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Readers of the Proceedings of the Research Section of the 2005 American Association for Agricultural Education Conference:

Faculty members in the Department of Community, Agriculture, Recreation, and Resource Studies (CARRS) at Michigan State University (MSU) were delighted to chair the research section of the 2005 American Association for Agricultural Education Conference. I would like to thank Dr. Dave Krueger, assistant professor of CARRS for co-chairing the research section of the conference with me. Appreciation and thanks is extended to Jake Riske, and undergraduate CARRS student at MSU for his assistance in organizing and planning this research endeavor. Drs. Connie Baggett and Rama Radhakrishna from Pennsylvania State University co-hosted the 2004 National Agricultural Education Research Meeting. They provided us with invaluable assistance in planning a conference of such magnitude and we thank them for their input. We would like to thank scholars from around the country for submitting over seventy research papers for consideration. Utilizing a very rigorous review process, nearly seventy professionals in agricultural education assisted MSU faculty in selecting thirty-nine refereed papers for the national conference. We want to thank referees, presenters, discussants, chairpersons, facilitators, media coordinators, registration assistants, and many other individuals who assisted with the research section. Dr. Tim Murphy from Texas A & M University should also be commended for assisting us with many of the logistics in San Antonio, Texas. Without his assistance and dedication, the research section and the 2005 American Association for Agricultural Education Conference would not have been possible.

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In 1987, Dr. Al Mannebach from the University of Connecticut chaired the Fourteenth Annual National Agricultural Education Research Conference and stated, "Although heretofore never expressed explicitly, the Annual National Agricultural Education Research Meeting seems to fulfill the following primary purposes:

1. To present and disseminate the most recent and best research on the national level as judged by referees.
2. To present and disseminate critique of research by researchers in the profession.
3. To provide a forum for discussion of methodology and results.
4. To provide feedback to authors regarding research procedures and methodology used.
5. To provide suggestions to authors for preparing manuscripts for publications.
6. To give novice researchers an overview of current research issues, methodology, and critique within the profession.
7. To improve the quality of research conducted in future years.
8. To identify and recognize the outstanding paper presentation at the National Agricultural Education Research Meeting on an annual basis.
9. To provide a written record of quality research completed and professional critique over time."

We trust you will find this information to be of some value.

Sincerely,

Eddie A. Moore

Eddie A. Moore, Professor

National Agricultural Education Research Conference Locations and Chairs

NAERC Chairs (s)	*Institution*	*Year*	*Location of NAERC*
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Hollie Thomas	Florida State University	1975	Anaheim, CA
Glen Shinn	Mississippi State University	1976	Houston, TX
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Bennie Byler	Mississippi State University	1978	Dallas, TX
Ronald Brown	Mississippi State University	1979	Anaheim, CA
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Maynard Iverson	North Carolina State University	1981	Atlanta, GA
Dale Oliver	Virginia Tech	1982	St. Louis, MO
Paul R. Vaughn	New Mexico State University	1983	Anaheim, CA
Jimmy Cheek	University of Florida	1984	New Orleans, LA
Bob Stewart	University of Missouri	1985	Atlanta, GA
Alan A. Kahler	Iowa State University	1986	Dallas, TX
Alfred J. Mannebach	University of Connecticut	1987	Las Vegas, NV
Edgar P. Yoder	The Pennsylvania State University	1988	St. Louis, MO
Michael F. Burnett	Louisiana State University	1989	Orlando, FL
Robert A. Martin	Iowa State University	1990	Cincinnati, OH
Larry R. Arrington	University of Florida	1991	Los Angeles, CA
John P. Mundt	University of Idaho	1992	St. Louis, MO
Dennis Scanlon	The Pennsylvania State University	1993	Nashville, TN
Thomas H. Bruening	The Pennsylvania State University		
David E. Lawver	Texas Tech University	1994	Dallas, TX
Robert Terry, Jr.	Texas A & M University		
Leon G. Schumacher	University of Missouri	1995	Denver, CO
Robert J. Birkenholz	University of Missouri		
George W. Wardlow	University of Arkansas	1996	Cincinnati, OH
Donald M. Johnson	University of Arkansas		
James J. Connors	University of Idaho	1997	Las Vegas, NV
Tim H. Murphy	University of Idaho		
Gary Moore	North Carolina State University	1998	New Orleans, LA
James Flowers	North Carolina State University		
Ag Ed & Com Dept.	University of Florida	1999	Orlando, FL
Greg Miller	Iowa State University	2000	San Diego, CA
Joe W. Kotrlik	Louisiana State University	2001	New Orleans
Michael F. Burnett	Louisiana State University		
Michael K. Swan	Washington State University	2002	Las Vegas, NV
Marty Frick	Montana State University		
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Larry Miller	The Ohio State University		
Connie D. Baggett	The Pennsylvania State University	2004	St. Louis, MO
Rama Radhakrishna	The Pennsylvania State University		
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Special Needs Students and Competitive Livestock Exhibition: A Case Study of Perceived Benefits with an Autistic Child

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Cindy L. Akers, *Texas Tech University*
David Doerfert, *Texas Tech University*
Kyle McGregor, *Tarelton State University*
Lance Kieth, *West Texas A&M University*

Abstract

A specific case study of an autistic child involved in competitive livestock exhibition was analyzed as a function of perceived benefits associated with the phenomenon. The theoretical basis was derived through previous studies involving qualitative analysis of agricultural science and 4-H students with livestock exhibition. As a result of this specific case study, similarities with a special needs student in relation to previous studies containing mainstream students were observed. The three broad themes to emerge were social relations, family, and responsibility/knowledge and care of animals. This study lists the themes in order of pervasiveness. Social relations was the strongest theme in this study, as well as the previous study; however, the only true "vocational" theme, responsibility/knowledge and care of animals, emerged as a stronger theme when related to the special needs student.

The authors suggest competitive livestock exhibition as a vocational outlet for life skill development to special needs students lacking skills. In addition, families of special needs students should consider competitive livestock exhibition as a means to involve all family members in an activity. Replications of the study are suggested.

Introduction/Theoretical Framework

For many years, special needs students have been placed in mainstream, agricultural science programs. Agricultural science teachers must continue to find ways to support individual education plans for mainstream special needs students. Although new and innovative ideas for satisfying these plans are preferred, agricultural science teachers with limited resources must understand the relationship between existing programs and individual education plans. Today, many special needs students participate in competitive livestock exhibition, a co-curricular activity supported by agricultural sciences, the FFA, and 4-H.

Vocational education programs, such as agricultural sciences, have opened many doors to special populations of secondary students. Most individual education plans submitted for special education requirements suggest vocational training for special needs students in public schools. An agricultural science program is included under the umbrella for mainstream submission by special education coordinators, and often in rural settings, agricultural sciences is the sole vocational curriculum (Randolph, 1988).

One predominant aspect of FFA and 4-H programs is the livestock show program, which is a competitive educational activity satisfying the mission of agricultural sciences and cooperative extension by teaching youth the responsibility of caring, feeding, managing and showing through exhibiting livestock projects (Baker, 1991, & Kieth, 1997).

It is unclear as to the specific benefits obtained by special education students involved in agricultural science, FFA, and 4-H programs such as competitive livestock exhibition. Perceptions of stakeholders to these individuals are equally vague. Parental perception of students with disabilities, specifically autism, in vocational programs are rarely investigated and accurately questioned.

The need for vocational training is apparent for children with special needs. Becoming a productive, partially self-sufficient member of society is the ultimate goal we have set for special needs students. Special attention, such as vocational activities, must be implemented in order for any individual to acquire skills needed in the work place. Specific and general vocational programs can be used in order to achieve this goal for special education students (Sarkes & Scott, 1986). Randolph (1988) suggests vocational activities, such as the care for animals, offer tremendous help in fulfilling the need for job related training.

The scholarly literature on autism has grown remarkably during the past two decades, and the result has been a much better understanding of the disorder and its characteristics. The recent abundance of literature and data on autism has caused a confusing state of information and misinformation in education. Although the general agreement about the importance of education is apparent, controversy continues in many areas, including value of early instruction, and value of methods used in instruction (Olley, 1999).

Autism, a pervasive developmental disorder, can be distinguished by several characteristics with various combinations. Characteristics include impairment of social interaction, impairment of communication, and abnormal development prior to age three. Using clinical criteria, 10 of every 10,000 people have some form of autism. Although autism is considered a disability, its characteristics qualify as a pervasive developmental order, not mental retardation or specific developmental disorders (Peeters, 1997).

Although the literature relating to autism is abundant, specifics relating to educational training are limited. Furthermore, literature regarding special needs students in agricultural sciences and its programs is limited. It can be concluded that vocational programs, such as agricultural sciences, can be considered for study in relation to vocational options and life skill development with disabled students.

A study (Davis, Kieth, Williams & Fraze, 2000) using symbolic interactionism indicated benefits for mainstream agricultural science and 4-H students involved in competitive livestock expedition. This study associated the previously developed themes with a special needs student. These themes include: (1) social relationships, (2) character, (3) family, (4) exposure to competition, (5) knowledge and care of animals, (6) exposure to cultures. The emergent themes found by Davis, et al. (2000) served as a theoretical foundation for this study.

Purpose and Research Questions

The purpose of this study was to understand the parents' and agricultural science teacher's perceptions of competitive livestock exhibition as associated with a special needs student. In order to evaluate the specific phenomenon in the particular case, the following questions were generated:

1. Is a competitive livestock exhibition program beneficial to a special needs student in becoming a productive member of society?
2. Do special needs students, specifically autistic children, benefit from competitive livestock exhibition?
3. What benefits are associated with special needs students and competitive livestock exhibition, and what is the order of pervasiveness of these benefits?

Methodology

This study used a single case to derive thematic meaning from parental perceptions and participant observation with competitive livestock exhibition. The parents and agricultural science teacher of a black autistic child involved in competitive livestock exhibition served as participants in the qualitative context for the study.

In order to better evaluate phenomenon in its natural setting, qualitative and case study research have become common in the field of education. Intentions of case study research are not to explain phenomenon, but to evaluate the situation and generate meaning from its context (Gall, Borg, Gall, 1996, p. 549).

Context for the Study

This case study reflected the perceptions of parents with a black autistic child participating in a competitive livestock show program. Due to confidentiality, the student or site was not reveled. The setting for the case involved a rural program in West Texas, located in the

Area I FFA alignment. This child participated for three years in all aspects of a diverse agricultural science and FFA program. This included participation in a competitive livestock show program. Currently, he has been placed in a special program to assist with behavioral transitions into post-secondary educational and vocational programs.

Methods of Data Collection

Denzin and Lincoln (1995) explained that in order to be a bricoleur researcher, various methods must be used that develops an intertwined set of methodological practices allowing for a better perception of the subject matter at hand. Due to the need of various methods in interpretive research, triangulation was established in order to analyze the data more effectively. Three methods of data collection were used in this case study to establish triangulation (Denzin & Lincoln, 1995). These three methods of data collection were interviews, archival, and personal recollection.

Marshall and Rossman (1995) state that participant's perspectives must unfold, not the perspectives of the researcher; therefore a semi-structured interview was used. This also allowed for vast amounts of information to be gathered. Interviewing took place in the participant's home. Both the mother and father of the autistic child were interviewed by one of the researchers. They were interviewed together, and the questions and responses were video and audio taped for transcription.

Gall, Borg, and Gall (1996) state that archived text offer accurate perspectives of participants at a specific time, eliminating any change of perspective due to post phenomenon experiences. The daily journal of the autistic child's mother was accessed, transcribed, and analyzed for any themes related to the sought objectives.

Further, personal experience, especially of professionals in the researched field, may identify biases when triangulated with other methodologies (Glesne, 1999). A behavioral journal kept by one of the authors, also the former agricultural science teacher in this case, describing the daily experiences with the autistic child, was transcribed and analyzed.

Limitations

In order to understand the nature of this study, several limitations were observed. First, sampling techniques used in qualitative studies do not allow application of findings outside of the participants. Furthermore, verbatim transcripts of audio and video taped interviews for later analysis are unable to replicate non-verbal communications such as body language. Participants of the study may not portray their true feelings when being interviewed.

Data Analysis

In qualitative studies, data analysis refers to the categorizing and ordering of information in such a way as to make sense, and to communicate a true and accurate report of the findings (Brink, 1991).

According to Benner (1985), the coding of data by means of open, axial, and selective coding can be used to conduct thematic analysis. Open coding is the process of breaking down, examining, comparing, conceptualizing, and categorizing data. After open coding, data can be put together by category. This is called axial coding. After the data is axially coded, it can be put into core categories, or selectively coded, to develop themes that relate to the research at hand (Strauss & Corbin, 1990). This study used such coding, resulting in the development of themes. Once the data was openly coded, axially coded, and selectively coded, emergent themes were documented and listed in order of pervasiveness.

Control Methods

Control measures are necessary to assure the truthfulness of the results presented. The usual measures of validity and reliability generally accepted in quantitative research are not appropriate for use in phenomenological studies. Nevertheless, steps to minimize errors of interpretation and to control interpretive bias remain important. Qualitative research methods have controls of reliability and validity built into the study design.

Triangulation was used in the design of this study. Emergent themes from the interviews, parental journal, and personal journal were constantly compared. This eliminated weak themes from being used as emergent themes in the findings. The use of an audio/video tape and transcriptions were used in the interview process. This eliminated interviewer bias by putting the entire conversation into text that was consistent when analyzed.

A professional educator, outside of the authors, also analyzed the data to ensure consistency. The two analyses proved consistent.

Results

Three broad themes emerged during the axial phase of coding the data. The three themes are *social relations, family,* and *responsibility/knowledge and care of animals.* The themes are listed in order of pervasiveness. The other themes considered in the theoretical framework yielded little or no significance in their relationships with special needs students. The themes will be discussed as appropriate categories. In order to capture the voice of the participants in the research study, actual transcriptions of interview questions and journal recordings were reported.

Social Relations

The most pervasive theme that emerged from the study was the development of social relations through livestock showing. These social relations participants developed are with peers, advisors, sponsors, stock show officials, and other subjects related to the environment of stock showing. The question responses and archival recordings revealed a strong response when associating social relationships with special needs students and competitive livestock exhibition.

> *He simple likes to do what the other kids do. You see him wandering what's going on in the next pen. Sometimes I think he don't have a care in the world about the animal. He just wants to be like everybody else and we want him to be like everybody else. We know that's not possible, but we can sure hope. He's making friends and he belongs—that's all that matters. We can see people going out of the way to help him fit in. That's not done everywhere. Stock shows is good for kids like this. People try to help them fit in and trust them. It's*

important that (Sam) knows to trust people. That's how he makes friends and that's how you to make it in life. (Interview-Father)

It seems (Sam's) main concern is to meet the guys at the pen. I wonder if he cares enough for the pig? (Journal-Mother)

(Sam's) doesn't do as well with his chores at the farm unless one of the other students is with him. He mocks perfectly what the other student does. This works exceptional when working on sequencing tasks with (Sam). It works better than me showing or telling him. You must make sure he has the appropriate role model to avoid bad habits. (Journal-Teacher)

The participants found meaning in social relations that is acquired and developed through activities associated with competitive livestock exhibition.

Family

The second theme to emerge was that of family. Family togetherness and family values give meaning to what is desired as a life skill which will be of value in the development of special needs youth. It is apparent that participants in this study put emphasis on the importance of the family participating in activities together such as stock showing. The responses and archival material consistently provided evidence for this emergent theme.

It gives them something to do together. (Sam) can't play sports, and his dad was an All-American. This gives them something other than chores they can do together. That's really important since (Sam) will be working with someone like his dad in a job some day. He's got to follow a lead and learn to take orders and directions. He needs to know his family loves him and is behind him. He sees this in stock showing with us helping. (Interview-Mother)

Some times I think it's me that likes it the most. (Sam) likes it too, but it's neat that we get to do it together. Many activities don't allow moms and dads to get involved with what they do. This is important for special ed. kids because we need to know what's going on. (Interview-Father)

After school (Sam's) father usually helps him with the animals. They seem to have a good relationship. (Journal-Teacher)

The participants found meaning in family that is acquired and developed through activities associated with competitive livestock exhibition.

Responsibility/Knowledge and Care of Animals

The third and final theme to emerge was that of responsibility/knowledge and care of animals gained through competitive livestock exhibition. Although this theme emerged first in the identification process, it ranked last in pervasiveness after attributed detail supported the previous emergent themes. These findings were consistent throughout the triangulation of sources.

(Sam) has learned how to care for something. He knows he's got to take care of something rather than himself. This is hard for a special kid to get. You doing good just to get them to take care of himself. (Interview-Father)

I see him taking better care of the dogs. Today, I saw him give the dogs fresh water. He did this without be asked to. (Journal-Mother)

(Sam) has been doing a great job with his daily tasks is class. I believe taking care of his pigs have become part of his routine. (Teacher-Journal)

The participants found meaning in animal knowledge and responsibility that is acquired and developed through competitive livestock exhibition.

In summary, the three themes to emerge in relation to competitive livestock exhibition and special needs students were social relations, family, and responsibility/knowledge and care of animals. These themes consistently emerged in all sources of data used in the triangulation control method.

Conclusions

This study indicated specific themes that emerged from the data collection of parental interviews, parental journal, and teacher journal, as to their relation to perceived benefits of competitive livestock exhibition with normal populations. The theme of social relations consistently emerged as the most pervasive with the special needs student in this study. The themes of family and responsibility/knowledge and care of animals are consistent as far as identification is concerned; however, these themes differ in terms of pervasiveness with the literature of mainstream populations and competitive livestock exhibition.

The finding of social relations as the most pervasive theme is consistent with the theoretical framework which identifies social relations in the context of perceived benefits. This finding is consistent with the literature of normal populations in related events. It can be concluded that social relationships generated through competitive livestock exhibition is an important aspect with the participants.

It can be further concluded that family is an important factor with this participants as well. This theme surpassed the order of pervasiveness found in literature associated with normal populations, which is listed as third.

The finding of responsibility/knowledge and care of animals is a combination and separation of themes when compared with the literature used as a theoretical background. Davis et al. (2000) associate responsibility with character, and knowledge and care of animals as an individual theme. Because these phenomena consistently emerged together in this case, they were combined as a theme.

Due to limitations associated with case study and qualitative methodologies, these conclusions cannot be accurately generalized to all special populations that compete in competitive livestock showing.

Discussion

As more special needs students enter mainstream curriculum, educators are faced with the task of providing these students with a quality education. Special needs students can gain life skills from various educational components, including vocational curriculum (Randolph, 1988). This study serves as a basis for questions and research concerning special needs students and competitive livestock exhibition, an extension of vocational, agricultural sciences, and 4-H programs.

Although special populations have not been examined, the results and conclusions indicate a consistency with literature concerning the development of life skills for mainstream populations through competitive livestock exhibition. Some differences were observed in theme associations and emergent pervasiveness. The theme of social relations appears to be the most important phenomena associated with competitive livestock exhibition and all participants. Life skills of family involvement and responsibility/knowledge and care of animals are consistent among special and normal populations; however, these themes as more pervasive in a special needs student context.

Connors and Dever (2005) researched unethical practices at youth livestock exhibitions and stated, "Educational programs have had a positive impact on the problem of unethical behavior at youth livestock exhibitions" (p. 28). Are specific educational programs available for special needs students involved in livestock exhibition?

As school officials, teachers, parents, and extension personnel begin to evaluate the worth of competitive livestock exhibition and its association with special needs students, they should consider the following:

- More special needs students who are lacking in an area of social development should consider competitive livestock exhibition as a vocational outlet for life skill development.
- Families of special needs students should consider competitive livestock exhibition as a means to involve all family members in an activity that is accessible for everyone.
- Parents of guardians should consider competitive livestock exhibition as a means to teach special needs students responsibilities and animal care techniques.
- Livestock show officials, teachers, and administrators should consider specialized curriculum and activities to enhance experiences gained by special needs students who stock show competitively.

