrepancy scores. Nine items in category IV had a mean weighted discrepancy score of less than .10. These nine items consisted of "coordinating the work of subordinates" (MWDS = .09), "making impromptu presentations" (MWDS = .05), "applying information to new or broader contexts" (MWDS = .05), "integrating information into more general contexts" (MWDS = .05), "writing reports" (MWDS = -.05), "delegating work to peers" (MWDS = -.04), "writing internal business communication" (MWDS = -.10), "empathizing with others" (MWDS = -.16), and "writing external business communication" (MWDS = -.32). As a result, these nine items are a low need for curriculum enhancement.

Conclusions/Implications/Recommendations

All 67 employability skills are at least moderately important to supervisors. Of all the skills dealing with communication, "listening attentively" was perceived by supervisors to be the most important. Six of the top ten most important employability skills deal with motivation and organization and time management. Therefore, it can be implied that supervisors desire employees who are highly motivated, organized, and can manage their time well. In addition,

supervisors place less importance on the visualization and supervision skills of their entry-level employees. It could be implied that because these graduates are entry-level employees, they have not yet had the time and experience needed to develop a strong vision for their job. Further, Swanson's (1994) SMPI asserts that developers and managers analyze the organization based upon its goals and standards. It could be that visualization and supervision skills simply do not fit into the needs of organizational goals and standards (Swanson, 1994) per these entry-level employees. Or, it could be that these graduates need to gain experience on the job by working independently and with fellow employees and not by delegating their work to others.

Swanson (1994) stated that managers determine what employees should ". . . be able to do to perform in the workplace" (p. 19-20). Per this study, supervisors recognized that graduates are most competent at maintaining a positive attitude while on the job, while they are least competent at identifying political implications of the decision to be made. An implication could be that entry-level graduates simply cannot think about all the ramifications of their decisions at work due to their lack of work experience. It could be that graduates are still getting a feel for the proper protocol for the chain of command that has been established at their workplace. In addition, graduates are least competent at delegating and coordinating their work and being visionary leaders. While this is an area supervisors identified graduates as being least competent in, the question becomes, "How much should be expected of entry-level graduates in these areas?" Further, the last five skills listed on the competence scale deal with coordination, organization and time management, visioning, and decision making. Could it be that entry-level employees simply have not had the time or experience and do not possess the knowledge needed to effectively perform these skills?

Through the Borich needs assessment model, supervisors identified "solving problems" as the employability skill in greatest need. Specifically, seven of the twenty-three items comprising category I dealt with problem solving and decision making. The human capital theory posits that institutions of higher education focus on the skill needs of its graduates (Knight & Yorke, 2003). Therefore, a recommendation is for faculty to begin addressing the skills in category I. By addressing all the specific skills in category I, human capital can be enhanced allowing graduates to be more successful and productive (Swanson, 2001; van Loo and Rocco, 2004) in the workplace. Once those skills have been addressed and satisfied, professors should address those in category II and then those in category III.

In all, 34% of the employability skills were perceived to possess the highest discrepancy scores and thus were ranked in category I, indicating the highest need to enhance the existing curriculum to include these skills. Sixteen percent of the items were perceived to possess a more moderate discrepancy score and were ranked in category II, 15% of the items were perceived to possess the lowest discrepancy scores and ranked in category III, while the remaining 34% of the items were perceived to be negligible in terms of need and ranked in category IV. Interestingly, supervisors identified writing skills of graduates to be negligible in terms of curriculum enhancement need. Because this institution prides itself on its nationally renowned intensive writing program, this finding is understandable and as a result, implies that the curriculum is currently meeting the writing needs of CAFNR graduates in their entry-level employment positions.