Research replications are recommended to include other cases of special needs students and competitive livestock exhibition. A need can also be acknowledged for descriptive and empirical data as associated with special needs students and livestock showing, as well as other competitive areas of agricultural sciences, FFA, and 4-H programs.

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An Initial Investigation of Emotional Intelligence And Level of Bias among Texas Agricultural Reporters

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Abstract

In the American culture, the intelligence quotient (IQ) has been the determining factor in how successful someone would become since the 20th century. However, a relatively new concept has emerged as a primary determinant for workplace success — emotional intelligence (Stein & Book, 2001). The purpose of this study is to examine the level of emotional intelligence among agricultural reporters across the state of Texas and determine the level of bias, if any, in their stories. The writings of four full-time agricultural journalists were examined along with their emotional intelligence scores. The results of this exploratory study begin to reveal the existence of a possible relationship between the ability of agricultural journalist to write objectively and their emotional intelligence. Of the four reporters, those with a higher emotional intelligence score wrote less judgment sentences (opinions of speakers or the writer) and utilized a higher percentage of report sentences (factual and verifiable). Additional study of this potential relationship is needed within agricultural communications. As such, the researchers recommend the methods of this study be replicated utilizing a larger, national sample. In addition, consideration should be given to include reporters from all fields, not just agriculture. Further, a comparison between the journalist's primary media type should be considered.

Introduction

In the American culture, the intelligence quotient (IQ) has been the determining factor in how successful someone would become since the 20th century. However, a relatively new concept has emerged as a primary determinant for workplace success — emotional intelligence (Stein & Book, 2001). Daniel Goleman (1995) defined emotional intelligence as "being able to rein in emotional impulse; to read another's innermost feelings; to handle relationships smoothly" (p. xiii). During the past decade, the concept of emotional intelligence has grown in acceptance and in research activity.

Seemingly growing in a negative direction is public confidence in reporters to report the news correctly and objectively. Bernard Goldberg, a former CBS news reporter, was admonished for an article he wrote in the *Wall Street Journal* criticizing not only CBS news, but the media industry in general for not reporting objectively. In his article, Goldberg stated that the media has "a liberal bias … so blatantly true that it's hardly worth discussing anymore" (Goldberg, 2002, p. 215). If emotional intelligence influences the ability to deal with workplace demands and pressures, would a higher level of emotional intelligence affect the objectiveness in reporting?

Related Literature

Emotional Intelligence

When psychologists began to write and think about intelligence, they focused on cognitive aspects, such as memory and problem solving. However, there were researchers who recognized early on that the non-cognitive aspects were also important (Cherniss, 2000). Psychologist David Wechsler, developer of one of the first IQ measurement instruments, the *Wechsler Adult Intelligence Score*, recognized the importance of studying non-cognitive factors (affective, personal, and social factors) as early as 1940 (Wechsler, 1940). According to John Mayer (2001), the precursor to the study of emotional intelligence was the study of cognition and affect, which examines how emotions interact with thoughts. Zajonc and Markus (1982) stated that attitudes may have an emotional basis developed prior to cognition.

Research on emotional intelligence is gaining momentum and becoming one of the most topical areas in organizational research (Van Rooy & Viswesvaran, 2004). Daniel Goleman has received the most public attention for his work with his books *Emotional Intelligence* (1995), *Working with Emotional Intelligence* (1998) and *Primal Leadership* (2002). When Goleman published his first book on EI, there was a relative dearth of empirical studies examining the link between organizational performance and EI (Van Rooy & Viswesvaran, 2004). That has since changed as Van Rooy and Viswesvaran (2004) were able to recently complete a meta-analysis of 69 independent studies that reported correlations between EI and performance or other variables.

Emotional intelligence is appealing, not only because of our general fascination with the way people feel but, more importantly, because the traditional cognitive predictors leave a considerable amount of variance unexplained (Van Rooy & Viswesvaran, 2004). With IQ accounting for 25% of the variance in job performance (Goldstein et al., 2002; Hunter & Hunter, 1984), the appeal of EI lies in the possibility of tapping into and explaining another portion of the remaining variance (Van Rooy & Viswesvaran, 2004).

Ciarrochi, Chan, Caputi, and Roberts (2001) stated that EI helps people cope with life outcomes. For example, someone who is not equipped with EI might become too stressed to perform creatively at work, or worse, respond to negativity with depression and hopelessness. On the other hand, individuals with a high EI will be able to adapt to negative life outcomes with much more ease and comfort. In their meta-analysis of 69 independent studies, Van Rooy & Viswesvaran (2004) found that emotional intelligence is a construct that is definitely worthy of future research and indicated that EI should be considered a valuable predictor of performance.

Assessing Emotional Intelligence

Van Rooy & Viswesvaran (2004) found that emotional intelligence concept is generally divided into four dimensions (Salovey & Mayer, 1990), although other models such as a five-component model (Bar-On, 1997) are also widely accepted. In the early 1980s, Reuven Bar-On began development of an emotional intelligence exam (Bar-On, 2000). This exam would later be known as the *BarOn EQ-i*. Bar-On's goal was to examine various factors that were thought to be components of effective emotional, as well as social, functioning (Bar-On, 2000).

The *BarOn EQ-i* provides a total emotional quotient (EQ) score and five EQ composite scale scores comprising 15 subscale scores (Bar-On, 2000). The five scales are intrapersonal EQ, interpersonal EQ, stress management EQ, adaptability EQ, and general mood EQ — each with its own set of subscales (Bar-On, 2000). The test is comprised of 133 items and employs a five-point response set, ranging from "not true of me" to "true of me." Approximately 30 to 40 minutes are needed to complete the exam; however, there are no imposed time limits. The assessment renders four validity scale scores, a total emotional quotient (EQ) score, five composite scale scores, and 15 EQ subscale scores. The scoring structure to this test is very similar to that of the intelligence quotient assessment (Bar-On, 2002). Since the development of the exam, the instrument has been translated into 22 languages and normative data has been collected in more than 15 countries. The *EQ-i* has previously been shown to demonstrate sufficient test-retest reliability (.85 after one month and .75 after 4 months; Bar-On, 1997).

Objectivity in News Reporting

Bernard Goldberg, CBS television reporter veteran, believes that journalism, especially TV journalism, has simply become a "showcase for … reporters with attitudes" (Goldberg, 2002, p.15). An example of how journalism should be, according to Goldberg (2002), occurred on September 11, 2001. That night Dan Rather, Peter Jennings, Tom Brokaw and others presented the news the way it should be: fair and accurate. As Goldberg says, "For a change, they gave it to us straight." (p. 196) He wonders why the news is not given to the public like this all the time.

Melissa Block, host of National Public Radio's *All Things Considered*, believes that the reporters can put aside their opinions and present things fairly. However, when they incorporate their opinions into the story, the truth may be vague, yet the story appears more interesting (More Things Considered, 2003). Surprisingly, a number of leading journalists will admit there are problems of bias. However, they refuse to accept any criticism of their practices. Almost one-third of journalists believe they cannot be impartial when they have strong feelings about the issue they are reporting (Lichter, Rothman, & Lichter, 1986). Despite this admission to having problems of bias, most reporters reject the allegation that they are. Journalists must take responsibility for their daily role in shaping the news (Lichter et al., 1986).

Emotional Intelligence and News Reporting

Traditional measures of intelligence, although providing some degree of predictive validity, have not been able to account for a large portion of the variance in workplace performance and career success (Emmerling & Goleman, 2003). In a recent meta-analysis examining the correlation and predictive validity of EI when compared to IQ or general mental ability, Van Rooy & Viswesvaran (2004) found IQ to be a better predictor of work and academic performance than EI. However, when it comes to the question of whether a person will become a "star performer" (in the top ten percent, however such performance is assessed) within that role, or to be an outstanding leader, IQ may be a less powerful predictor than emotional intelligence (Emmerling & Goleman, 2003).

Several competencies help to define emotional intelligence for reporters. They are self-regard, emotional self-awareness, assertiveness, independence, self-actualization, empathy, social responsibility, interpersonal relationship, stress tolerance, impulse control, reality testing, flexibility, problem solving, optimism and happiness (Bar-On, 2000). These competencies focus on the personal and social abilities of a person. Knowing one's internal emotions and managing these emotions helps to self-regulate emotions (Goleman, 1998). Being able to recognize emotions of others and induce desired responses of others affects the level of social skills individuals have (Goleman, 1998). All of these competencies and factors determine an individual's emotional intelligence and potentially their objectivity in reporting the news.

Emotional intelligence is currently not included in the preservice curriculum for journalists yet reporters are expected to control the emotional impulses that can potentially skew their views and their news stories. Understanding the emotional intelligence of agriculture reporters and the potential relationship to their journalistic objectivity may facilitate the efforts of university degree programs to adequately prepare news reporters.

Purpose and Objectives

The purpose of this study is to examine the level of emotional intelligence among agricultural reporters across the state of Texas and determine the level of bias, if any, that exists in their stories. The following objectives were formulated to accomplish the purpose of this study:

1. Determine the emotional intelligence level of selected agricultural reporters in Texas;
2. Categorize the stories into hard news and feature articles;
3. Evaluate the sentences in the identified articles using the Hayakawa-Lowry News Bias categories; and
4. Determine bias of judgment statements in the identified articles.

Methodology

The population used in this exploratory study was Texas newspapers with a full-time agricultural reporter on staff (N=10). The researchers contacted all the reporters in the target population on July 1, 2003 and explained the nature of the study. Five reporters agreed to participate. Reporters were asked to send all articles they published during the month of August 2003 (August 1-31, 2003) to the researcher. One reporter later withdrew from the study due to the fact that no stories were published during the data collection period.

The BarOn Emotional Quotient Inventory (BarOn EQ-i test-retest reliability was .85 after one month and .75 after 4 months; Bar-On, 1997) test was selected for the purposes of this research. This test was developed by clinical psychologist Reuven Bar-On and was the first empirically constructed test of emotional intelligence that is commercially available (Bar-On, 2002). The EQ-I was administered to the four reporters after the August data collection period.

The reporters participating in this study were employed by the following publications: The *Livestock Weekly, Lubbock Avalanche-Journal, Southwest Farm Press*, and the *Victoria Advocate*. The articles collected were sorted into two categories: (a) hard news and (b) features. A panel of three experts from agricultural communications, trained in the Hayakawa-Lowry method of content analysis, coded the articles. To insure inter-coder reliability, the articles were coded independently by each expert. When discrepancies in coding decisions were found, the panel members and the researchers met to review the sentences in question and work as a group to achieve consensus. Each sentence of the identified articles was coded using the Hayakawa-Lowry News Bias categories:

1. Report sentence, attributed,
2. Report sentence, unattributed,
3. Inference sentence, labeled,
4. Inference sentence, unlabeled,
5. Judgment sentence, attributed and favorable,
6. Judgment sentence, attributed and unfavorable,
7. Judgment sentence, unattributed and favorable,
8. Judgment sentence, unattributed and unfavorable,
9. All other sentences (Lowry, 1985).

Descriptive statistics were used to analyze the data of this study using Microsoft® Excel.

Findings

Demographic information was collected from each reporter prior to the emotional intelligence exam. Reporters A, B, and C were female and Reporter D was male. Ages of the reporters ranged from 23 to 54 years. Each reporter had completed a bachelor's degree and Reporter D had also completed a master's degree. The number of years each reporter had been in the profession ranged from 4 to 31 years.

Objective one sought to determine the emotional intelligence level of selected agricultural reporters in Texas. The BarOn EQ-i reports findings in five scales: (a) Intrapersonal, (b) Adaptability, (c) General Mood, (d) Interpersonal, and (e) Stress Management (Bar-On, 2002). Four validity scale scores are available upon completion of the test along with a total emotional quotient (EQ) score, five composite scale scores and 15 EQ subscale scores (Bar-On, 2002). The guidelines for interpreting the scores are provided in Table 1.

Table 1. *How to Interpret BarOn EQ-i Scores*

Standard Score	Interpretive Guideline
130+	**Markedly High---**atypically well developed emotional capacity
120-129	**Very High---**extremely well developed emotional capacity
110-119	**High---**well developed emotional capacity
90-109	**Average---**adequate emotional capacity
80-89	**Low---**under-developed emotional capacity, requiring improvement
70-79	**Very Low---**extremely under-developed emotional capacity, requiring improvement
Under 70	**Markedly Low---**atypically impaired emotional capacity, requiring improvement

The *Intrapersonal* scale includes the following five sub-scales: (a) Self-Regard—the ability to respect and accept oneself, (b) Emotional Self-Awareness—the ability to recognize one's feelings, (c) Assertiveness—the ability to express feelings, beliefs, and thoughts, and stand up for personal rights, (d) Independence—the ability to be self-directed and controlled in thinking and actions as well as being free of emotional dependency, and (e) Self-actualization—the ability to realize potential capacities. Figure 1 illustrates each reporter's *Intrapersonal EQ* scores.

The *Adaptability* scale includes the following three sub-scales: (a) Reality Testing—to accurately assess the immediate situation, (b) Flexibility—one's overall ability to adapt emotions, thoughts, and behavior to changing situations and conditions, and (c) Problem Solving—the ability to identify and define problems, and implement effective solutions. The *Adaptability EQ* scores of the four reporters are illustrated in Figure 2.

The *General Mood* scale includes two sub-scales: (a) Optimism—the ability to maintain a positive attitude towards life, and (b) Happiness—the ability to feel satisfied with life and enjoy oneself and others. The four reporter's *General Mood EQ* scores are illustrated in Figure 3.

The *Interpersonal* scale includes the following three sub-scales: (a) Empathy—the ability to be aware of, understand, and appreciate the feelings of others, (b) Social Responsibility—the ability to demonstrate cooperation, contribution, and constructivism to one's social group, (c) Interpersonal Relationship—the ability to establish and maintain relationships by giving and receiving affection, and possessing sensitivity towards others. The four reporter's *Interpersonal EQ* scores are illustrated in Figure 4.

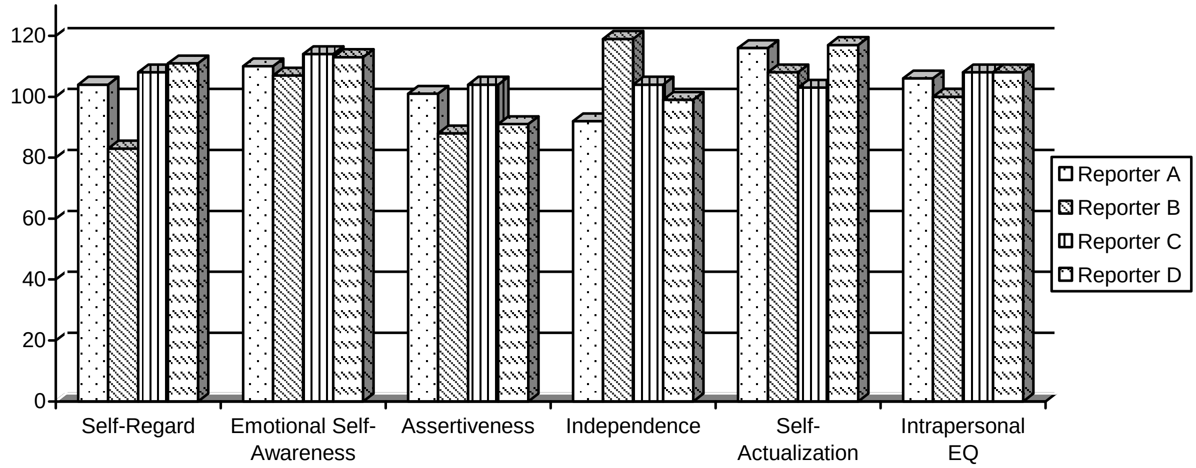

Figure 1: Four Texas agriculture reporters BarOn EQ-i Intrapersonal EQ scale

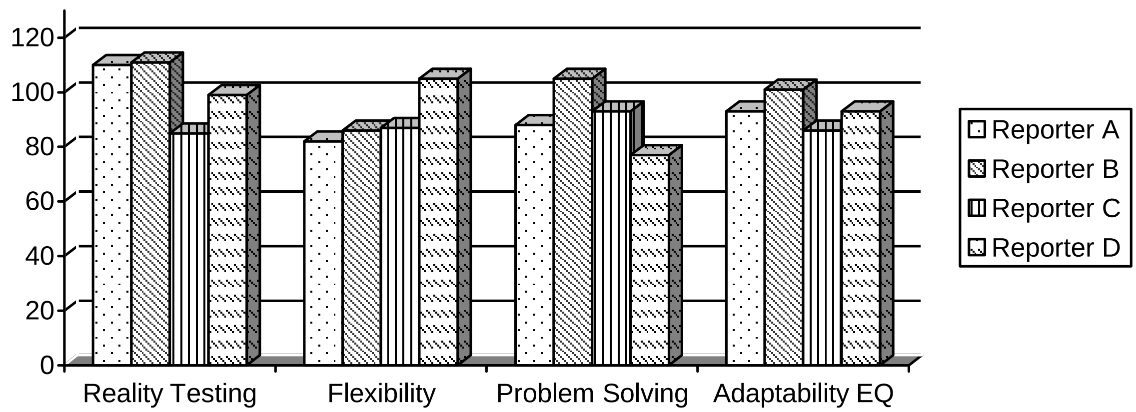

Figure 2: Four Texas agriculture reporters BarOn EQ-i Adaptability EQ scores

The *Stress Management* scale includes the following two sub-scales: (a) Stress tolerance—the ability to endure difficult situations without getting too overwhelmed, and (b) Impulse control—the ability to resist impulses and the temptation to act. Figure 5 illustrates the reporter's BarOn EQ-i *Stress Management EQ* scores. Table 2 then summarizes each reporter's emotional intelligence exam scores by the five scales along with their overall EQ score.