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AN EXPLORATORY EDUCATIONAL NEEDS ASSESSMENT OF E. COLI 0157:H7 KNOWLEDGE HELD BY PETTING ZOO PARTICIPANTS

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Abstract

Participants at a regional fair petting zoo were randomly solicited to answer questions to determine their knowledge level about the dangers of E. coli 0157:H7. The instrument contained questions in four construct areas: general knowledge, transmission, prevention and implications. Demographic information was also collected from the 382 respondents. Statistical analysis of this descriptive/correlational research project indicated that, while 73% of the participants were aware that hand washing was recommended for prevention of illness, participants provided correct responses at a much lower rate in the areas of general knowledge of E. coli, implications of contracting and transmission of the bacteria. Correlational analysis indicated that several low correlations existed between demographic variables and individual items as well as construct areas. Previous participation in FFA or 4-H was positively correlated to construct areas 2 and 3. This participation also had a low positive correlation with the overall score on the instrument indicating that involvement in one of these youth agricultural leadership organizations was related to a higher level of knowledge about the dangers of E. coli 0157:H7. Researchers plan to replicate this study on a national level as an educational needs assessment of materials for distribution to managers and promoters of petting zoos. These materials can include signage, brochures, pen layout diagrams as well as other beneficial documentation. Recommendations for petting zoo participant safety are included.

Introduction

The American family tradition of attending the local petting zoo has been threatened by frightening headlines about the dangers of contracting illnesses such as *Escherichia coli* (*E. coli*) 0157:H7 at the local fair. Infectious disease outbreaks reported during the previous decade have been attributed to various organisms, including *E. coli* 0157:H7. Such incidents have substantial medical, public health, legal, and economical effects (CDC, 2005).

E. coli 0157:H7 causes 73,500 illnesses in the United States annually, 2000 hospitalizations, and 60 deaths (Mead et al., 1999). *E. coli* 0157:H7 is a pathogenic strain of *E. coli* that causes serious illness including: hemorrhagic colitis, hemolytic uremic syndrome, and even death (Kaper, 1994).

In September of 2006, a large outbreak of illness related to ingesting *E. coli* 0157:H7 contaminated spinach leaves grabbed national headlines from California to New Jersey. Spinach was pulled from grocery shelves nationwide as consumer awareness about the safety of raw vegetables increased. It should be noted, however, that recent outbreaks of *E. coli* 0157:H7 are not limited to spinach or ground beef but have been attributed to the all of the following causes: eating raw or undercooked meat, consumption of contaminated fruits or vegetables, unpasteurized milk and juice, swimming in or drinking contaminated water, and by direct contact with animal feces (Bowman & Lindstrom, 2005). Direct animal contact, or contact with animal feces is the newest recognized route of transmission. In 1996, visiting a farm with cows was identified as an important risk factor in contracting *E. coli* 0157:H7 (Kassenberg et al., 1998).

In 2000, outbreaks of *E. coli* 0157:H7 infections in school children in Pennsylvania and Washington resulted in 56 illnesses and 19 hospitalizations. These illnesses and hospitalizations were directly associated with school and family visits where children came in direct contact with farm animals (CDC, 2001).

More recently, reports of attendees contracting *E. coli* 0157:H7 from petting zoos in Florida and North Carolina prompted officials at the State Fair of Texas to discontinue their petting zoo because of rising insurance premiums associated with the liability of this long-time fair attraction (Menzer, 2005). The 2005 South Plains Fair in Lubbock, Texas, took similar precautionary action by prohibiting the sale of livestock feed to fair-goers entering the 4-H petting zoo.

The Texas Tech University Departments of Agriculture Education and Communications and Animal and Food Sciences, the Texas Tech University College of Human Sciences, and the International Center for Food Industry Excellence (ICFIE) joined forces in a multi-phased, inter-disciplinary project to assess the knowledge and public perceptions of fair-goers at the 2005 South Plains Fair. This research was conducted to gain insight into public perceptions and knowledge related to *E. coli* issues at petting zoos.

The objectives of this research study were to:

1) Describe the demographics of individuals who participate in a regional fair petting zoo.