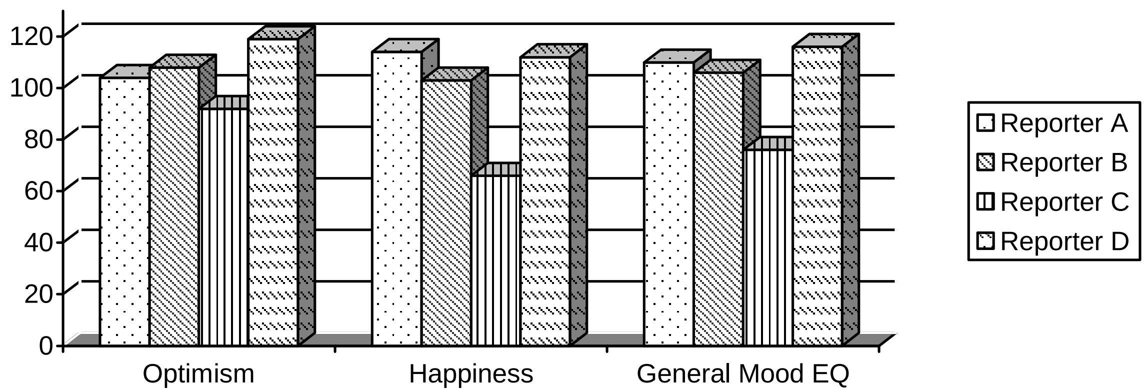

Figure 3: Four Texas agriculture reporters BarOn EQ-i General Mood EQ scores

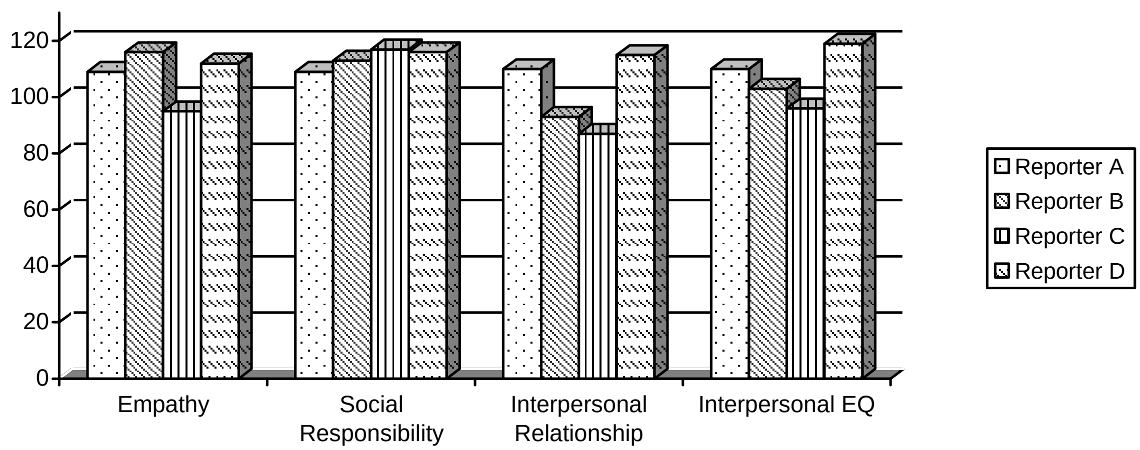

Figure 4: Four Texas agriculture reporters BarOn EQ-i Interpersonal EQ scores

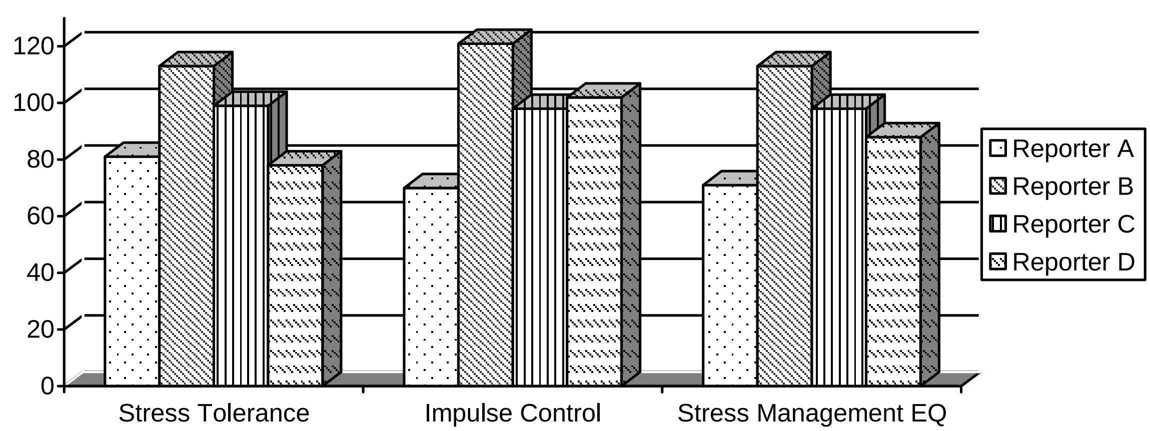

Figure 5: Four Texas agriculture reporters BarOn EQ-i Stress Management EQ scores

Table 2. *BarOn EQ-i Results for Four Texas Agriculture Reporters*

EQ-i Results	Reporter A	Reporter B	Reporter C	Reporter D
Total EQ	99	105	94	104
Intrapersonal	106	100	108	108
Adaptability	93	101	86	93
General Mood	110	106	76	116
Interpersonal	110	103	96	119
Stress Management	71	120	98	88

A total of 27 news stories were considered for this study. When categorized into hard news and feature stories, researchers found 13 articles to be hard news and 14 articles to be feature stories. The research found the following number of sentences falling into each category: (a) report attributed = 573 (42.73%), (b) report unattributed = 371 (27.67%), (c) inference labeled = 51 (3.80%), (d) inference unlabeled = 61 (4.55%), (e) judgment attributed, favorable = 103 (7.68%), (f) judgment attributed, unfavorable = 104 (7.76%), (g) judgment unattributed , favorable = 26 (1.94%), (h) judgment unattributed, unfavorable = 24 (1.79%), and (i) other = 28 (2.09%). These findings are illustrated in Table 3.

Table 3. *Number of Sentences by Hayakawa-Lowerey News Bias Category*

Sentence Category	No. of Sentences	% of Total
Report Attributed	573	42.73
Report Unattributed	371	27.67
Inference Labeled	51	3.80
Inference Unlabeled	61	4.55
Judgment Attributed, Favorable	103	7.68
Judgment Attributed, Unfavorable	104	7.76
Judgment Unattributed, Favorable	26	1.94
Judgment Unattributed, Unfavorable	24	1.79
All Other Sentences	28	2.09
TOTAL	1,341	100.00

Objective four sought to determine the bias of judgment statement in the identified statements (Table 4). Judgment sentences (n=257) represented 19.17% of the total number of sentences. Of the 257 judgment sentences, 80.54% (207) of the sentences were attributed to a source, with 19.46% (50) being unattributed. Most of the judgment sentences were favorable (n=129, 50.20%) with the remaining judgment statements viewed as unfavorable (n=128, 49.81%).

Table 4. *Breakdown of Judgment Sentences*

Judgment Sentence Type	No. of Sentences	% of Total
Attributed, Favorable	103	40.08
Attributed, Unfavorable	104	40.47
Unattributed, Favorable	26	10.12
Unattributed, Unfavorable	24	9.34
TOTAL	257	100.00

Conclusions

Agriculture Reporters' Emotional Intelligence

Reporter A is just shy of the norm average level of emotional intelligence. This individual scored highest in the self-actualization and happiness subscales. Competencies that yielded the lowest scores were impulse control, stress tolerance, and flexibility. Emotional intelligence scores for Reporter B indicate and individual who is slightly above the norm average. Reporter B had high scores in the impulse control, independence, and empathy subscales. Self-regard, flexibility, and assertiveness were Reporter B's lowest scores. Reporter C did not score high enough to be considered average by the Bar-On EQ-I guidelines. Social responsibility, emotional self-awareness, and self-regard were this reporter's highest scores with happiness, reality testing, flexibility, and social interpersonal relationship yielding the lowest scores. The overall emotional intelligence score for Reporter D indicate an individual who is slightly above the average norm population. The highest scored subscales for reporter D were optimism, self-actualization, and social responsibility. The lowest scored subscales for Reporter D were problem solving, stress tolerance, and assertiveness.

As a group, there were no commonalities with the four reporters between high and low scores on the EQ subscales. However, when compared individually, some similarities were observed. Reporter A and Reporter C both have high scores for the interpersonal relationship score. Social responsibility was a subscale that Reporters B and D both had high scores for. Reporters A and D both had low scores for the stress tolerance subscale, however, Reporter B had a high score for this subscale. Flexibility presented a problem for Reporters A, B, and C. Reporter B and Reporter D both had low scores for the assertiveness subscale. As a result of these findings, no generalizations can be made, simply a report of the results.

Agricultural Reporters' Objectivity

The majority of the sentences were report statements, which are factual and verifiable. Report sentences accounted for 70.40% of the total number of sentences in the sample. Inference statements, which are subjective and immediately verifiable, accounted for 8.35% of the total number of sentences in the sample. Judgment sentences, which are expressions of the writer's or quoted speaker's opinions, accounted for 19.17% of the total number of sentences. Other sentences, which include rhetorical questions and introductory statements, accounted for 2.09% of the total number of sentences in the sample.

Most sentences written fell into the report attributed category, with 42.73% of the total number of sentences in the sample. The report unattributed category made up the second largest percentage of the sample, with 27.67% of the total. In reference to the inference sentences, a larger percentage of the sample fell into the inference unlabeled category, with 4.55%. Labeled inference sentences represented 3.80% of the total sentences in the sample.

The majority of the sentences sampled were very balanced, as reporters presented an even distribution of favorable and unfavorable sentences. Reporters sampled are also attributing most sentences they write. Judgment attributed, unfavorable sentences represented a slightly larger percentage than judgment attributed, favorable. A total percentage of 7.76% represented judgment attributed, unfavorable sentences, with a total percentage of 7.68% for judgment attributed favorable sentences. Overall the reporters sampled have an even distribution of judgment attributed, favorable and unfavorable sentences written. However, Reporter C had more unfavorable sentences, which brought the average of the group down.

The number of judgment sentences written made up 19.17% of all sentences sampled. This indicates that the agricultural reporters in this study are using their personal opinions when writing about agriculture. Reporters are displaying a slightly more positive bias, with 9.62% being favorable and 9.55% being unfavorable. Reporters are also attributing more judgment sentences to a source than not attributing to a source. Fifteen percent of all judgment sentences were attributed to a source.

Emotional Intelligence and Reporter Objectivity

The lowest score for a subscale on the emotional intelligence assessment for Reporter C was the happiness subscale. The happiness subscale was at least 37 points higher on the other reporter's assessments. Since Reporter C wrote the most unfavorable sentences, the low score on the happiness subscale may have some relationship to the negativity writing within their articles.

The older, more mature reporters of the group had a higher EQ score than did the younger reporters raising the question of a potential relationship between age, EI and/or ability to write objectively. Also, the four reporters worked at different types of publications, ranging from a daily publication to a monthly publication. Each reporter has a different editor, and those editors may require completely different items and views to be included in each story, whether it be hard news or a feature story. As such, is it the EI of the writer that is important to writing objectively or the EI of the editor?

Recommendations

The results of this exploratory study begin to reveal the existence of a possible relationship between the ability of agricultural journalist to write objectively and their emotional intelligence. Of the four reporters, those with a higher EQ wrote less judgment sentences (opinions of speakers or the writer) and utilized a higher percentage of report sentences (factual and verifiable). Additional study of this potential relationship is needed within agricultural communications. As such, the researchers recommend that the methods of this study be replicated utilizing larger, national sample. In addition, consideration should be given to include reporters from all fields, not just agriculture. Further, a comparison between the journalist's primary media type (broadcast, newspaper, magazine, etc.) should be considered.

There are many different commercially available emotional intelligence assessments with only the Bar-On EQ-I being used in this study. Future studies should examine the results obtained by using a different EI assessment instrument.

Citing studies in the field of psychotherapy, training programs, and executive education, Emmerling and Goleman (2003) stated that there is evidence that an individual's social and emotional competence can be improved with sustained effort and a systematic development program. However, little is known as to whether or not a university undergraduate program (a professional entry point for agricultural journalist), is the best location for the development of emotional competencies. Additional study is recommended before consideration is given to including this instruction as part of a core curriculum for future agricultural communicators.

Exploring a potential link between EI and the ability of an agricultural journalist to report the news objectively is only the first step and should spur researchers to further investigate how emotional intelligence may impact success in the agriculture work place.

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Food, Land, and People: Content Analysis and Correlation to Arkansas State Standards

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Abstract

Project Food, Land, and People (FLP), now used in 27 states, is a comprehensive K-12 curriculum that teaches about the interconnectedness of the environment, food, and society. Because teachers in Arkansas need to follow state guidelines, the curriculum was correlated to the state standards. That correlation revealed a systematic, thorough integration of academic subjects with agriculture. The FLP lessons address 75% of Arkansas Science Frameworks in grades K-4 (including 100% of those in Life Science), 66% of Arkansas Science Frameworks in grades 5-8 (including 81% of those in Life Science), and 37% of Arkansas Science Frameworks in grades 9-12 (including 63% of those in Life Science). FLP addresses 70% of Arkansas Math Frameworks in grades K-4, 41% in grades 5-8, and 29% in grades 9-12). In Social Studies, FLP addresses 69% of the Arkansas Frameworks in grades K-4, 56% in grades 5-8, and 43% in grades 9-12. The entire FLP curriculum, which consists of 55 units, incorporates 45% of all Arkansas Frameworks in all subject areas in grades K-4, 35% in grades 5-8 and 25% in grades 9-12. Documentation of this connection provides an important validation for teachers to consider when adopting and implementing an integrated curriculum.

Introduction

Agriculture education has long been an important part of vocational education in the public school, but like other disciplines within vocational education, its focus and application is changing with changing workforce demands and expectations of society. "The primary goal of vocational education is to prepare youth and adults for employment." (Imel, 1989, p.3). This goal has assumed greater national importance throughout the last quarter century. Since the 1980s, the range of competencies expected of workers by employers has expanded well beyond specific occupational training into a broad array of basic academic and interpersonal skills. While the vocational intent of instruction remains a vital part of agricultural education, the mission has been expanded to include agricultural literacy, as suggested by a report of the National Research Council (NRC), in 1988. That report stated agriculture "is too important a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies" (NRC, 1988, p. 8). The report stated that all students should receive systematic instruction about agriculture in grades K-12, incorporated into existing courses.

In 1991, the U.S. Department of Labor issued a report that said teachers must "understand how curriculum and instruction must change to enable students to develop those high performance skills needed to succeed in the high performance workplace" (SCANS/Academic Innovations Web Summary, p.1). More and more, employers believe that vocational education should focus on the development of applied basic academic skills. This report outlined competencies in basic skills, thinking skills, and personal qualities needed to succeed in the workplace, identifying the basic skills of reading, writing, mathematics, listening, and speaking as those that form a fundamental knowledge base *(What Work Requires of Schools: A SCANS Report for America 2000,* 1991).

These reports support expanding the mission of agricultural education to include agricultural literacy in all subjects, with an emphasis on how academic subjects relate to agriculture and the integration of applied academic skills. Although agricultural education has made great strides in responding to the recommendations of both reports, considerable debate still exists on how to achieve the desired results of this change in the curriculum.

When selecting a curriculum for adoption, teachers must recognize and believe in the need for change as well as "be able to recognize problems that can be addressed by the adoption of the curriculum." (Conroy, 1999, p. 2-3). However, the requirement to follow a state-mandated curriculum with specific goals and objectives in order to enable students to pass subject-area state achievement tests leaves teachers limited opportunity to teach vocational competencies such as those that build agricultural literacy unless those competencies can be directly tied to the core curriculum academic frameworks (Blackburn, 1999). Project Food, Land, and People was designed to meet the need for an integrated curriculum in both vocational and non-vocational courses that could be used at both the elementary and secondary levels.

Project Food, Land, and People (FLP) is a comprehensive resource for use in teaching Pre-K-12 about the interconnectedness of the environment, our food supply, and their relationship or impact on society (Project Food, Land, and People, 2004). More than 1600 professional educators and agriculturalists worked together for more than ten years to develop frameworks, select topics for lessons, develop and pilot test the lessons, and finally make the FLP curriculum available to the public (Project Food, Land and People, 2003a). The 55 lesson units of the FLP program systematically and thoroughly integrate academic core subjects as well as off-core activities in fine arts, physical education and health into the broadly thematic study of agricultural literacy and agricultural awareness. As of 2003, 27 states had adopted the curriculum (Project Food, Land and People, 2003b).

Theoretical Framework

A joint effort to incorporate basic skills instruction into vocational curriculum has these basic assumptions: academic skills are "embedded" into vocational courses, vocational tasks provide a real-world use for academic skills, putting these skills into an everyday context strengthens the academic skills, and neither academic skills nor vocational skills should be taught in isolation (Pritz & Crowe, 1987, p.10). Applying academic concepts by solving problems related to the vocational program is a very effective way to combine academic and vocational instruction. Problem-solving activities embed the very decision-making processes and workplace competencies identified by SCANS as essential to success in the workforce. These activities are realistic working world problems that incorporate the personal qualities necessary for effective social interaction and decision-making. Just as importantly, problem-based vocational academic learning provides reinforcement for basic skills needed with a suitable degree of guidance on how to proceed. This not only assists in learning; it helps to develop a persistence to see a job through to completion.

Mastery of academic content and the need for a more interactive and student-centered classroom have been identified as essential to the integration of higher-order theoretical and conceptual skills into vocational education (Kisailus, 1994). "Higher-order thinking skills are essential and must be taught." (Kerka, 1992, p.1). The ability to learn constantly through thinking, reasoning, problem-solving, and interpersonal relations are critical, not only to work, but to one's personal life as well. However, higher-order thinking skills are not just the province of an academic curriculum. Since learning is not automatically transferred to new settings, the context of learning is critical to understanding and active learning develops cognitive management skills. Higher-order thinking constructs meaning from experience rather than simply changing behavior (Johnson & Thomas, 1992). Vocational education provides a real-world context for cognitive development, teaching students "how to think instead of what to think." (Chalupa, 1992, p.21).

FLP follows the intent and many of the processes of the curriculum integration models developed by Grubb, Davis, et. al, (1991) to incorporate academic content into vocational courses, facilitate collaboration between vocational and non-vocational teachers, and to horizontally and vertically align agriculture with the academic curriculum of the school. Analysis of the FLP content reveals a systematic, thorough integration of academic subject materials with agriculture and other vocational subjects. Conversely, the academic content foci of the FLP lessons can be used as a concept and activity base for a curriculum infusion model (NDCI Web Page) to infuse agricultural literacy and awareness into the curriculum of specific academic subject areas. Each FLP lesson unit can stand alone as a conceptual thematic unit to provide the activities and content base for a short-term unit of an academic course or the entire compendium of FLP lessons can provide the activities and concepts to infuse an agricultural literacy and awareness curriculum thematically throughout the entire academic course. The documentation of this connection provides an important scaffold for classroom teachers to use in formulating and implementing an integrated curriculum such as FLP with their state mandated frameworks.

Objective

The original goal of bringing FLP to Arkansas was to focus on the development of academic skills using agricultural literacy resources. Facilitators and teachers in a pilot training program conducted in April 2004 indicated a need to analyze the FLP lesson content and correlate that content to the Arkansas Frameworks in order to make it more accessible for classroom use. The objectives of this study were to:

1. Identify the academic concepts in the FLP lessons that are part of the Arkansas Frameworks.
2. Establish which Arkansas Frameworks in the core and off-core academic curriculum areas are contained in the FLP lessons.
3. Determine the extent to which academic concepts in the FLP lessons correlate with the Arkansas Frameworks.

Methodology

The FLP program content was analyzed by outlining and summarizing concepts and activities in the subject areas of science, mathematics, language arts, social studies, art, music, dance, theater, physical education, and health. Then sample lesson objectives were written for each concept or activity and those objectives were correlated by comparison with the wording and intent of the respective Arkansas Frameworks for each subject area. The Arkansas Curriculum Frameworks used for this comparison are compiled and published on the Arkansas Department of Education Web site and are available by subject area (for example: Mathematics). Each subject area is subdivided into several strands (for example: "Number Sense, Properties and Operations"), which are then divided into several individual competencies (for example: "NPO.1.1. Demonstrate number sense (concepts of counting, grouping, and place value) using manipulatives"). All of the strands and competencies within a subject area are presented in sequence separately by three grade levels of K-4, 5-8, and 9-12. Documentation of this analysis and correlation study was summarized in a 282-page compendium of FLP lesson objectives and the Arkansas Frameworks addressed by those objectives.

Results of Analysis and Correlation

The overall results of analysis of the FLP program and correlation to the Arkansas Frameworks are presented in Table 1. The science and language arts content areas were represented by the largest number of Arkansas Frameworks used at least once (129 and 123), but the largest number of total incidents of usage occurred in language arts and social studies (1232 and 1047). The content area with the fewest number of frameworks (39) and the lowest occurrence of total incidents of usage (173) was in the combined area of physical education/health.

Table 1. *Number of Arkansas Frameworks Used and Total Occurrences by Content Area*

Subject	Grades K-4		Grades 5-8		Grades 9-12		All Grades	
	Frame-works	**Total Usage**	**Frame-works**	**Total Usage**	**Frame-works**	**Total Usage**	**Frame-works**	**Total Usage**
Science	42	327	49	378	40	170	131	875
Math	33	217	18	172	13	94	64	483
Language	52	475	41	509	30	248	123	1232
Social Studies	38	395	30	395	23	256	91	1046
Fine Arts	25	89	27	253	16	105	68	447
PE/Health	21	86	14	70	4	17	39	173

Sheer numbers of frameworks used and their total incidence only give a broad picture of the comprehensiveness of the FLP program in its applicability to the Arkansas state curriculum requirements. Comparison of the numbers of Arkansas Frameworks utilized by FLP to the total number of Arkansas Frameworks in each subject and strand gives a much more relevant picture of the overall usefulness of FLP in meeting Arkansas' curricular needs. Table 2 presents a comparison of Arkansas Frameworks used in FLP lesson units with the overall Arkansas Frameworks requirements in the core curriculum areas of science, mathematics, language arts, and social studies.

Table 2. *Comparison of FLP and Total Arkansas Frameworks by Content Area in the Core Curriculum*

Subject/Strand		FLP K-4	Ark K-4	% K-4	FLP 5-8	Ark 5-8	% 5-8	FLP 9-12	Ark 9-12	% 9-12
Science	PS	10	21	48%	15	23	65%	12	42	29%
	LS	17	17	100%	17	21	81%	20	32	63%
	ES	15	18	83%	17	30	57%	8	33	24%
	Subtotal	**42**	**56**	**75%**	**49**	**74**	**66%**	**40**	**107**	**37%**
Math	NPO	9	12	75%	4	11	36%	5	9	56%
	GS	7	11	64%	3	7	43%	2	10	20%
	M	7	7	100%	6	7	86%	3	8	38%
	DSP	9	11	82%	4	10	40%	3	8	38%
	PAF	1	6	17%	1	9	11%	0	10	0%
	Subtotal	**33**	**47**	**70%**	**18**	**44**	**41%**	**13**	**45**	**29%**
Language	OV	21	27	78%	12	18	67%	5	14	36%
	W	11	76	14%	18	50	36%	18	49	37%
	R	14	65	22%	8	57	14%	4	48	8%
	IR	6	8	75%	3	9	33%	3	12	25%
	Subtotal	**52**	**176**	**30%**	**41**	**134**	**31%**	**30**	**123**	**24%**
Social Studies	TCC	10	12	83%	6	8	75%	6	10	60%
	PPE	9	13	69%	13	16	81%	6	15	40%
	PDC	9	11	82%	6	8	75%	4	9	44%
	PAG	4	9	44%	3	17	18%	3	9	33%
	SSPS	6	10	60%	2	5	40%	4	11	36%
	Subtotal	**38**	**55**	**69%**	**30**	**54**	**56%**	**23**	**54**	**43%**

The FLP lessons addressed 75% of all Arkansas Science Frameworks in grades K-4, 66% of those in grades 5-8, and 37 % of those in grades 9-12. However, the strands of physical science, life science, and earth science were not represented equally, which is consistent with the content inherent in an agricultural theme. The Life Science Framework was most completely addressed at all grade levels, with 100% of the Arkansas Frameworks addressed in grades K-4, 81% in grades 5-8, and 63% in grades 9-12. FLP addressed 83% of the Earth Science Frameworks and 48% of the Physical Science Frameworks in grades K-4, 57% of the Earth Science Frameworks and 65% of the Physical Science Frameworks in grades 5-8, and 24% of the Earth Science and 29% of the Physical Science Frameworks in grades 9-12.

FLP lessons addressed 70% of all Arkansas Math Frameworks in grades K-4, 41% of those in grades 5-8, and 29% of those in grades 9-12. The strands of Measurement, Data Analysis and Statistical Probability, and Number Sense, Properties and Operations were most fully represented both in percentages and actual occurrences of usage. FLP used 100% of the Measurement Frameworks in grades K-4, 86% in grades 5-8, and 38% in grades 9-12. In the strand Number Sense, Properties and Operations, FLP used 75% of the Arkansas Frameworks in grades K-4, 36% of those in grades 5-8 and 56% of those in grades 9-12. In the Data Analysis and Statistical Probabilities strand FLP used 82% of the Arkansas Frameworks in grades K-4, 40% of those in grades 5-8 and 38% of those in grades 9-12. Geometry and Spatial Sense would appear to be highly utilized from percentages alone, but it was actually used in only a few lessons (six in grades K-4, four in grades 5-8, and two in grades 9-12). The Patterns and Algebra

Functions strand was hardly used at all (one lesson unit in grades K-4, three in grades 5-8, and none in grades 9-12).

Overall, FLP used 69% of the Arkansas Social Studies Frameworks in grades K-4, 56% of those in grades 5-8, and 43% of those in grades 9-12. The strongest representation in social studies was in Time, Continuity and Change ("History"), People, Places and Environments ("Geography"), and Production, Distribution and Consumption ("Economics"). Strands least represented were Power, Authority and Governance ("Government") and Social Sciences Processes and Skills ("Processes"). FLP used 83% of the "History" Frameworks in grades K-4, 75% of those in grades 5-8, and 60% of those in grades 9-12. In "Geography," FLP used 69% of the Arkansas Frameworks in grades K-4, 81% of those in grades 5-8, and 40% of those in grades 9-12. Of the total number of Arkansas "Economics" Frameworks, FLP used 82% in grades K-4, 72% in grades 5-8, and 44 % in grades 9-12. Although the FLP lessons used a relatively small proportion of the total "Processes" Frameworks (60% in grades K-4, 40% in grades 5-8, 36% in grades 9-12), the frameworks that were used were used extensively in nearly every lesson with a social studies component. Only three or four "Government" Frameworks were used at each grade level, and two of them only once in the entire program.

Correlation of the FLP lesson units to the Arkansas Language Arts Frameworks would be deceptive taken from a percentage basis alone. The Arkansas Frameworks compendium includes a great many Language Arts Frameworks, the majority of which are in the writing and reading strands. Most of the Arkansas Writing Frameworks specifically address process issues of prewriting, mechanics and usage, and editing. Unless the FLP lesson clearly indicated these process skills, they were not included in the analysis and correlation for this study. Similarly, most of the Arkansas Reading Frameworks address the selection and use of fiction in reading. Since many of the FLP lessons did not include specific student reading passages or directions to engage in outside reading, Reading Frameworks were not cited, although it might be implied that a certain level of reading occurred.

Given the restrictions already described, some important trends in language arts usage emerged from the analysis. High levels of usage in oral and visual communications were shown at both the K-4 and 5-8 grade levels (78% in grades K-4 and 67% in grades 5-8), most of that in basic classroom communication skills such as using content vocabulary, listening, participating in discussion, and following directions. This was one area where some latitude was exercised in interpreting and applying the frameworks to the FLP lesson format. Even so, a substantial proportion of the total lessons directly used oral presentation skills (eight in grades K-4, 15 in grades 5-8, and eight in grades 9-12). Another area with a high percentage of usage in grades K-4 was in research/inquiry (75%). At the upper grade levels, the Arkansas Frameworks employ a more extensive use of question generation and more advanced research skills that, while they may be implied and expected, were not specifically requested. A much smaller percentage of Research/Inquiry Frameworks was used at the upper grade levels (33% in grades 5-8 and 25% in grades 9-12), but these frameworks were used very widely in almost all the lessons. Despite the low percentages in numbers alone, Writing Frameworks for producing consistent written products, such as "writing across the curriculum" and "writing to inform, [etc.]" were also used in almost every lesson.

Table 3 presents a comparison of Arkansas Frameworks used in FLP lesson units with the overall Arkansas Frameworks requirements in the off-core curriculum areas of art, music, dance, theater, physical education, and health.

Table 3. *Comparison of FLP and Total Arkansas Frameworks by Content Area in the Off-Core Curriculum*

Subject/Strand		FLP K-4	Ark K-4	% K-4	FLP 5-8	Ark 5-8	% 5-8	FLP 9-12	Ark 9-12	% 9-12
Art		6	27	22%	8	28	29%	6	22	27%
Music		7	26	27%	7	19	37%	3	32	9%
Dance		1	44	2%	7	52	13%	5	37	14%
Theater		11	35	31%	5	55	9%	2	26	8%
	Subtotal	**25**	**132**	**19%**	**27**	**154**	**18%**	**16**	**117**	**14%**
P.E.		7	24	29%	4	12	33%	1	16	6%
Health		14	36	39%	10	42	24%	3	46	7%
	Subtotal	**21**	**60**	**35%**	**14**	**54**	**26%**	**4**	**62**	**6%**

There are several issues to consider when describing the results of the correlation of FLP lesson content to off-core Arkansas Frameworks. Most of the Arkansas Fine Arts Frameworks specifically address issues of technique, composition, and appreciation that were not part of the FLP lessons. Artwork, whether “creative” or “illustrative” was an important activity in 73% of the lessons in grades K-4 and 5-8, and 57% of the lessons in grades 9-12. Music, mostly singing content-related lyrics to a familiar tune or music appreciation and interpretation, was an element in 39% (16 out of 41) of the lessons for grades K-4, 29% (14 out of 49) of those for grades 5-8, and only 9% (three out of 35) of those for grades 9-12. Dance was only used in four lessons for grades K-4 (10%), four lessons for grades 5-8 (8%) and two lessons for grades 9-12 (6%). Theater, largely role-playing, but occasionally the production or acting out of skits, featured in 10 (24%) of the lessons for grades K-4, seven (14%) of the lessons for grades 5-8, and four (11%) of the lessons for grades 9-12. Physical education, when used, appeared in the context of playing classroom games and expressive activities associated with dance or pantomime. P.E. was featured in 12 (29%) of the lessons for grades K-4, 11 (22%) of the lessons in grades 5-8, and six (17%) of the lessons for grades 9-12. Health was featured in 14 (34%) of the lessons for grades K-4, 12 (24%) of the lessons for grades 5-8, and seven (20%) of the lessons for grades 9-12.

The FLP lesson units with the greatest number of Arkansas Science, Mathematics, Language Arts, and Social Studies Frameworks are listed and described in Tables 4-7 with a brief description of the concepts or activities *specifically related to the academic content area* of that subject. The units in these tables are arranged in the order of appearance in the FLP lesson compendium with the number of Arkansas Frameworks at each grade level.

Table 4. *Top Ten FLP Lesson Units Featuring Arkansas Science Frameworks*

Unit	**Unit Title**	**FW K-4**	**FW 5-8**	**FW 9-12**	**Brief Description of Science Concepts or Activities in Unit**
13	Trash Bashing	14	11	5	Recycling and alternatives
14	Root, Root for Life	17	17	NA	Structure and function of roots
17	Perc Through Pores	16	17	NA	Soil structure, runoff, erosion
24	Investigating Insects	13	15	9	Collect, record, observe insects
28	Gifts from the Sun	17	23	NA	Photosynthesis, energy in plants
30	Till We or Won't We?	16	19	11	Cultivation practices
42	Calorie Counting	NA	18	16	Identify, measure food energy
45	What Will the Land Support	NA	13	13	Population pressure simulation
47	Mighty Macros	NA	12	10	Nutrition needs of humans
53	Managing Pests	NA	12	11	Pest controls and consequences

Table 5: *Top Ten FLP Lesson Units Featuring Arkansas Math Frameworks*

Unit	**Unit Title**	**FW K-4**	**FW 5-8**	**FW 9-12**	**Brief Description of Math Concepts or Activities in Unit**
9	We're into Pumpkins	13	7	NA	Measuring pumpkins
25	Your School Ground Through New Eyes	13	8	5	Survey and map school grounds
31	Be Label Able	10	5	5	Read and use food labels
39	What's the Shape of Your Diet?	19	11	8	Describe nutrition polygon and calculate perimeter, area
40	What Piece of the Pie?	18	7	6	Graph food costs for US farms and consumers
41	Why I Buy	14	7	5	Survey/display food preferences
42	Calorie Counting	NA	8	6	Compare caloric input/output
47	Mighty Macros	NA	8	6	Calculate nutrient requirements
50	Six Billion and Still Growing	NA	10	6	Calculate/display population growth
51	Less Elbowroom	NA	7	6	Calculate/display population doubling rates

Table 6. *Top Ten FLP Lesson Units Featuring Arkansas Language Arts Frameworks*

Unit	**Unit Title**	**FW K-4**	**FW 5-8**	**FW 9-12**	**Brief Description of Language Concepts or Activities in Unit**
2	Seed Surprises	18	NA	NA	Book report
14	Root, Root for Life	16	10	NA	Lab and oral report, research
20	Tree-mendous	17	10	NA	Word game, reading, writing
21	Expression Connection	20	18	7	Word game, poetry
22	Feed the Need	16	11	13	Interview, oral report
31	Be Label Able	12	14	15	Oral presentation, critique
38	Step By Step	9	16	10	Oral m/m report, ads/skits, letter
44	Soil Is Not Trivial	NA	18	11	Research, write group report
48	Loco for Cocoa	NA	18	24	Research, write, present fiction or non-fiction report
49	To Whom It May Concern	NA	24	21	Persuasive formal letter

Table 7. *Top Ten FLP Lesson Units Featuring Arkansas Social Studies Frameworks*

Unit	**Unit Title**	**FW K-4**	**FW 5-8**	**FW 9-12**	**Brief Description of Social Studies Concepts/Activities**
13	Trash Bashing	13	11	10	Recycling and alternatives
22	Feed the Need	26	18	13	Causes, effects of world hunger
35	From Fiber to Fashion	17	8	9	Clothing industry
37	Nail By Nail, Board By Board	17	9	9	Building materials and sources and uses of resources
38	Step By Step	21	15	9	Food: producer to consumer
44	Soil Is Not Trivial	NA	13	10	Dust Bowl and erosion
49	To Whom It May Concern	NA	16	11	Civic issues in bioengineering
50	Six Billion and Still Growing	NA	15	13	Effects of overpopulation
52	Trading Favorites	NA	18	9	Market simulation
55	Cows or Condos	NA	NA	15	Land use issues

Even though the off-core content areas of the fine arts, physical education, and health as utilized in FLP were correlated to fewer numbers of Arkansas Frameworks (as described earlier), these subject areas were integrated throughout the program of study in several general activity categories as shown by the list of units containing these activities in Table 8.

Table 8. *Notable Uses of Arkansas Fine Arts, Physical Education, and Health Frameworks in FLP*

Subject	Activity	FLP Units (K-4)	FLP Units (5-8)	FLP Units (9-12)
Art	Illustration	9, 10, 12, 15- 18, 24, 26, 27, 29, 30	9, 10, 12, 15-18, 24, 26, 27, 29, 30, 42	24, 29, 30, 42
	Creative (Group project)	4, 6-8, 11, 18, 22, 25, 30, 37-39	6-8, 11, 18, 22, 25, 30, 37-39, 44, 48	22, 25, 30, 37-39, 44, 48
	Creative (Individual project)	3, 5, 9, 14, 18-21, 23, 28, 31, 34, 35, 39	9, 14, 18-21, 23, 28, 31, 34, 35, 39, 50, 54	11, 21, 31, 34, 35, 39, 50, 54
Music	Singing	3, 10, 11, 13, 14, 18, 19, 29	10, 11, 13, 14, 18, 19, 29	11, 12
	Compose/Perform	14, 20, 21, 23, 28	14, 20, 21, 23, 28	21
	Interpretation	1, 7, 20, 21	7, 20, 21	NA
	Appreciation	6	6, 44	44
Dance	Apprec./Interpr.	6, 20, 21, 23	6, 20, 21, 23	21
Theater	Role Play or Pantomime	2, 10, 5, 20, 21, 28, 34	10, 20, 21, 28	21
	Skits/Drama	3, 7, 20, 21, 28, 38	7, 15, 20, 21, 28, 38, 44	21
P.E	Games and Group Activities	4, 11, 13, 15, 20, 24, 25	11, 13, 15, 20, 24, 25, 48	NA
	Expressive Mvmt.	1, 2, 17, 21, 28	17, 21, 28	NA
Health	Diet and Nutrition	1, 3, 8, 12, 28,30, 31, 39	12, 30, 31, 42, 47, 48	30, 31, 39,42, 47
	Prevent Disease, Mental, Dental	5, 11, 15, 19, 24, 25	11, 15, 19, 24, 25, 39	11, 12

Implications and Recommendations for Application

All of the core curriculum areas of science, mathematics, language arts, and social studies were systematically and thoroughly integrated into an agricultural literacy base in FLP. The lessons utilized a majority of the number of Arkansas Science, Mathematics and Social Studies Frameworks, especially for grades K-4 and 5-8. The strongest areas of integration in grades K-4 and 5-8 in terms of numbers alone were science and social studies, including 100% of the K-4 Life Science Frameworks. The social studies strand of "Government" was weak at all grade levels. Mathematics showed strong correlation with the Arkansas Frameworks for grades K-4, especially in the "Measurements" strand, correlating to 100% of the Arkansas Frameworks in that strand. Correlation of mathematics for grades 5-8 was markedly weaker in numbers of frameworks in all strands except "Measurement." The mathematics strand of "Algebra" was very weak in all grade levels. FLP correlated to less than a third of all Arkansas Language Arts Frameworks at all grade levels, but the frameworks that were used representing the basic process skills of oral and visual communication and writing for specific purposes across the curriculum were integrated into almost all units in the FLP program. Similarly, small numbers of Arkansas Frameworks were used in the off-core content areas of the fine arts and physical education, but these important physical and expressive activities were also integrated into nearly all the FLP lessons. Nearly one third of all the FLP lesson units incorporated some aspect of health that correlated with the Arkansas Frameworks.

When compared from grade level to grade level, FLP appeared to be stronger and more fully developed for the K-8 grade levels, especially in the younger half of this range. Fewer lessons were aimed at grades 9-12 (35 compared to 41 for grades K-4 and 49 for grades 5-8), and those that were often addressed a broad range of ages rather than directly addressing the more complex process and investigative skills of the upper grade levels. Another problem affecting the assessment of the FLP program's utility for the upper grades is that many Arkansas Frameworks for grades 9-12 are very content-specific and not easily addressed by a broad integration into general agricultural literacy topics. Conversely, the higher-order thinking and process skills used in FLP lesson units developed and aimed specifically for the upper grades were few in number but very effectively integrated, so what may have been missing in quantity is made up for in quality.

We are continuing to follow up on previously trained teachers and facilitators with individual interviews to gather feedback and encourage implementation and use of the FLP program in Arkansas schools. Plans are being formulated to expand the original teacher base with additional training sessions and to make more teachers aware of the fact that this curriculum correlates well with the state standards. If other states use a similar set of frameworks or standards, it would be logical to expect that these FLP lessons' concepts would be highly correlated with their own frameworks. However, for other states to be able to determine without doubt that a correlation exists, each state would need to do its own correlation analysis. Doing so would support justification of the integration of this agricultural and environmentally based curriculum throughout all grade levels.

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

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Abstract

The purpose of this study was to analyze the attitudes of North Carolina Secondary Agricultural Educators regarding the state of diversity inclusion in North Carolina secondary agricultural education programs. North Carolina secondary agricultural teachers agreed that the barriers to diversity inclusion centered on stereotypes, guidance counselors, prejudicial issues, and the perception of agriculture itself. North Carolina secondary agricultural education teachers agreed that mentoring and multicultural education were strategies that could be utilized to increase diversity inclusion in secondary agricultural education. Recommendations included preservice multicultural training, reflective diversity teaching practices, and establishing collaborative relationships with guidance counselors.