2) Determine participant knowledge of *E. coli* issues at a regional fair petting zoo in the construct areas of: general knowledge, transmission, prevention and implications.
3) Explore relationships between participant knowledge about *E. coli* and pertinent demographic variables.

Theoretical Framework

Witkin and Altschuld (1995) proposed the three-phase plan for needs assessment that was used to guide the planning, data collection and recommendations for this research. In phase 1, (Figure 1) the researchers conducted a preassessment of the research topic by synthesizing data collected from peer-review publications and the popular press. The major issue of the preassessment was determined to be a lack of knowledge about the perceptions and information held by the general population who attended petting zoos in regards to safety from *E. coli* 0157:H7. Researchers determined that data collection could take place at a local petting zoo produced by the cooperative extension at a regional fair.

PHASE 1 **Preassessment** (explore) →	**PHASE 2** **Assessment** (data gathering) →	**PHASE 3** **Post-assessment** (utilization) →
Set-up management plans for needs assessment (NA). Define general purpose of the NA. Identify major need area and/or issues. Identify existing information regarding need areas. Determine: • Data to collect • Sources • Methods • Potential uses of data	Determine context, scope and boundaries of the NA. Gather data on needs. Set preliminary priorities on needs – Level 1 Perform casual analysis at Levels 1, 2 and 3. Analyze and synthesize all data.	Set priorities on needs at all applicable levels. Consider alternative solutions. Develop action plan to implement solutions. Evaluate the NA. Communicate results.
Outcomes Preliminary plan for Phases 2 and 3, and plan for evaluation of the NA	**Outcomes** Criteria for action based on high-priority needs.	**Outcomes** Action plan(s), written and oral briefings, and reports.

Figure 1. Three-Phase Plan for Needs Assessment (Witkin & Altschuld, 1995)

During phase 2, the researchers determined the scope and context of the needs assessment to be limited to participants of the regional petting zoo and not inferable to other populations. The researchers also determined that this study, while small in context, would lead to refined methods and instrumentation for a national study of the same topic. This project was conducted in order to develop preliminary data for inclusion in a USDA grant application for conducting this study on a national level. In addition to determining context and scope of the project, the

researchers developed the objectives, created and pilot tested the instrumentation, collected the data, and analyzed the results using correlations, ANOVA and descriptive statistics.

According to Witkin and Altschuld (1995), the purpose of phase three of the needs assessment model to "bridge the use of the data and plans for action" (p. 14). The researchers used the data collected during this project to set the priorities of educational needs as well as develop action plans for future research and suggestions for petting zoo coordinators to help protect the public health. These recommendations are discussed in detail in the "recommendations" section of this paper.

Using the three-phase model for needs assessment, the researchers determined educational need areas, collected and analyzed data and made recommendations for improvement of programming delivered to the public. This topic is of special importance to extension educators who work with 4-H or FFA chapters who regularly provide petting zoos for local or regional events.

Methodology

This descriptive/correlational research was designed to measure participant knowledge about the dangers of *E. coli* 0157:H7 in the context of the traditional petting zoo. The participants of this study included a purposive selection of visitors at the 2005 South Plains Fair Petting Zoo in Lubbock, Texas. Instrument administrators positioned themselves at the two entrances of the facility and solicited possible respondents as they entered the building. Participants in the study were given a small battery-powered fan as an incentive to complete the study. All adults and children over the age of 8 were encouraged to participate. Bilingual facilitators assisted participants who were Spanish speaking only by verbally translating the instrument and recording the results. In the same manner, facilitators were required to verbally administer the questionnaire to a small number of participants who were illiterate.

The cooperative extension office, who sponsored the petting zoo, estimated that 75,000 visitors attended the petting zoo during the 10 days it was open at the same fair in the previous year. Based on this estimate, the researchers selected a sample size of 382 (Krejcie & Morgan, 1970). Researchers randomly selected days and two-hour blocks to collect data and followed that schedule until the sample size of 382 respondents was reached. The data collection was completed in six hours over three days.