Introduction

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

Diversity Inclusion Barriers

There are numerous barriers that exist that hinder the process of ethnic minority and women inclusion in vocational education, particularly agricultural education. According to Talbert & Larke (1995), barriers include a lack of mentors or role models, stereotypes, teachers, guidance counselors, the perception of agriculture itself, sexual harassment. Klauke (1989) suggested that prejudicial issues in relation to ethnic minorities and women by school systems should be addressed. In addition, teaching materials should be examined for racial, cultural, or gender biases (Klauke, 1989). Furthermore, teachers and staff should become familiar with the ethnic minority groups represented in their classrooms, while they promote an atmosphere of acceptance and cooperation (Klauke, 1989). Additionally, according to Foster (2001) acceptance by peers, community, and administrators combined with the challenge of balancing family and career are some of the barriers women endure in vocational education.

Diversity Inclusion Strategies

The literature reveals that positive role models of the same ethnicity and gender can be influential factors for students to enroll in Agriscience courses and ultimately pursue agricultural careers (Talbert & Larke, 1995). Role modeling has been heralded in education as one of the key tools for advancement through the ranks for everyone. Bowen (1994) stated that role models function as teachers and coaches to create learning opportunities and to challenge their protégés to develop to their full potential. Bell (1996) stated that superior role models also "recognize that they are, first and foremost, facilitators and catalysts in a process of discovery and insight. Over the years, the description of a role model has stayed basically the same. Success does not come overnight for most people; hard work, knowledge, and dedication are key factors, especially for ethnic minorities and women (Boyer, 1990).

For all students to achieve in school, educators, parents, and policymakers must develop strategies to address the different learning styles of all students. The public school system must give all public school students the chance to learn, excel, and achieve educationally (National Coalition for Women and Girls in Education, 1988). One key strategy that can be utilized to promote an attitude of change toward ethnic minority and women inclusion is multicultural education. According to Banks (1994), multicultural education offers a relevant view of educational purpose in an increasingly complex world. Multicultural education provides a map to increase the awareness of women and ethnic minority groups in relation to diversity. Banks (1994) also stated that the multicultural education map can be utilized to chart the future and it can help educators and communities, government, and the private sector challenge arrangements that reproduce inequity. The National Council for the Accreditation of Teacher Education describes multicultural education as "preparation for the social, political and economic realities individuals will experience in culturally diverse and complex human encounters providing a process for individuals to develop competencies for perceiving, evaluating, and behaving in different cultural settings." Multicultural education represents a change in educational thinking (Anderson, 1990). Sheppard (1983) noted that vocational teachers need training in multicultural education because America is a culturally pluralistic society and cultural and ethnic diversity in the United States is a fact of life. Banks (1994), cited four principles of ethnic and cultural diversity: (1) ethnic and cultural diversity should be recognized and respected at the individual, group, and societal levels; (2) diversity provides a basis for societal enrichment, cohesiveness, and survival; (3) equality of opportunity must be afforded to all members of ethnic and cultural groups; and (4) identification for individuals should be optional in a democracy.

Foster, Pikkert and Husmann (1991) stated that more ethnic minorities and women could be encouraged to enter the profession by changing current societal attitudes against ethnic minorities and women teachers in agriculture, increasing salaries, increasing acceptance by administrators, improving teacher education programs, building support networks and increasing recruitment efforts. Research has indicated students are more likely to become involved in a vocational education sector, particularly agricultural education, if individuals from their respective ethnic minority group or gender are employed in instructional and supervisory roles (Williams, 1992; Jones & Bowen, 1998; Osborne, 1994).

According to Hawley (1997), a mentor is that person who achieves a one to one developmental relationship with a learner and one whom the learner identifies as having enabled personal growth to take place. Mentors perform roles in four key categories (Hawley, 1997). Hawley (1997) stated that these four categories are coaching, facilitating, counseling, and networking. Coaching is showing one how to carry out a task or activity (Hawley, 1997). Facilitating is creating opportunities for learners to use new skills and counseling is helping learners explore the consequences of potential decisions (Hawley, 1997). Last, but not least is networking, which is referring learners to others when the mentor's experience is insufficient (Hawley, 1997).

In the United States, the majority of teachers are white females, with African American, Native American, Hispanic, and even male teachers being dangerously underrepresented in the public school system (Shure, 2001). According to Luft (1996) secondary agricultural education teachers could make a greater effort to specifically recruit ethnic minority and female students interested in agricultural occupations. Perhaps program revisions are necessary to attract culturally diverse students. It is suggested that FFA advisors encourage and strive to increase ethnic minority and female membership. Luft (1996) also recommended that secondary agriculture teachers be provided in-service opportunities to improve their cultural diversity teaching practices. To help improve the extent to which cultural diversity is addressed in the future by secondary agriculture teachers, preservice teacher education students should also be required to take courses dealing with teaching the culturally diverse, with strong encouragement to implement the practices into their teaching. Courses designed to prepare agriculture teachers to serve the culturally diverse populations should contain content recommended by experts in multicultural education (Luft, 1996).

Theoretical Framework

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

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

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

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

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

Purpose and Objectives

The purpose of this study was to analyze the attitudes of North Carolina Secondary Agricultural Educators regarding the state of diversity inclusion in North Carolina secondary agricultural education programs. In order to accomplish the aforementioned purpose, the following objectives were developed:

1. Determine the demographic characteristics of North Carolina secondary agricultural education teachers.

2. Assess North Carolina secondary agricultural education teachers' perceptions of the barriers of diversity inclusion in North Carolina secondary agricultural education programs.

3. Assess North Carolina secondary agricultural education teachers' opinions of proposed solutions to increase diversity inclusion in North Carolina secondary agricultural education programs.

Methodology

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

The overall correlation coefficient for the instrument was .93. According to Davis (1971) this would indicate a very strong association between variables. The population for this study consisted of secondary agriculture teachers in North Carolina who were listed in the 2001-2002 North Carolina Agricultural Education Directory (N = 366). Based on Krejcie and Morgan’s (1970) formula for a 5% margin of error, a random sample of 180 would be required for a population of this size. As is the nature of survey research a certain loss rate can be expected, in an attempt to achieve the target sample size of 180 a random sample of 210 secondary agricultural education teachers was utilized. A three round mail questionnaire approach was utilized for this study. The first round consisted of North Carolina secondary agricultural education teachers receiving a cover letter from the researcher outlining the purpose of the research, a survey, and a return stamped envelope. Teachers were given one week to return the initial survey; this resulted in 63 surveys being returned. The next round consisted of all non-respondents receiving a follow-up letter stressing to them the importance of returning the survey for data analysis purposes and to strengthen the study. This resulted in 38 surveys being returned. Non-respondents were again given one week to return the survey. The third round consisted of all nonrespondents receiving all of the items received in the first round, with another week to respond, 9 surveys were returned. In order to control for nonresponse error Miller and Smith (1983) recommended comparing early to late respondents. Research has shown that late respondents are often similar to nonrespondents. In relation to this study, no significant differences were found. The final return rate was 52%.

Findings

Table 1. presents the means, standard deviations, frequencies, and percentages for the demographic variables contained in the survey instrument. In relation to age, North Carolina secondary agricultural education teachers reported a mean age of forty. Regarding gender in this study, fifty-one secondary agricultural education teachers were male and twenty-three were female. In relation to race or ethnicity, there were nine Black agricultural education teachers and sixty-five White Agricultural Education Teachers. However, there were no Hispanic, Native American, and Asian agricultural education teachers reported. Thirty-eight North Carolina agricultural education teachers held bachelor degrees. Thirty-two North Carolina agricultural education teachers held master's degrees. Four agricultural teachers in North Carolina had earned the specialist degree. No teachers in North Carolina held a doctorate degree that taught secondary agricultural education. Agricultural Education Teachers in North Carolina had taught secondary agriculture an average of twelve years. Lastly, agricultural teachers in this study were asked how many hours of training they had taken in the area of diversity inclusion in the past five years. North Carolina agricultural teachers had taken a mean of four hours of training in the area of diversity.

Table 1. *Demographic Program*

Demographics	N	Percent
1. Age	40	--
2. Gender:		
Male	51	68.9%
Female	23	31.1%
3. Race/Ethnicity:		
Black	9	12.2 %
White	65	87.8 %
Hispanic	0	0 %
Native American	0	0 %
Asian	0	0 %
4. Highest Degree:		
Bachelor's	38	51.4%
Master's	32	43.2%
Specialist	4	5.4 %
	Mean	**SD**
5. Number of years teaching:	11.59	9.75
6. Number of Hours in Diversity Training:	3.67	5.67

Table 2 presents the means and standard deviations for the program variables contained in the survey instrument. Agricultural teachers in North Carolina were asked to provide their current FFA membership. FFA membership on the average in North Carolina was seventy. Agricultural education programs in North Carolina had a mean enrollment of seventy-nine. North Carolina Agricultural Teachers were also asked to provide the number of ethnic minorities they currently had enrolled in their program, which equaled a mean of nineteen. Also Agricultural teachers were asked to report how many females they currently had enrolled in their program, which equaled a mean of twenty-seven.

Table 2. *Program Characteristics*

Program Variables	Mean	SD
1. Student enrollment:	78.65	47.74
2. Current FFA membership:	69.45	58.47
3. Ethnic minorities currently enrolled in program:	18.77	28.19
4. Females currently enrolled in program:	26.88	29.43

Respondents were asked their perceptions in relation to eighteen statements regarding the potential barriers to diversity inclusion in North Carolina secondary agricultural education programs. Table 3 shows the means and standard deviations for the perceived barriers to diversity inclusion as they relate to secondary agricultural education programs in North Carolina. Respondents were in agreement concerning the following nine statements: (1) Stereotypes are a primary reason why women do not enroll in agricultural classes., (2) Guidance counselors influence the participation of ethnic minority in agricultural education., (3) Guidance counselors influence the participation of women in agricultural education., (4) The perception of agriculture itself influences the participation of ethnic minorities in agricultural education., (5) The perception of agriculture itself influences the participation of women in agricultural education., (6) Prejudicial issues in relation to ethnic minorities by school systems should be addressed., (7) Prejudicial issues in relation to women by school systems should be addressed., (8) Only when students observe staff commitment to providing a fair and representative environment will they feel a sense of school ownership., (9) Acceptance by peers is a barrier to diversity inclusion in vocational education.

Table 3. *Barriers of Diversity Inclusion Table*

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

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

North Carolina secondary agricultural education teachers were uncertain concerning the following eight statements in relation to the perceived barriers of diversity inclusion: (1) A lack of role models hinders the participation of ethnic minorities in agricultural education., (2) A lack of role models hinders the participation of women in agricultural education., (3) Stereotypes are a primary reason why ethnic minorities do not enroll in agricultural classes., (4) The glass ceiling theory may influence the participation of ethnic minorities in agricultural education., (5) The glass ceiling theory may influence the participation of women in agricultural education., (6) Acceptance by the community is a barrier to diversity inclusion in vocational education., (7) Acceptance by the school administrators is a barrier to diversity inclusion in vocational education., (8) Balancing family and a career is a barrier women endure in vocational education.

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

Respondents were asked their perceptions in relation to fifteen statements regarding the potential solutions to diversity inclusion in North Carolina Secondary Agricultural Education Programs. Table 4 shows the means, standard deviations, and rankings for the perceived solutions to diversity inclusion as they relate to secondary agricultural education programs in North Carolina.

Table 4. *Solutions to Diversity Inclusion Table*

Solutions	**Mean**	**SD**
1. FFA advisors should encourage and strive to increase ethnic minority and female membership.	4.45	.67
2. For all students to achieve in school, educators, parents, and policymakers must develop strategies to address the different learning styles of all students.	4.39	.76
3. Teachers and staff should become familiar with the ethnic minority groups represented in their classrooms in order to promote and atmosphere of acceptance and cooperation.	4.20	.60
4. Multicultural education can be used to increase the awareness of ethnic minority groups in relation to diversity.	3.95	.77
5. Multicultural education provides a more global view of society.	3.93	.93
6. Multicultural education can be used to increase the awareness level of society as a whole toward diversity inclusion.	3.89	.88
7. An increase in support networks and recruitment efforts by public school officials would enhance diversity inclusion in agricultural education.	3.81	.83
8. Multicultural education can serve to inform future instructional decisions teachers will make.	3.77	.84
9. Teaching materials should be examined for racial, cultural or gender biases.	3.76	1.04
10. Mentoring is a strategy that could be utilized to increase diversity inclusion in secondary agricultural education.	3.67	.78
11. Multicultural education is a strategy that can be utilized to promote an attitude of change toward diversity inclusion in secondary agricultural education.	3.66	.93
12. The infusion of diversity competencies in teacher education programs will have a positive effect upon agricultural education.	3.59	.91
13. Secondary agricultural education teachers need training in multicultural education.	3.53	1.04

14.	Multicultural education may not eliminate the stereotypes that agricultural teachers have about diversity inclusion.	3.35	.93
15.	An increase in salary levels would encourage a higher degree of diversity inclusion at the instructor level.	3.18	1.36

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

The following thirteen statements were agreed upon by North Carolina Secondary Agricultural Education Teachers: (1) Secondary agricultural education teachers need training in multicultural education., (2) Multicultural education is a strategy that can be utilized to promote an attitude of change toward diversity inclusion in secondary agricultural education., (3) Multicultural education provides a more global view of society., (4) Multicultural education can be used to increase the awareness of ethnic minority groups in relation to diversity., (5) Multicultural education can be used to increase the awareness level of society as a whole toward diversity inclusion., (6) Multicultural education can serve to inform future instructional decisions teachers will make., (7) Teaching materials should be examined for racial, cultural, or gender biases., (8) Teachers and staff should become familiar with the ethnic minority groups represented in their classrooms in order to promote and atmosphere of acceptance and cooperation., (9) The infusion of diversity competencies in teacher education programs will have a positive effect upon agricultural education., (10) An increase in support networks and recruitment efforts by public school officials would enhance diversity inclusion in agricultural education., (11) Mentoring is a strategy that could be utilized to increase diversity inclusion in secondary agricultural education., (12) FFA advisors should encourage and strive to increase ethnic minority and female membership., (13) For all students to achieve in school, educators, parents, and policymakers must develop strategies to address the different learning styles of all students.

North Carolina secondary agricultural education teachers were uncertain regarding the following two statements: (1) Multicultural education may not eliminate the stereotypes that agricultural teachers have about diversity inclusion, (2) An increase in salary levels would encourage a higher degree of diversity inclusion at the instructor level.

Conclusions

1. North Carolina secondary agricultural teachers agreed that the barriers to diversity inclusion centered on stereotypes, guidance counselors, prejudicial issues, and the perception of agriculture itself.

2. North Carolina secondary agricultural education teachers were uncertain regarding some barriers to diversity inclusion, which may be an indicator to the under representation of ethnic minorities and women in North Carolina secondary agricultural education programs.

3. The majority of North Carolina secondary agricultural education teachers were in highest agreement concerning that FFA advisors should encourage and strive to increase ethnic minority and female membership.

4. The researcher also found that North Carolina secondary agricultural education teachers agreed that mentoring and multicultural education were strategies that could be utilized to increase diversity inclusion in secondary agricultural education.

5. North Carolina Secondary Agricultural Education Teachers also felt that teachers and staff should become familiar with the ethnic minority groups represented in their classrooms in order to promote an atmosphere of acceptance and cooperation.

Recommendations

1. Preservice agricultural education programs in North Carolina should have a strong emphasis in the area of multicultural education and diversity training.

2. In-service workshops should be provided to North Carolina secondary agricultural education teachers in an attempt to increase their skills in the area of diversity.

3. North Carolina secondary agricultural education teachers should actively seek to establish relationships and networks with school administrators and guidance counselors.

4. North Carolina secondary agricultural education teachers should perhaps incorporate more activities in their daily instructional activities that encourage problem solving and decision-making skills in relation to diversity issues.

Implications

Diversity is a trend in the United States cultural landscape that is here to stay. The discipline of agricultural education is no exception, for a field that has traditionally been white male dominated, pedagogical changes to address cultural differences will become a way of life. If the purpose of education is to prepare individuals to function in an ethnically and culturally diverse world, then how will agricultural education as a profession respond?

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Factors Influencing the College Choice of Urban Agricultural Education Students

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Abstract

The purpose of this study was to identify factors influencing the college choice behaviors of students who graduated from an urban agricultural education program. A secondary purpose was to identify factors that discriminate between individuals who complete a postsecondary degree and/or a certificate in agriculture and those who do not. Former students in the study indicated parents and/or guardians as the individuals most influencing their decisions to pursue a postsecondary education although former students indicated their mother or female guardian as having slightly more influence than the father or male guardian. Events and experiences reported by former students who chose postsecondary education and/or certificate in agriculture focused around several themes including an interest in agriculture, personal factors, and job opportunities. Former students who did not choose a postsecondary education and/or certificate cited a lack of interest and personal factors. A discriminant analysis procedure identified school high grade point average and mother or female guardian's level of influence as the most distinguishing factors predicting if the former students completed or did not complete a postsecondary degree and/or certificate in agriculture.

Introduction

A concern long voiced by college recruiters and admissions officers has been, "Why do high school students choose to attend one college and not another?" (Martin & Dixon, 1991). This is particularly relevant for colleges of agriculture that traditionally expend a great deal of time, energy, and financial resources in their marketing and recruitment programs (Washburn Garton, & Vaughn, 2002). Even more so, colleges of agriculture are continually challenged to seek new and innovative ways to appeal to potential students (Wildman & Torres, 2001). Due to the projected shortage of available graduates in the U.S. food, agriculture, and natural resources system over the next few years (Goecker, Whatley, & Gilmore, 1999), increasing enrollments in colleges of agriculture will be key to assuring the continued relevance of agricultural college curricula within the land-grant system (Donnermeyer & Kreps, 1994).

Traditionally, colleges of agriculture have targeted students from a farming background (Touchstone & Riesenberg, 1997). Yet, the demographic composition of today's college of agriculture student has changed in many instances (Dyer & Breja, 2001). For example, Scofield (1995) noted an increase in students from urban backgrounds of College of Agriculture freshmen at Iowa State University. Similarly, Dyer, Lacy, and Osborne (1996) reported that 66% of freshmen in the College of Agriculture at the University of Illinois were from urban areas. These trends seem to mirror what is expected to occur well into the 21st century. For example, demographic projections indicated that over the next 20 years, employers and the U.S. economy will largely rely on a workforce drawn from urban communities (Lytle, 1992). In addition, racial and ethnic minorities currently comprise 28% of the U.S. population (U.S. Bureau of the Census, 2000) and during the next 10 years, non-Hispanic whites are projected to constitute only 25% of the population growth (Esters & Bowen, 2003). As a result of these demographic changes, opportunities to maintain a pipeline of future agriculturalists will depend on the ability of colleges of agriculture to attract students from nontraditional backgrounds (Esters, 2004).

The concept urban agricultural education programs has been around for more than 50 years, although there has been increasing interest over the last 20 years in what has been termed urban "magnet" schools for the agricultural sciences. One of the primary reasons for this interest comes as a result of more American cities expanding into once rural areas creating the need for schools to change their programs to reflect the changing community (Predmore, 2004). Sutphin (1990) noted that, "as urban areas expand, so do opportunities for agricultural education" (p. 7). Bowen (2002) further suggested that the creation of urban agricultural education programs in inner cities reflects "proactive behavior", especially in terms of increasing diversity in agricultural education.