The instrument was a researcher – developed, multiple-choice exam with questions divided into four constructs. This exam was created in cooperation with the university's food science department. The faculty in food science provided the construct areas of knowledge as well as the individual items within each construct area. This process was conducted in order to ensure construct validity of the instrument.

Constructs for the instrument were as follows:

- General knowledge of *E. coli*
- Knowledge of *E. coli* prevention
- Knowledge of the implications of *E. coli*

- Knowledge of *E. coli* transmission

In addition to the knowledge questions, a section was included for the respondents to provide demographic data such as age, place of residence and whether they owned pets or livestock. Reliability analysis was conducted using a local 4-H meeting as a pilot test group. This group of 38 individuals included children and adults from both rural and urban backgrounds. SPSS 13 was used to calculate a KR-20 coefficient for the multiple choice questions which were coded either correct (1) or incorrect (0). The resulting coefficient was .67. While the reliability coefficient is not in the .8 range that is typically acceptable, Nunnally (1967) suggests that .5 could be considered adequate in the early stages of a research line or with new instrument development. Demographic data were also coded and included in the data set. The analysis for this study used descriptive tools, correlations and ANOVA to explain results of the data collection.

Results and Discussion

Demographics

Three hundred, eighty-two petting zoo participants completed the questionnaire. The descriptive statistics of these subjects are detailed in Table 1.

Table 1.
Petting zoo participants' descriptive statistics.

Variable	Frequency	Percentage
Gender		
Female	243	63.6
Male	130	34.0
Missing	9	2.4
Total	382	100.0
Place of Residence		
Urban	253	66.2
Rural	123	32.2
Missing	6	1.6
Total	382	100.0
Pet Owners		
Yes	297	77.7
No	73	19.1
Missing	12	3.2
Total	382	100.0
Current or Former FFA/4-H members		
Yes	76	19.9
No	251	65.7
Missing	55	14.4
Total	382	100.0

The respondents in the sample were 63.6% (n=243) female, with 66.2% (n=253) living in an urban community, operationally defined as a population greater than 10,000. Nearly 78% (n=297) of the respondents currently owned pets. Nearly 20% (n=76) were current or former members of FFA or 4-H organizations. The average age of the participants was 33.2 with a range of 8 to 83. The standard deviation of the age was 13.5. The data collected on participant age was categorically reduced to "children" and "adults" with any respondent 18 years or younger being categorized as "child" (n=53) and individuals 19 and over categorized as "adult" (n=325).

The questionnaire solicited participant responses in four construct areas related to *E. coli* 0157:H7 safety at petting zoos. These construct areas were: 1) general knowledge about the dangers of *E. coli*, 2) tactics that participants could employ to prevent themselves and their families from becoming infected with *E. coli*, 3) implications to a person's health from contracting *E. coli*, and 4) how *E. coli* is transmitted from the environment to people. The multiple choice questions in each construct area were score either right (1) or wrong (0) and entered into the database. Results are seen in Table 2.

Table 2.
Percentage of correct answers for constructs 1-4.

Construct	Responses	Correct	Incorrect	Total
1. General knowledge	382	37.3%	62.7%	100%
2. Prevention	382	73.5%	26.5%	100%
3. Implications	382	46.0%	54.0%	100%
4. Transmission	382	28.8%	71.2%	100%

Participants were most knowledgeable about how to prevent sickness from *E. coli* (construct two, 73.5% correct) in response to questions regarding hand washing, the use of sanitizers and avoiding direct contact with animal manure. They were least knowledgeable about how *E. coli* is transmitted (construct four, 28.8% correct) from animals to objects in the environment, and to humans. Construct three included questions about how to recognize early symptoms of illness for facilitating appropriate medical attention. Participants correctly answered 46 % of the questions in construct three. Construct one asked participants about their general understanding of what *E. coli* is and why they should be concerned when attending petting zoos. The respondents correctly answered 37.3 % of the questions in construct one.