Urban agricultural education programs combine the traditional vocational program model with new approaches and broadened curricula (NRC, 1988). A particular emphasis of these programs is to attract more urban, minority, and non-minority students into agricultural education (Talbert, 1996). Some of the more recognized urban agricultural education programs include the Chicago High School for Agricultural Sciences in Illinois, Walter Biddle High School of Agricultural Sciences in Philadelphia, PA, John Bowne High School in Queens, NY, and the Agricultural Food and Sciences Academy in Minneapolis, MN.

The process of student college choice is complex (Hossler & Stage, 1992). Numerous studies have explored this phenomenon in the field of agriculture and have identified numerous factors influencing this decision-making process which include values, financial incentives, exposure to agriculture, and family (Donnermeyer & Kreps, 1994; Scofield, 1995; Wildman & Torres, 2001); and former graduates, campus visits, printed university publications, professors, career opportunities, and academic reputation (Washburn et al., 2002). Other factors which have emerged in the college choice literature are parents' education, gender, high school grade point average (Hossler & Stage, 1992); socioeconomic status and self-esteem (Paulsen, 1990); and race (Hossler & Bouse, 1991).

Despite recent interest and the opportunity of growth of urban agricultural education, there still exists a paucity of research and scholarship on the topic. Previous literature on urban agricultural education has focused primarily on career choice (Esters, 2003); attitudes toward agriculture (Talbert, 1995, 1996); factors influencing secondary enrollment (Esters, 2003); perceptions of career opportunities (White, Stewart, & Linhardt, 1990); beliefs of agriculture (Thompson & Russell, 1993); perception of agricultural education stakeholders (Russell & Trede, 1999); agricultural education program development (Russell & Trede, 1999); and successful program components (Soloninka, 2003). Although a variety of topics have been studied, there has been no published research examining the college choice behaviors of students enrolled in these programs. As such, this study addressed the void within the college choice research in agricultural education by examining students who graduated from an urban agricultural education program?

Theoretical Framework

The theoretical framework for this study was based upon the Social Learning Theory of Career Decision-Making (Krumboltz, Mitchell, & Jones 1976; Mitchell & Krumboltz, 1990). Social learning theory explains how educational and occupational preferences and skills are acquired and how selection of courses, occupations, and fields of work are made. The theory identifies the interactions of genetic factors such as race, environmental learning experiences and task skills. It is posited that each of these influencers plays a part in all career decisions that are made, but different combinations of interactions of the influencers produce a multitude of different career choices that individuals make (Mitchell & Krumboltz, 1990).

In addition to the influencers and the outcomes of their interactions, social learning theory suggests three sets of testable propositions which include factors influencing (1) preferences, (2) career decision-making skills, and (3) entry behaviors into educational or occupational alternatives. Given that this research focused on the actual entry behaviors of individuals into a specific area of study (i.e., agriculture), social learning theory's third group of propositions provided the primary theoretical underpinning for the study. Factors of primary importance in this study fall within the social learning theory's category of influencers: 'Environmental Conditions and Events'. According to Sharf (2002), these factors are generally outside the control of the individual and include social, cultural, political, and economic conditions. Mitchell and Krumboltz (1996) describe several conditions and events, categorized as social, educational, and occupational, that affect an individual's decision-making. Such factors may be planned or unplanned, but they are usually beyond the control of the individual.

Purpose and Objectives

The purpose of this ex post facto correlational study was to identify factors that influence the college choice behaviors of students who graduated from an urban agricultural education program. A secondary purpose was to identify factors that discriminate between individuals who complete a postsecondary degree and/or a certificate in agriculture and those who do not. The research questions that guided this study were:

1. What is the demographic profile of students who graduated from an urban agricultural education program?

2. What individuals influenced students to complete or not complete a postsecondary degree and/or certificate in agriculture?

3. What events and/or experiences most influenced students to complete or not complete a postsecondary degree and/or certificate in agriculture?

The following hypothesis was tested in this study:

A discriminant model consisting of selected factors will explain why former students who graduated from an urban agricultural education program complete or did not complete a postsecondary degree and/or a certificate in agriculture.

Methods and Procedures

This ex post facto correlational study utilized a retrospective static-group comparison design (Tuckman, 1999). The population for this study included all students (N=448) who graduated from an urban agricultural education program in Pennsylvania between 1992 and 1995. One school was chosen to control some of the variance across agricultural science programs and the instruction delivered. Additionally, the researchers assumed that high school students who graduated from high school between 1992-1995 would now be 25-30 years of age and likely have completed some type of postsecondary education. Also, there was a higher chance that students who graduated eight to 11 years ago have formed stable attitudes as to why they chose or did not choose postsecondary education in the agricultural sciences. In order to control frame error, efforts were made to obtain the current names and addresses of graduates with the assistance of the school's principal and agriculture coordinator.

A four-part survey instrument was developed to collect the data. Section one included items pertaining to the amount of education completed, individuals influencing secondary and postsecondary school choice, and events or experiences influencing former students' secondary school choice and decision to pursue a postsecondary education. Section two included items related to career choice, individuals influencing career choice, and events or experiences that influenced former students' decision to choose or not choose a career in agriculture. Section three included items measuring self-esteem using the Rosenberg Self-Esteem Scale. Part four of the instrument included items that elicited demographic data. Level of influence variables were measured on a five-point scale ranging from 1= no influence to 5= very high influence. Because this study was part of a larger investigation, only items in section one were used to address the three research questions.

The questionnaire was reviewed for content and face validity by a panel of experts consisting of five faculty members of the Department of Agricultural and Extension Education at The Pennsylvania State University and the agricultural coordinator from the participating high school. The instrument was also pilot tested using 43 similar graduates of another urban agricultural education program. The majority of the pilot group was similar in age with the population of this study. The internal consistency of the Rosenberg Self-Esteem Scale was found to be very high (Cronbach's alpha = .84) based on responses from 22 former students. Post-hoc reliability for this scale with the population was also found to be very high (Cronbach's alpha = .88).

Data collection was conducted in three stages. Questionnaires along with a cover letter and prepaid return envelope were mailed to the 448 graduates on July 6, 2003. Two weeks after the first mailing, 31 (8%) of the graduates had responded. On July 21, a second mailing was sent to all nonrespondents which resulted in 21 (6%) additional surveys. On August 7, a final mailing was sent to all remaining nonrespondents. By the end of the third mailing, 36 additional surveys were returned for a total response rate of 24% (n=88). Although the response rate for this study is considered low, follow-up studies five years after high school graduation (Riesenberg & Stenberg, 1992) of agricultural education program completers (Helm & Straquadine, 1999), and college of agriculture graduates (Heyboer & Suvedi, 1999; Jones, 1999) have yielded response rates between 25% and 59%.

To address the problem of nonresponse bias, a comparison was made between early and late respondents (Miller & Smith, 1983). A chi-square analysis procedure was used to compare early and late respondents on the following variables: year of graduation, and whether or not they had a certificate in agriculture, a degree, and a degree in agriculture. No statistically significant differences (p. >.05) were found between early and late respondents on any of the four variables. Although early and late respondents were found to be very similar on major variables included in the study, because of the response rate, the researcher encourages readers not to generalize the findings beyond the 88 respondents.

Data were coded and analyzed using the Statistical Package for the Social Sciences (SPSS version 11.5). Descriptive statistics including frequencies, percentages, means, standard deviations, and correlations were used to analyze the data. Discriminant analysis was used to test the hypothesis of the study.

Results/Findings

Research Question One

What is the demographic profile of students who graduated from an urban agricultural education program?

Sixty-eight percent of the former students who responded were female. Slightly more than half were white (54%) while 40% were African American, 4% Hispanic, and 2% were classified as other. Of the former students who responded, 43% indicated that they had a high school high school grade point average between 3.00 – 3.50, 27% had high school grade point averages between 3.51 – 4.00, and 24% had high school grade point averages between 2.50 – 2.99.

The former students completed associate's degrees in 13 different academic programs. Associate degree majors included areas such as office management, science, nursing, communication, and education. Of the former students who responded, 8% completed bachelor's degrees in agriculture while 7% completed a bachelor's degree in liberal arts. An additional 5% completed bachelor's degrees in education, business, and science. At the master's degree level, the former students completed degrees in three different areas: agriculture, education, and liberal arts. No student earned a doctoral degree. Eight former students had also completed certificates in several areas of agriculture (pesticide applicator, animal science, and landscaping).

Research Question Two

What individuals influenced the students to complete or not complete a postsecondary degree and/or certificate in agriculture?

The former students reported data on the level of influence that selected individuals had on their decision to pursue or not pursue postsecondary education (Table 1). Mean values are reported only for those who responded (n=37). The former students indicated that their mother or female guardian had a "high influence" (*M*=4.07) on their decision to pursue postsecondary education. Their father or male guardian (*M*=3.64) also had a "high influence" while friends (*M*=3.18) had a "low influence" on the choice of postsecondary education followed by another teacher (*M* =3.14). The 30 females who responded indicated similar patterns with their mother or female guardian (*M*=4.10) and their father or male guardian (*M*=3.70) as having a "high influence" on their decision to pursue postsecondary education while another teacher (*M*=3.10) and a friend (*M*=3.07) had a "low influence." Conversely, the seven males who responded indicated that a friend (*M*=4.00) had a "high influence" on their decision to pursue postsecondary education while their mother or female guardian (*M*=3.43) and father or male guardian (*M*=3.00) had a "low influence" on their decision. Interestingly, friends had more influence on former students' decision to pursue postsecondary education than teachers, family members, agriculture teachers, and guidance counselors. A Spearman's rho coefficient of .93 revealed that males and females were in agreement with their rankings of individuals who influenced their decision to pursue postsecondary education.

Table 1. *Individuals' Level of Influence on the Former Students' Decisions to Pursue Postsecondary Education (n = 37)*

Individual	Males (n= 7[b])			Females (n= 30[b])			Overall (n=37[a])		
	Rank	*M*	*SD*	Rank	*M*	*SD*	Rank	*M*	*SD*
Mother or female guardian	2	3.43	1.81	1	4.10	1.21	1	4.07	1.28
Father or male guardian	4	3.00	1.92	2	3.70	1.60	2	3.64	1.56
A friend	1	4.00	.58	4	3.07	1.66	3	3.18	1.57
Another teacher	6	2.57	1.51	3	3.10	1.64	4	3.14	1.59
Another family member	3	3.29	1.70	5	3.00	1.70	5	3.10	1.67
An agriculture teacher(s)	5	2.86	1.35	5	3.00	1.70	6	3.05	1.60
Guidance counselor	7	2.43	1.40	6	2.77	1.57	7	2.83	1.52

Note. Scale: 1 = No Influence, 2 = Very Low Influence, 3 = Low Influence, 4 = High Influence, and 5 = Very High Influence. [a]Total does not equal 88 due to missing data. [b]r_s = .93

Research Question Three

What events and/or experiences most influenced students to complete or not complete a postsecondary degree and/or certificate in agriculture?

The former students were asked to list an event or experience that most influenced their decisions to choose a postsecondary education in agriculture (Table 2). Four former students indicated that an interest in agriculture was the event or experience that most influenced their decisions to pursue postsecondary education in agriculture. Personal factors were the events or experiences cited by two former students as influencing their decision to pursue a postsecondary education in agriculture while limited job opportunities were indicated by one former student. Additionally, two former students indicated that events or experiences that were classified as "other". Of the former students who did not choose a postsecondary education in agriculture, 13 indicated events or experiences that were classified as "other" while 13 former students indicated a lack of interest and 8 former students indicated personal factors.

Of the 88 former students who responded, 14 received a degree/certificate in agriculture. There were only four former students who received more than one degree and/or certificate in agriculture. The remaining 10 students received one degree and/or certificate in agriculture.

Table 2. *Events and Experiences Most Influencing Former Students to Choose or Not Choose a Postsecondary Education in Agriculture (n = 88)*

	Those Choosing[a]	Those Not Choosing[b]	
Event/Experience	*F*	*f*	Total %
Lack of interest	--	13	17.1
Other	2	13	17.0
Personal Factors	2	8	13.2
Other educational interest	--	7	9.2
Interested in agriculture	4	2	7.9
Other career interest	--	6	6.8
Low salaries	--	5	6.6
Enlisted in armed services	--	4	5.3
Limited job opportunities	1	3	5.3
Job opportunity	--	2	3.9
Negative high school experience	--	3	3.9

Note. [a]Five respondents did not provide an event or experience. [b]Seven respondents did not provide an event or experience.

Hypothesis 1: A discriminant model consisting of selected factors will explain why former students completed or did not complete a postsecondary degree and/or a certificate in agriculture.

A discriminant analysis procedure was used to test whether a model consisting of selected factors could explain why former students chose or did not choose a postsecondary degree and/or certificate in agriculture. Due to the low response rate (24%) of the study, the purpose of using the discriminant analysis was to explain if the two groups were similar. Hence, prediction and/or inference to the target population were not an intended goal of this analysis. The dependent variable in the discriminant analysis was whether or not former students chose to complete a postsecondary education in agriculture (‘yes” or “no”). The independent variables were gender, race, father or male guardian’s level of education, mother or female guardian’s level of education, father or male guardian’s occupation, mother or female guardian’s occupation, high school grade point average, self-esteem, father or male guardian’s level of influence on postsecondary education, and mother or female guardian’s level of influence on postsecondary education. Before computing the discriminant analysis, intercorrelations among these variables were computed (See Table 3). The following scale was used to describe the strength of the relationships: .01-.09 = negligible; .10-.29 = low; .30-.49 = moderate; .50-.69 = substantial; and .70 or higher = very strong (Davis, 1971).

There were few relationships among the independent variables. Furthermore, choosing postsecondary education in agriculture was not related to gender, race, father or male guardian’s level of education, mother or female guardian’s level of education, father or male guardian’s occupation, mother or female guardian’s occupation, self-esteem, father or male guardian’s level of influence on postsecondary education, and mother or female guardian’s level of influence on postsecondary education.

These variables were analyzed for their suitability to be included in a discriminant model to test the hypothesis. According to Cohen (1983), when the amount of explained variance is 5% or higher in a regression equation when the power is .80 or greater, it is practically significant at the .05 level with an appropriate sample size. However, because the researcher was trying to maximize the number of cases classified correctly with a discriminant model, only variables with zero-order correlations of .20 or higher were to be used in the discriminant analysis. To be of practical importance in this study, variables needed to explain at least 4% of the variance in the dependent variable.

As shown in Table 3, two variables met the minimum cutoff of .20 for inclusion in the discriminant analysis. High school grade point average (r = -.25) and mother or female guardian's level of influence (r =.20) were negatively related to choosing a postsecondary education in agriculture. Former students who chose a postsecondary education in agriculture had lower high school high school grade point averages and their mother or female guardian had a lower influence on their decision to choose a postsecondary education in agriculture. As such, these variables were included in the discriminant analysis in order to test the hypothesis.

A stepwise discriminant analysis procedure was initially performed on the independent variables to determine if they discriminated between former students who chose or did not choose a postsecondary education in agriculture. No variables qualified for the stepwise analysis. As an alternative, the full-entry method was utilized. The discriminating power of the two variables was determined by Wilk's lambda. As shown in Table 4, high school grade point average and mother or female guardian's level of influence explained 9% of the variance. Using Cohen's (1983) rationale, this model explained an amount of variance that was of practical significance. Wilk's lambda indicated that the independent variables discriminated between former students and if they chose or did not choose a postsecondary education in agriculture. Thus, former students who chose a postsecondary education in agriculture had lower high school grade point averages and their mother or female guardian had less of an influence on their decision to choose a postsecondary education in agriculture.

Table 3. *Intercorrelations Among Independent and Dependent Variables for Former Students Who Chose or Did Not Choose Postsecondary Education in Agriculture (n = 88)*

Factors	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	X_9	X_{10}	Y_1
Gender (X_1)	--										
Race (X_2)	.04	--									
Father or Male Guardian's Level of Ed. (X_3)	.05	-.05	--								
Mother or Female Guardian's Level of Ed. (X_4)	.08	-.08	.36	--							
Father or Male Guardian's Occ. (X_5)	.04	.03	.43	.06	--						
Mother or Female Guardian's Occ. (X_6)	.13	-.14	.22	.34	.22	--					
High School Grade Point Average (X_7)	-.31	.12	.20	.04	.08	.21	--				
Self-Esteem (X_8)	-.12	-.28	-.06	.04	.17	-.08	.05	--			
Father or Male Guardian's Level of Inf. (X_9)	.14	-.08	.26	.28	-.01	.17	-.10	.15	--		
Mother or Female Guardian's Level of Inf. (X_{10})	.12	-.15	.05	.37	-.04	.19	-.10	.31	.65	--	
Agricultural Degree/Certificate (Y_1)	.03	-.13	-.16	.04	-.03	-.07	-.25	-.02	.03	.20	--

Code: Gender (0= Male, 1= Female); Race (0=African American, 1= Other); Agricultural Degree/Certificate (0= No, 1= Yes); Father or Male Guardian's Level of Education (0= High School Diploma or less, 1= Technical Degree or more); Mother or Female Guardian's Level of Education (0= High School Diploma or less, 1= Technical Degree or more); Father or Male Guardian's Occupation (0= Blue Collar, 1= White Collar); Mother or Female Guardian's Occupation (0= Blue Collar, 1= White Collar); Agricultural Career (0= No, 1= Yes); Self-esteem, Father or Male Guardian's Level of Influence and Mother or Female Guardian's Level of Influence expressed as interval data; high school grade point average expressed as ordinal data..

Table 4. *Discriminant Analysis for Former Students Who Chose or Did Not Choose Postsecondary Education in Agriculture (n = 88)*

Function Derived	Eigen Value	Canon. R	Wilk's Lambda	Chi Square
Postsecondary Education in Ag.	.088	.29	.92	3.38

Variables Comprising Discriminant Function

Variable	Stand. Discrim. Coefficient
H.S. GPA	.581
Mother or Female Guardian Level of Influence	.894

The discriminant function accurately classified former students if they chose a career in agriculture 50% of the time. Also, the discriminant function accurately classified former students who did not choose a postsecondary education in agriculture 73% of the time (Table 5). Thus, the overall classification accuracy of the function was 67% which is better than what could be expected by chance (50% accuracy).

Table 5. *Results of Predicting Group Membership Based on Discriminating Variables*

Actual Group (*N*)	Predicted Group Membership			
	Ag Career		No Ag Career	
	f	*%*	*f*	*%*
Ag Career	5	50.0	5	50.0
No Career	9	27.3	24	72.7

Note. Percent of cases classified correctly = 67.4%.

Conclusions

The following conclusions are based on the findings of the study.

This study identified several factors influencing students' decisions to choose or not choose a postsecondary education degree and/or certificate in agriculture. Of the former students who responded, 14 received a degree/certificate in agriculture. Furthermore, former students included in this study indicated several events or experiences such as an interest in agriculture, personal factors, and job opportunities most influencing their choice of a postsecondary education in agriculture.

The former students indicated parents and/or guardians as the individuals most influencing their decisions to pursue a postsecondary education although mother or female guardian had slightly more influence than the father or male guardian. Interestingly, friends had more influence on former students' decision to pursue postsecondary education than teachers, family members, agriculture teachers, and guidance counselors. Thus, for the former students in this study, it can be concluded that parents or guardians were the primary individuals influencing their decisions to pursue a postsecondary education although the mother or female guardian was the most influential. Further, based on the findings, it seems plausible to conclude that friends were just as influential as other selected individuals.