Correlations

Demographic variables were correlated to each construct area score as well as the total score on the instrument. Significant correlations were identified using the Davis (1971) naming convention. Results from this correlational analysis are presented in Table 3.

Table 3.
Correlations between demographic factors and knowledge of construct areas of E. coli 0157:H7.

Construct	Gender	Age	FFA/4-H members	Pet Ownership
1. General knowledge	.035	.009	.081	-.004
2. Prevention	-.038	.061	.145*	.089
3. Implications	-.013	.130*	.169**	.017
4. Transmission	-.027	.108*	.067	.025
Total Score	-.019	.142**	.209**	.058

* significant at .05
** significant at .001

The demographic variables of gender and pet ownership resulted in no significant correlations to the construct variables or the total score; however, age and FFA/4-H membership yielded six significant relationships. The correlation between age of respondent and implications, transmission and total score resulted in low, positive (Davis, 1971) relationships, indicating that, generally, older participants scored higher in those areas than younger participants. FFA/4-H membership also produced low, positive correlations with prevention, implications and total score.

Because age had a positive correlation with two construct areas and total score, the researchers determined the need to categorize the interval data into "child" and "adult" for the purpose of the needs assessment. A new variable was created in the database with a "1" representing respondents who reported their age at 19 or greater. A "0" was entered in this column if the respondent indicated their age to be 18 or less. Four individuals declined to reveal their age. A one-way ANOVA was conducted to determine if the mean scores of the two groups differed on any of the construct areas or on the total instrument score. Results of the ANOVA analysis can be seen in Table 4.

Table 4.
Differences in mean scores of adults and children of the four construct areas and total instrument score. (N=382)

	Source	SS	df	MS	F	p	Cohen's d
Construct 1	Between	.03	1	.031	.07	.788	.04
	Within	158.59	376	.422			
	Total	158.62	377				
Construct 2	Between	1.39	1	1.39	3.46	.063	.28
	Within	150.79	376	.40			
	Total	152.18	377				
Construct 3	Between	2.62	1	2.62	5.73	.017	.36
	Within	172.15	376	.45			
	Total	174.77	377				
Construct 4	Between	2.51	1	2.51	6.87	.009	.39
	Within	137.60	376	.36			
	Total	140.11	377				
Total Score	Between	17.72	1	17.72	9.18	.003	.45
	Within	725.66	376	1.93			
	Total	743.38	377				

Note. construct 1 = general knowledge, construct 2 = prevention, construct 3 = implications, construct 4 = transmission

The ANOVA indicates that there are significant differences in mean scores between children and adults in Constructs 3 and 4 as well as the total instruments score. Effect sizes (as calculated using Cohen's d) were small for Constructs 3 and 4 and medium for the total score (Thalheimer & Cook, 2002). These results indicate that adults significantly outscored children in the construct areas of Implications, Transmission and overall knowledge of the dangers of *E. coli* 0157:H7.

Conclusion and Implications

The researchers used Witkin and Altschuld's (1995), three-phase model of needs assessment to guide this exploratory research study. Phase one involved the creation of the following research objectives:

1) Describe the demographics of individuals who participate in a regional fair petting zoo.
2) Determine participant knowledge of *E. coli* issues at a regional fair petting zoo in the construct areas of: general knowledge, transmission, prevention and implications.
3) Explore relationships between participant knowledge about *E. coli* and pertinent demographic variables.

Phase two consisted of instrument creation, data collection and analysis which resulted in the following conclusions and recommendations for phase three. Recommendations take the form of future research but also practical educational techniques that can be used by fair managers to help prevent the spread of *E. coli* 0157:H7 at petting zoos.

Recent outbreaks of *E. coli* 1057:H7 at public venues, such as fair petting zoos, have increased the need for administrators of such events to provide appropriate educational information to the petting zoo attendees. Legal liability issues add to the concerns of fair organizers who wish to reduce risk of illness for its patrons. In order to maintain the educational opportunity that these events provide, it is important to reduce the risk involved for those who chose to participate. That can be done through direct educational efforts during the event itself. While most petting zoo attendees were aware that they should wash or sanitize their hands, scores for the remaining construct areas were below 50 percent. Organizations that promote and host petting zoos should take an active role in educating their patrons in all four areas but should focus added attention to adolescents.

While it was not an original objective of this research to compare children and adults, it became obvious to the researchers that there were differences in knowledge levels from the respondents. This is perhaps the most important finding of this study. Phase 3 of the needs assessment model indicates that priorities should be set. Priorities determined through the implementation of this research project would include focusing the educational material at a higher level toward participants less than 19 years of age. The significant decline in scores by adolescents would indicate less exposure to educational sources such as formal education and media that would assist older individuals in making correct choices. The positive correlation between construct scores and FFA/4-H membership would suggest that these organizations have an impact on educating young people about this issue. The researchers suggest more in-depth analysis with future research to determine exact sources of this information.

Future plans for this research include making improvements to the instrument in order to increase the reliability coefficient to ensure that questions in each construct area are consistently producing valid responses. The researchers intend to use this improved instrument to replicate this study on a national scale to further identify specific educational needs of petting zoo attendees. Once those detailed needs are identified, educational materials will be developed and disseminated via the Internet to administrators for use during their event. These materials will include posters, brochures, signage, traffic flow recommendations and other materials. These educational items will be provided on a website free of charge and advertised to extension personnel, FFA advisors, fair administrators and other parties who participate in creating and managing their own local petting zoos.

Recommendations for Improvement of Practice

Although the United Kingdom and a few states have recommendations for petting zoo exhibitors and other animal exhibition venues, there are no federal laws in the United States that address the risks involved with the transmission of pathogens at events where the public has direct contact with animals (CDC, 2005). However, in 2001 the Center for Disease Control and Prevention issued a set of guidelines. Due to the lack of petting zoo safety knowledge, this section briefly highlights their established recommendations.

The first recommendation by the Center for Disease Control (2005) pertains to education. It is recommended that the operators of petting zoos are familiar themselves with the basic risks

associated with animal contact. The staff should also be trained and familiarized before working at the petting zoo to reduce the risk of injury or disease associated with animals. Finally, petting zoo operators should provide educational materials to the visitors at the entrance to animal contact areas (CDC, 2005).

Once attendees have entered the petting zoo, the Center for Disease Control (2005) recommend s the following regarding the control of direct animal contact. Food or beverages should be disallowed from the animal area. Containers should be positioned at the entrance with signs asking participants to dispose of food or drink before they enter the facilities. Manure and soiled bedding should be removed promptly by the petting zoo staff. It should be disposed of properly and implements and containers that handle animal waste should be stored out of reach of the petting zoo participants.

Hand washing facilities should be easily accessible and visible at all exits along with signs directing participants to thoroughly wash their hands. In the event that hand washing is not possible, hand sanitizer should be provided. Children should be closely supervised to prevent hand-to-mouth activities and the petting zoo staff should be present in all areas where animal contact is permitted. Finally, animals should be fed only feed provided by the petting zoo and all pens should be cleaned and disinfected following the event.

Safety of petting zoo participants is of concern because of the negative backlash toward agriculture when an outbreak occurs. Those less familiar with livestock handling procedures are also less knowledgeable about *E. coli* 0157:H7, what it is, how to recognize symptoms and prevent illness. This needs assessment has outlined several constructs for providing educational programs as well as brought into focus the target audience of the educational materials. Expanding the scope of this study is necessary in order to infer these findings to a national audience and the researchers recommend this line of study be continued in a timely manner.

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