In general, there were several factors influencing students' decisions to choose or not choose postsecondary education in agriculture which supports the Social Learning Theory of Career Decision-Making. Furthermore, two variables, high school grade point average and mother or female guardian's level of influence, were identified as the most distinguishing factors in predicting if former students chose or did not choose a postsecondary degree and/or certificate in agriculture.

Recommendations

Based on the study's findings and conclusions, the following recommendations are made:

1. Urban agricultural education programs should develop student follow-up procedures to determine if their graduates are pursuing postsecondary education in agriculture. As a result, further insight could help identify reasons why students who graduated from urban agricultural education programs choose or do not choose postsecondary education degrees and/or certificates in agriculture.

2. With the goal of most agricultural education programs being to prepare students for entry into education and careers in agriculture, administrators and stakeholders of urban agricultural education programs should design strategies to increase the number of their students choosing to pursue postsecondary education in agriculture. This is particularly significant with recent reports indicating that the future of agriculture will rely on a more diverse workforce.

Implications

Although the findings of this study are unique to one school, perhaps they have implications for other urban agricultural education programs. Given that former students indicated parents and/or guardians as the individuals most influencing their decisions to pursue a postsecondary education, more emphasis should be placed on involving them in the college choice process. For example, organizers of high school college recruitment events could arrange for various colleges of agriculture to talk with students and their parents and/or guardian about postsecondary education and opportunities in the agricultural sciences.

Additionally, given that former students indicated a lack of interest, other career interests, personal factors, other educational interests, and "other" events and experiences as the leading events and experiences why they did not choose postsecondary education in agriculture, perhaps administrators and agriculture teachers in urban agricultural education programs should ensure that they are providing a variety of learning experiences which may increase students' interest in postsecondary education in the agricultural sciences.

Recommendations for Future Research

1. Future research should replicate this study to examine whether the findings are valid for other urban agricultural education programs which would increase the generalizability.

2. Future studies should continue to test the propositions of the social learning theory to examine other factors that influence urban agricultural education students' postsecondary education enrollment behaviors.

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Influence of 4-H Program on Former 4-H Members' Career and Life Experiences

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Abstract

The overall purpose of this study was to ascertain the views of former 4-H members (alumni) relative to the influence of 4-H program on their career and later life experiences. Descriptive research design with a mail survey was used to collect data. Information on 4-H program activities, including leadership development, personal development, subject knowledge, community development, communications skills, influence of 4-H on later life experiences, comparison of 4-H with other youth organizations, and demographic characteristics were gathered. Of the 289 randomly selected 4-H alumni, 168 responded for a return rate of 58 percent. Findings indicated that participation in 4-H projects and activities and challenges and responsibilities experienced in 4-H contributed to leadership development, personal development, subject knowledge, development of communication skills, and community development. 4-H alumni even after leaving 4-H many years ago view their 4-H experiences as very positive. Experiences they had in 4-H continues to influence them in later life. Many alumni believe that 4-H is a superior organization and most helpful in teaching youth responsibility, subject knowledge, leadership skills, self-confidence and self-worth.

Introduction/Theoretical Framework

Four-H is one of the leading youth organizations across United States and Canada. 4-H is the most highly recognized of all Cooperative Extension programs (Van Horn, Flanagan, & Thomson, 1995). For over 102 years, 4-H has been helping young people ages 5-19, reach their fullest potential through learning new life skills, meeting new people, learning responsibility and building self-confidence. Participation in 4-H fosters knowledge acquisition, leadership and personal development, and citizenship through projects, activities, and programs (Asthroth and Haynes, 2002).

A number of studies have examined the impact of 4-H projects and activities on life skill development (Fox, Schroeder, and Lodl, 2003; Mead, Hirschl, Rodriguez, and Goggin, 2000; Collins and Associates, 1997; Boyd, Herring, and Briers, 1992; and Heinsohn and Cantrell, 1986). Findings from these studies indicated that 4-H members developed critical life skills such as decision making, leadership, communication, personal development and social skills.

Mead, Hirschl, Rodriguez, and Goggin (2000) conducted a study to see whether participation in 4-H a positive experience for youth and for their development. They found that participation in 4-H made a difference in the lives of New York state youth and contributed to their positive development. Mead et al, indicated that through 4-H participation: 1) youth expanded their communication, problem solving, and decision making abilities, 2) many youth went on to college and followed career paths based on their involvement in 4-H, 3) underachievers and less popular youth who joined 4-H found acceptance and subsequently expanded their self-esteem, 4) youth gained positive social growth and community involvement, 5) youth learned about others through 4-H community service projects, and 6) youth applied what they learned in 4-H in their daily lives. Mead, et al., concluded that the longer the participation in 4-H, greater is the ability to make healthy choices, resolve conflict, gain self-confidence, and assume leadership roles.

Boyd, Herring, and Briers (1992) found that participation in the 4-H program was positively related to perceived leadership life skill development. More interestingly, they found that as the level of 4-H participation increased, leadership and life skill development also increased. Similarly, Cantrell, Heinsohn, and Doebler (1989) indicated that 4-H activities and events were major factors in promoting life skill development of youth. Zeldin, McDaniel, Topitzes, and Clavert (2000) found that involving youth in decision-making resulted in positive benefits. They concluded that involving youth at all levels of decision-making would most likely achieve positive outcomes.

Other researchers have examined the impact of 4-H on former members (alumni). Ladewig and Thomas (1987) in their national study of former 4-H members found that 4-H alumni were more satisfied with 4-H's contribution to their personal development (e.g., development of self-worth, responsibility development and goal setting). Additionally, Ladewig and Thomas found that years of participation, entry age, and gender contributed to life skills of 4-H alumni. The challenges and responsibilities learned in 4-H had the most significant positive impact on achieved level of schooling and grades. However, they concluded that, despite all the positive aspects derived from 4-H participation, much of the 4-H experiences were not translated into corresponding levels of adult activity.

Collins and Associates (1997) studied the impacts of 4-H programs on members, families and alumni in Canada. They examined issues such as benefits of 4-H participation in terms of: 1) promoting leadership development, subject knowledge, decision making, communication, teamwork, health and safety, community awareness, citizenship, and agricultural awareness; and 2) influence of 4-H participation on later life experiences such as post-secondary education, career selection, farming or home economic practices, and participation in community affairs as an adult. Findings revealed that 4-H experience was beneficial (83%), helped in leadership development, teamwork and communication skills (82%), taught youth to face challenges and take responsibility (78%), helped youth develop subject knowledge (73%), decision-making and management skills (72%). Thinking back on 4-H, 84% of alumni indicated that participation in 4-H kept them busy and out of trouble, and parents and families benefited from children's membership in 4-H.

In 2003, a follow-up to the 1997 study was conducted by the Canadian 4-H Council to determine alumni attitudes towards 4-H and impact of the 4-H program on their career and later life experiences. Overall, a majority (74%) of alumni felt experiences in the 4-H program contributed significantly to personal and career experiences later in their lives. Eighty-five percent said that they would recommend 4-H to young people, while 78% felt that the knowledge and skills gained in 4-H continue to benefit them in their adult lives.

In today's environment of complex problems, budget constraints, and expensive program alternatives, evidence is needed concerning "who benefited, by how much, and what difference does it make that individuals participated in 4-H (Ladewig and Thomas, 1987). Further, stakeholder demands for accountability and assessing impact of extension programs, especially 4-H programs are of critical importance as we address the challenges of the 21st century.

Purpose and Objectives

The major purpose of the study was to ascertain how 4-H experiences of past members has influenced or contributed to other experiences later in life. As a means of accomplishing this purpose, the following objectives were developed.

1. Determine demographic and 4-H program profile of 4-H alumni;

2. Determine contribution of 4-H experiences to leadership development, personal development, agriculture subject knowledge, communications skills, and community development;

3. Determine the influence of 4-H participation on later life and career experiences of 4-H alumni; and

4. Compare 4-H with other youth organizations in helping to learn skills such as leadership development, personal development, agriculture subject knowledge, communications skills and community development.

Methods and Procedures

Population and Sample

This study employed a descriptive research design. The population for the study included all 4-H alumni (N=1,297) listed in the 4-H Alumni Database maintained in the Department of Agricultural and Extension Education at Penn State. A random sample of 289 alumni was chosen for the study. This sample size reflects a 5% margin of error with a 5% risk of drawing a bad sample (Krejcie and Morgan, 1970).

Instrumentation

A questionnaire developed by the Canadian 4-H Council (2003) was modified and used to collect data for the study. Section one of the questionnaire consisted of information relative to 4-H participation, age at participation, number of years in 4-H, and county, club or officer position held. Section two contained 38 statements measuring contribution of 4-H experiences relative to leadership development, personal development, agriculture subject knowledge, communications skills and community development. These 38 statements were measured on a seven-point scale that ranged from 1 “no contribution” to 7 “great contribution.” Section three contained seven statements measuring 4-H experiences influencing career and later life experiences. The seven statements were measured on a scale that ranged from 1 “no influence” to 5 “critical influence.” Section four contained statements comparing 4-H program with other youth programs using three anchors, 1 “4-H most helpful,” 2 “other programs were most helpful,” and 3 “ programs about the same.” The final section consisted of items that elicited selected demographic characteristics (place of residence, level of education completed, county, gender, age, and employment status).

Validity and Reliability

A panel of five experts (two agricultural and extension education faculty, extension program leader for youth, children, and families, 4-H program coordinator, and a graduate assistant) judged the questionnaire for content and face validity. A pilot test was conducted using collegiate 4-H members to estimate the reliability. All the sections of the questionnaire had acceptable reliability (see Table 1). Cronbach’s alpha for the final study ranged from a low of 0.89 (Communication) to a high of .96 (Influence). Reliability estimates for both pilot and final studies are shown in Table 1.

Table 1. *Reliability Estimates for Pilot Study and Final Study*

Section	Number of Items	Cronbach's Alpha Pilot Study (N=11)	Combat's Alpha Final Study (n=168)
Leadership[a]	6	0.79	0.93
Personal Development[a]	12	0.72	0.92
Communication[a]	6	0.73	0.89
Agriculture[a]	9	0.96	0.95
Community Development[a]	5	0.84	0.94
Influence[b]	7	0.89	0.96
4-H Endorsement[c]	9	0.89	0.95

[a] scale 1 (no contribution) to 7 (great contribution)
[b] scale 1(no influence) to 5 (critical influence)
[c] scale 1 (strongly disagree) to 7 (strongly agree)

Data Collection and Analysis

The questionnaire was mailed to the sample on November 24, 2003. A follow-up letter and another copy of the questionnaire were mailed on December 14, 2003 to subjects who did not respond after three weeks. Again, a post card reminder was sent on December 20, 2003 to all subjects who had not responded to the two previous mailings. When the data collection period ended six weeks later on February 5, 2004, a total of 178 4-H alumni had responded (61%). Of these, 168 (58%) provided complete and useful data. As suggested by Miller and Smith (1983), subjects who responded the first four weeks of the data collection period (early) were compared with those who responded after the first four weeks (late). The103 early and 65 late respondents were not statistically significant (p>.05) on key variables (gender, age, number of 4-H projects completed, leadership development, personal development, subject knowledge, communications skills, community development, and influence) examined in the study.

The data provided by 168 4-H alumni was entered into a SPSS database. Reliability was assessed again and compared with the pilot study estimates (see Table 1). Descriptive statistics were used to analyze and summarize the data.

Results

Objective 1: Demographic and Program Profile

A majority of the 4-H alumni were female (74%), 23% had completed high school; 27% some college; 30% bachelor's, and 16% graduate degrees (masters and doctoral), and 3% professional degrees. The average age of alumni was 47.6 years with the youngest being 18 and the oldest 86 years. Almost (66%) lived on a farm or in rural, non-farm location, 12% in towns of 2,501-10,000 population, 9% under 2,500, 10% in cities with 10,000 or more, and 4% other. A little over one-half of the respondents (52%) indicated that they work full-time, 18% were retired, while 11% were self-employed. Four percent were full-time home-makers, 7% worked part-time, 1% unemployed, and 7% were employed in other occupations.

Regarding 4-H participation, 82% of alumni had joined 4-H before age 12. Alumni had participated in 4-H an average of 8.5 years. Seventy-nine percent had held officer position in

4-H. On average, alumni had completed 23 projects with a minimum of 3 and a maximum of 100 projects. Alumni had participated in a variety of 4-H projects: animal science (64%), leadership and personal development (60%), family and consumer science (34%), environmental education and earth sciences (31%), healthy lifestyles (28%), and communication and expressive arts, and citizenship and civic education (23% each).

Three out of every four 4-H alumni reported that they had to leave 4-H because of age limitations, while 25% left 4-H while they were still eligible to participate. Of the 25% who left 4-H, seven percent dropped out because 4-H no longer met their interests, 2% felt that 4-H was for younger kids, while 16% gave other reasons (moving to different location, family concerns, sports and extracurricular activities at school, sports, etc.)

Objective 2: Contribution of 4-H Experiences

On a seven-point scale (1 "no contribution" to 7 "great contribution"), alumni were asked to indicate the extent to which the experiences they had in 4-H contributed to leadership, development, personal development, subject knowledge, communications and community development. Means and standard deviations for these five experiences are presented in Tables 2 through 7.

Regarding leadership development, alumni felt that their 4-H experiences greatly contributed to developing group interaction skills (*M*=5.68, *SD*=1.32), acquiring leadership skills (*M*=5.61, *SD*=1.65), and decision making skills (*M*=5.60, *SD*=1.29). However, experiences such as business management, developing entrepreneurial skills, contributed "somewhat" to leadership development (Table 2).

Table 2. *Means and Standard Deviations for 4-H Experiences Contributing to Leadership Development*

Statement	***n***	***M****	***SD***
Developing entrepreneurial skills	162	4.59	1.84
Acquiring teamwork skills	163	5.58	1.40
Acquiring skills for leadership	163	5.61	1.65
Building leadership skills	163	5.58	1.67
Developing decision making skills	163	5.60	1.29
Building group interaction skills	164	5.68	1.32

*Mean computed on a scale 1(no contribution) to 7(great contribution)

4-H alumni indicated that the experiences they had in 4-H contributed "greatly" to developing personal pride in achievements and progress (*M*=6.19, *SD*=1.08), enjoying recreation, leisure, companionship and fun (*M*=6.00, *SD*=1.00), in developing self-esteem/self-confidence (*M*=5.96, *SD*=1.22), and setting and working to achieve personal goals. (*M*=5.81, *SD*=1.20). However, skills such as learning business management and techniques, and developing good nutritional practices, and learning money management contributed "somewhat" to their personal development (Table 3).

In the agriculture subject knowledge section, alumni indicated that 4-H experiences contributed "greatly" to they being good stewards of natural resources (*M*=5.13, *SD*=1.79), in promoting agricultural awareness (*M*=4.94, *SD*=1.97), and food safety awareness (*M*=4.60, *SD*=1.77). However, learning about transfer of technology in agriculture and comprehending and promoting environmental sustainability contributed “somewhat” to learning agriculture subject knowledge (Table 4).

Regarding communications skills, alumni indicated that developing a sense of personal responsibility (*M*=5.88, *SD*=1.22), acquiring interpersonal skills (*M*=5.05, *SD*=1.08), and interpersonal communication skills ((*M*=5.14, *SD*=1.67) contributed “greatly” to learning communications skills. Developing debating skills and technology skills contributed “somewhat” to learning communications skills (Table 5).

The experience of giving service to community (*M*=5.22, *SD*=1.75) and learning heritage appreciation and citizenship skills (*M*=4.83, *SD*=1.75) “greatly” contributed to community development. However, participating in other community development related activities such as rural renewal and rural economic development (*M*=3.94, *SD*=1.94) and learning how to strengthen rural communities (*M*=4.30, *SD*=1.86), “somewhat” contributed to learning community development (Table 6).

Table 3. *Means and Standard Deviations for 4-H Experiences Contributing to Personal Development*

Statement	***n***	***M****	***SD***
Developing problem solving skills	163	5.50	1.24
Learning skills for judging, evaluating, and assessing	163	5.59	1.60
Acquiring skills necessary for employment	163	5.19	1.60
Learning business management skills and techniques	163	4.60	1.61
Learning meeting management skills/democratic procedures	164	5.41	1.68
Learning money management	165	4.74	1.69
Developing self-esteem/self confidence	164	5.96	1.22
Developing personal pride in achievements and progress	165	6.19	1.08
Acquiring and developing good nutritional practices	164	4.68	1.70
Practicing good habits of health, fitness, and safety	164	4.89	1.60
Setting and working to achieve personal goals	165	5.81	1.20
Enjoying recreation, leisure, companionship, fun	164	6.00	1.14

*Mean computed on a scale 1(no contribution) to 7(great contribution)

Table 4. *Means and Standard Deviations for 4-H Experiences Contributing to Subject Knowledge*

Statement	***n***	***M****	***SD***
Promoting agricultural awareness to others	150	4.94	1.97
Being good stewards of natural resources	150	5.13	1.79
Recognizing and improving farm safety issues	149	4.43	2.05
Comprehending the agric-food industry	150	4.40	2.02
Awareness of food safety	154	4.60	1.77
Investigating possible careers in agriculture	149	4.29	2.08
Learning about technology transfer in agriculture	148	3.35	1.97
Learning agricultural production, processing & marketing	150	4.18	2.04
Comprehending & promoting environmental sustainability	149	3.94	1.90

*Mean computed on a scale 1(no contribution) to 7(great contribution)

Table 5. *Means and Standard Deviations for 4-H Experiences Contributing to Communication Skills*

Statement	***n***	***M****	***SD***
Developing debating skills	161	3.74	1.85
Acquiring interpersonal skills	160	5.05	1.58
Developing public speaking skills	162	4.68	2.04
Interpersonal communication-listening, speaking, talking	160	5.14	1.67
Developing technology skills	159	3.89	1.98
Developing a sense of personal responsibility	161	5.88	1.22

*Mean computed on a scale 1(no contribution) to 7(great contribution)

Table 6. *4-H Experiences Contributing to Community Development*

Statement	***n***	***M****	***SD***
Learning how to strengthen rural communities	152	4.30	1.86
Promoting growth and development of your community	152	4.39	1.83
Learning heritage appreciation and citizenship skills	152	4.83	1.75
Giving service to the community	154	5.22	1.75
Participating in rural renewal and rural economic development.	151	3.94	1.94

*Mean computed on a scale 1(no contribution) to 7(great contribution)

Objective 3: Influence of 4-H participation

4-H alumni were asked to indicate on a five-point scale (1 “no influence” to 5 “critical influence) the influence of 4-H participation on their career and later life experiences. Means and standard deviations for the seven statements are shown in Table 7. Almost all the statements had mean scores of four or above four, indicating “critical influence.” Alumni indicated that 4-H participation influenced them continue education to finish high school (M=4.56, SD=0.66), job/career selection (M=4.49, SD=0.68), and continuing education beyond high school (M=4.36, SD=0.91). Alumni also indicated that 4-H participation influenced them in preparing for leadership responsibilities (M=3.94, SD=1.00), and in helping family farming practices (M=3.93, SD=1.33). Finally, alumni indicated that 4-H was influential in choosing the community where they currently reside (M=4.27, SD=0.70).

Table 7. *Influence of 4-H Participation on Later Life and Career Experiences*

Statement	***n***	***M****	***SD***
Continuing your education to finish secondary/high school	165	4.56	0.66
Selection of job/career	166	4.49	0.68
Continuing your education beyond high school	160	4.36	0.91
Selecting university/college/vocational school	142	4.08	1.27
Preparing for assuming leadership responsibilities	162	3.96	1.00
Improving parents' or family farming practices	137	3.93	1.33
Choosing to live in the community where you now reside	167	4.27	0.70

*Mean computed on a scale 1(no influence) to 5 (critical influence)

Objective 4: Comparison of 4-H with Other Youth Organizations

Alumni were asked to indicate membership in other youth organizations while they were in 4-H. Of the 168 alumni who responded, 12 were not members of any other youth organizations while they were in 4-H. As a result, only 156 (168 minus 12) were included in the analysis to address objective 4. In addition to being 4-H members, alumni indicated that they were also members in other youth organizations such as boys and girl scouts, church groups, FFA, youth groups, YMCA, YWCA, Community Sports Clubs, and Young Farmers, etc., 4-H alumni were asked to indicate the youth program that was most helpful. As shown in Table 8, more than one-half of alumni indicated that 4-H was "most helpful" in learning agriculture (60%), leadership development (57%), responsibilities (61%), self-worth and self-confidence (55%), and communication skills (53%). However, alumni indicated that other youth programs and 4-H were more or less the same (44%) in learning cooperation and team work skills (Table 8).

Table 8. *Comparison of 4-H with Other Youth Organizations (n=156)*

Item	**Other Youth Programs Most Helpful**	**Programs About the Same**	**4-H Most Helpful**
Subject knowledge skills	9%	31%	60%
Leadership development skills	12	31	57
Learning responsibilities	9	30	61
Self-confidence and self-worth	6	39	55
Communication skills	7	40	53
Cooperation and teamwork skills	15	44	41

Further, as shown in Table 9, 4-H alumni were asked to indicate on a seven-point scale (1 "strongly disagree" to 7 "strongly agree") the extent to which they agree or disagree with the statements that reflect 4-H as a worthy organization. As shown in Table 9, alumni "strongly agreed" that knowledge and skills gained in 4-H continue to benefit them in their adult lives (M=6.39, SD=0.93). An overwhelming majority of alumni indicated that they would recommend 4-H to young people (M=6.53, SD=1.17), would recommend to adults to become 4-H leaders or volunteers (M=6.11, SD=1.22). Alumni also "agreed" that 4-H helped young people out of trouble better than other programs (M=5.34, SD=1.41). Alumni, however, "neutral" to the statement, 4-H had too little to offer youth in secondary or high school and 4-H program placed too much emphasis on 4-H competition/awards.

Table 9. *Overall Endorsement of 4-H*

Statement	***n***	***M****	***SD***
4-H kept young people busy and out of trouble better than other programs	145	5.34	1.41
4-H had too little to offer youth in secondary school or high school*	143	5.19	1.67
4-H program placed too much emphasis on competition/awards*	144	5.28	1.61
I would recommend 4-H membership and participation to young people	147	6.53	1.17
Parents and families benefited from their children's membership in 4-H	146	6.20	1.11
Activities beyond the 4-H club promoted 4-H participation	145	6.03	1.29
Awards program helped keep members active and participating in 4-H	146	5.56	1.40
Knowledge and skills gained in 4-H continue to benefit members in their adult lives	148	6.39	0.93
I would recommend to other adults that they become leaders or volunteers in 4-H	147	6.11	1.22

*Mean computed on a scale 1(strongly disagree) to 7(strongly agree)
** items were reverse coded

Conclusions and Recommendations

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

Overall, it appears that participation in 4-H projects and activities, the value of projects completed, and other experiences alumni had in 4-H contributed to leadership development, personal development, subject knowledge, development of communication skills, and community development. By participating in 4-H programs and activities, alumni believe that they learned many of the day-to-day skills, values, and responsibilities. 4-H alumni also learned the value of giving service to the community. These results support findings of earlier studies reported in the literature (Fox, Schroeder, and Lodl, 2003; Mead, Hirschl, Rodriguez, and Goggin, 2000; Collins and Associates, 1997; Boyd, Herring, and Briers, 1992; Ladewig and Thomas, 1987; and Heinsohn and Cantrell, 1986).

4-H alumni even after leaving 4-H many years ago view their 4-H experiences as very positive. It appears that the experiences they had in 4-H continues to influence them in later life. Alumni believe that the experiences, challenges and responsibilities learned in 4-H influenced them to continue education beyond high school and college. In addition, alumni believe that 4-H experiences helped them in making career choices and prepared them to assume leadership responsibilities. These results mirror findings of the Canadian 4-H Council (2003) and Ladewig and Thomas (1997) studies.

Many 4-H alumni believe that 4-H is a superior organization when compared to other youth organizations. Alumni view 4-H as the most helpful organization/program in teaching responsibility, subject knowledge, leadership skills, self-confidence and self-worth. This finding support the observations made by Sarver, Johnson, & Verma, 2000 who indicated that youth organizations, especially 4-H programs has worth, in that, they help prepare youth to be contributing members of society, provide family support, and satisfy developmental needs of youth.

An overwhelming majority of 4-H alumni either "agreed or strongly agreed" that 1) 4-H kept young people busy and out of trouble better than other youth programs, 2) they would recommend 4-H to young people, 3) parents and families benefited from children's membership in 4-H, and 4) knowledge and skills gained in 4-H continue to benefit members in adult life.

The following recommendations are made for programmatic improvements in 4-H and for further research.

The last decade has witnessed dramatic decline in 4-H enrollment in the United States and Pennsylvania is no exception. For example, 4-H enrollment in Pennsylvania declined from 104,000 in 2002-03 to 93,000 in 2003-04 (Radhakrishna, Everhart, & Sinasky, 2004). The findings of this study can be of immense value in increasing 4-H enrollment in the coming years. Extension educators, program leaders and administrators should capitalize on the positive assessment of 4-H by alumni and use this positive assessment of 4-H to advertise and market 4-H programs throughout the state.

Potential exists for using 4-H alumni as ambassadors in each county or region to market 4-H programs. What is needed is a strategy and a plan to identify 4-H alumni in each county and provide resources for them to attract youth and children to join 4-H. A one-page professionally done flier highlighting key findings from this study should be developed and disseminated to all stakeholder groups. Examples may include: bulletin board size posters depicting major highlights of the study should be developed and displayed in major agricultural and related events such as Farm Show, Ag Progress Days, in county offices, government offices and in other public places.

Periodic assessments of former 4-H members should be documented to determine changes that are taking place in the lives of former 4-H members. Results of such assessments will be of great value to improve future 4-H program offerings. In addition, results of such assessments should be examined on a regional/county basis so that programs specific to regions/counties are developed and delivered.

The findings of this study should be shared with extension educators in the counties, county extension directors, regional directors, extension administrators to make informed decision about the 4-H program and its future directions.

In a time when budget constraints, elimination of Extension programs and personnel facing Cooperative Extension, the impact and value of Extension programs, especially 4-H programs and activities should be documented. In addition, these impact results should be communicated to key stakeholders for better understanding of the differences that 4-H makes on young people that carry into adulthood.

Finally, a need exists to develop a common measuring tool to document the value and/or impact of 4-H programs on participants. Such a tool will help aggregate nationwide data and communicate the impact of 4-H programs on a national scale. An effort like this will help convince stakeholders to continue support 4-H programs nationwide. The National 4-H Council should take a lead in this important research effort that may contribute significantly to strengthen 4-H programs and adequately prepare us to address the challenges of the 21st century.

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Identifying Teaching and Learning In-Service Needs of Georgia Agriculture Teachers

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Abstract

The continuing trend toward increasing diversity of curriculum offered within secondary agricultural education programs is driving a change in pre-service and in-service training for agriculture teachers. This study looks at Georgia agriculture teachers' perceived importance of, and competence in, teaching and learning, and identifies their in-service needs. A range of competencies from teaching students problem-solving and decision making skills, motivating students to learn, teaching students to think critically and creatively, to assessing and evaluating student performance were evaluated. A revised version of Joerger's (2002) needs assessment instrument was used to gather data from existing Georgia agriculture teachers - this data was used to prioritize competencies where agriculture teachers need supplemental training. The findings of this study indicate that Georgia agriculture teachers' greatest needs for in-service training were in motivating students to learn, teaching students to think critically, managing student behavior problems, and teaching learning disabled students.

Introduction

Agricultural education in the United States has changed tremendously since the turn of the 20th century. In the early years of the 20th century technical institutes, trade schools, and agricultural high schools began to flourish as the need for a trained work force increased due to the growing industrial revolution in the United States (Finch & Crunkilton, 1999). According to Finch and Crunkilton (1999), quality of these early programs often did not extend beyond the concern of the individual instructor, thus resulting in an inconsistency in quality among programs across the country.

As the number of agricultural programs at the high school level increased, a movement by organizations such as the Association of Agriculture Colleges and Experiment Stations was formed to secure federal funding for these programs. The Smith-Hughes Act of 1917 set the stage for vocational education being separate and distinct from academic education (Finch & Crunkilton, 1999). The Smith-Hughes Act, Carl D. Perkins Vocational and Applied Technology Acts I and II, and more recent legislation supported the concept of providing students with a broad experiential base to prepare them for employment and higher education. Although the technology and pedagogical means of educating students in agricultural programs has radically changed during the last century, the basic mission is still witnessed in agricultural education departments and programs across the United States - educate individuals so they can be successful in the agriculture industry, and/or prepare them for higher forms of education.

With the radical change in agricultural education, comes the need to continually identify if teacher education programs at higher education institutions are truly meeting the needs of current and future agriculture educators. This study surveyed agriculture teachers in the state of Georgia to determine pre-service/in-service training needs for agriculture teacher competencies in teaching and learning skills associated with managing the “total program” of agricultural education. The ensuing paragraphs detail the findings of other researchers seeking to provide more effective pre-service and in-service training for agriculture teachers.

Theoretical Framework

As agricultural technology advances, agricultural education teachers are constantly challenged to introduce and demonstrate these new technologies to their students to better prepare them to enter the work force, while adhering to the aforementioned mission of agricultural education. In order to fulfill this mission, agricultural education teachers must continue to stay on the forefront of technology and pedagogy. To meet this demand, these teachers need annual in-service training opportunities from both educational institutions and industry. It is through in-service training that agricultural education teachers are able to expand their knowledge and improve their pedagogical skills so they are better able to serve their students and the community in which they teach.

In-service opportunities are often orchestrated by teacher educators and state agricultural education staff to meet the needs of the teachers (Barrick, Ladewig & Hedges, 1983). In more recent years, however, teacher educators have begun developing methods of identifying what agricultural education teachers perceive to be pertinent to their educational needs for the classroom, laboratory, and FFA (Joerger, 2002). Agricultural education teachers' needs vary depending on years of experience, highest degree held, leadership experience, and levels of pedagogical and technical knowledge (Dobbins & Camp, 2000; Garton & Chung, 1996; Joerger, 2002; Layfield & Dobbins, 2002; and Roberts & Dyer, 2002). Previous research has identified a cadre of instruction and curricula needs ranging from student behavior, motivating students to learn, working with special populations, and student evaluation, to implementing new curricula, developing adult programs, and planning fieldtrips (Dyer & Osborne, 1996; Elbert & Baggett, 2003; Layfield & Dobbins, 2002; Peiter, Terry & Cartmell, 2003; and Roberts & Dyer, 2002).

According to Layfield and Dobbins (2002), experienced teachers rated using computers in classroom teaching, preparing FFA degree applications, preparing proficiency award applications, using multimedia equipment in teaching, and teaching record-keeping skills as their top five in-service needs. Roberts and Dyer (2002) identified the following instruction and curricula needs of effective teachers: teaching leadership, motivating students, teaching in laboratory settings, changing curricula to meet changes in technology, and designing and modifying curriculum and course offerings to attract high quality students.

One proven method of identifying agricultural education pre-service and in-service needs assessments utilizes a descriptive survey based on the Borich Needs Assessment - 5-point Likert scale (Garton & Chung, 1996; Joerger, 2002; Layfield & Dobbins, 2002). Most researchers use a modified version of the Borich Needs Assessment Model to evaluate the "perceived level of importance" and "perceived level of competence" of teachers regarding professional competencies that were identified by previous research and related to the issues of their respective states. In 1997, Garton and Chung used a modified version of the Borich Needs Assessment Model and a quadrant analysis to survey the in-service needs of beginning agriculture teachers.

While Garton and Chung (1997) utilized a quadrant analysis, Edwards and Briers (1999) sought to compare the ranking of in-service needs as determined by direct assessment to a ranking based on a mean weighted discrepancy score (MWDS), i.e., the Borich model. Consequently, they determined that the discrepancy method, like the Borich Model or a version of it, is more effective than a direct assessment.

In 2002 Joerger modified the Borich Needs Assessment instrument and created a new instrument which was modeled after Garton's and Chung's (1996, 1997) research. The categories identified by Joerger - teaching and classroom management, leadership and SAEP development, technical agriculture, and program design and management - best represent the needed competencies associated with the total program philosophy of agricultural education. Joerger discovered the competencies presented in the survey were important for agriculture teaching success. Due to Edward's and Brier's findings that an assessment tool similar to the Borich model was more effective than direct assessment and Joerger's and Garton's and Chung's continuing revision and refining of the Borich Needs Assessment instrument, it was determined to be the best instrument to achieve the purpose and objectives of this study.

Purposes and Objectives

The purpose of this study was to determine Georgia agriculture teachers' perceived levels of importance and confidence as they relate to specific teaching and learning competencies, both for beginning and veteran teachers, and use that information to determine the pre-service and in-service needs of Georgia agriculture teachers. More specifically, the following objectives guided this study:

1. Identify demographic characteristics of middle and high school agricultural education teachers in Georgia;
2. Identify teachers' perceived level of importance of 12 teaching and learning competencies;
3. Identify teachers' perceived level of competence of 12 teaching and learning competencies; and
4. Determine in-service needs of Georgia agricultural education teachers in specific areas of teaching and learning.

Procedures

The population for the study included all middle and high school agricultural education teachers in Georgia ($N = 348$) employed during the 2004-2005 school year. The survey instrument was distributed and collected at the annual Georgia Vocational Agriculture Teachers Conference. A reminder was sent to the agriculture teacher listserv encouraging those who didn't complete the instrument at the close of the conference to return it at their earliest convenience or complete an on-line instrument. Hard copies were also distributed at regional agriculture teacher meetings. A total of 212 participants completed the instrument, resulting in a response rate of 61%.

The researcher compared early and late respondents to control non-response error (Miller & Smith, 1983). The 121 teachers who responded on or before August 15, 2004, were classified as early respondents; the 91 who responded after August 15, 2004, were classified as late respondents. A comparison of mean differences was calculated using a t-test on the 12 scaled questions between the two response groups. Results indicated no significant difference between the two response groups; therefore, it was concluded that the data represent the target population.

A modified version of the *Minnesota Beginning Agricultural Education Teacher In-service Programming Needs Assessment* (Joerger, 2002) was used to survey the teachers. This instrument is modeled after the 1996/1997 Garton and Chung instrument which was based on the Borich Needs Assessment Model (Borich, 1980). The instrument consisted of two sections: demographics and 12 scaled statements on teaching and learning. The instrument was deemed to have face and content validity by a panel of experts consisting of four University of Georgia faculty, two graduate students, three regional coordinators of agricultural education, and four agriculture teachers. Instrument reliability for the 12 scaled statements on teaching and learning was determined by calculating a Cronbach's alpha coefficient. The reliability was .88 and .90 for importance and competence, respectively.

The questions on the instrument were constructed with two Likert-type scales ranging from 1 to 5. The importance scale range was 5 = very important to 1 = not important. The competence scale range was 5 = very competent to 1 = not competent.

The Statistical Package for the Social Sciences (SPSS) 12.0™ was used to analyze the data. Means and standard deviations were calculated to determine which competencies teachers perceived to be of greatest and least importance. Means and standard deviations were also used to determine in which competencies teachers perceived to be most and least competent. In order to determine the prioritization of the competencies, a mean weighted discrepancy score (MWDS) was calculated as described by Joerger (2002):

> Calculations reflecting the design and specifications of the Borich Needs Assessment Model (Borich, 1980) were established for determining the prioritization of the in-service needs of beginning teachers using the procedure developed by Borick and described by Garton and Chung (1996, 1997). A discrepancy score was initially calculated for each teacher for each competency by subtracting the competency score from the importance score. A weighted score was then calculated by multiplying the discrepancy score by the mean importance rating for each competency. A mean weighted discrepancy score (MWDS) was calculated by taking the sum of the weighted discrepancy scores and dividing by the number of complete participant responses for competency. The individual and groupings of professional competencies were ranked from highest to lowest using the mean weighted discrepancy score (p.13).

Findings

Objective One: *Identify Demographic Characteristics of Georgia Agricultural Education Teachers*

As indicated in Table 1, 74.5% of the teachers were male. Twenty-eight percent of the teachers were 25-34 years of age; 27% were 45-54; and 24% were 35-44 years of age. Nearly 35% of the teachers reported having less than five years teaching experience; 17% 6-10 years; and 12% reported 11-15 and 21-25 years of teaching. Approximately 42% had obtained a bachelor degree; 36% reported having a master degree; 15% a specialist degree; and 5% had earned a doctorate.

Table 1. *Demographic Characteristics of Georgia Agricultural Education Teachers*

Characteristic	*n*	*P*
Gender		
Male	158	74.5
Female	54	25.5
Age		
Less than 25	29	13.7
25 to 34	60	28.3

35 to 44	51	24.1
45 to 54	58	27.4
55 to 64	16	7.5
More than 65	2	0.9
Teaching Experience		
Less than 5 years	74	34.9
6 to 10 years	36	17.0
11 to 15 years	26	12.3
16 to 20 years	20	9.4
21 to 25 years	26	12.3
26 to 30 years	25	11.8
More than 30 years	5	2.4
Highest Degree Earned		
Bachelor	90	42.5
Master	78	36.8
Specialist	32	15.1
Doctorate	12	5.7

Objective Two: Identify Teachers' Perceived Level of Importance for 12 Teaching and Learning Competencies

Agriculture teachers were asked to rate 12 statements using the following scale: Not Important (M = 1.0-1.49), Of Little Importance (M = 1.5-2.49), Somewhat Important (M = 2.5-3.49), Important (M = 3.5-4.49), and Very Important (M = 4.5-5.0). As reported in Table 2, teachers believed that motivating students to learn (M = 4.69), teaching students to think critically and creatively (M = 4.63), managing student behavior problems (M = 4.63), teaching students problem solving skills (M = 4.56), and organizing and supervising teaching labs (M = 4.56) were very important competencies. The remainder of the items, as perceived by the teachers, was deemed important.

Table 2. *Agriculture Teachers' Perceived Level of Importance*

Competency	*n*	*M*	*SD*
Motivating students to learn	210	4.69	.51
Teaching students to think critically and creatively	210	4.63	.54
Managing student behavior problems	210	4.63	.62
Teaching students problem-solving and decision making skills	210	4.56	.56
Organizing and supervising teaching laboratories	210	4.56	.57
Assessing and evaluating student performance	210	4.38	.65
Teaching learning disabled students	210	4.28	.80
Conducting parent/teacher conferences	210	4.27	.76
Planning and conducting student field trips	208	4.25	.64
Teaching using experiments	209	4.24	.72
Developing performance based assessment instruments	208	4.06	.84
Conducting an adult program	210	3.79	.95

Note. Scale: 1 = Not Important; 5 = Very Important.

Objective Three: Identify Teachers' Perceived Level of Competence for 12 Teaching and Learning Competencies

Agriculture teachers were asked to rate 12 statements using the following scale: Not Competent (*M* = 1.0-1.49), Little Competence (*M* = 1.5-2.49), Somewhat Competent (*M* = 2.5-3.49), Competent (*M* = 3.5-4.49), and Very Competent (*M* = 4.5-5.0). As indicated in Table 3, teachers believed that they were competent in all 12 competency areas. Planning and conducting fieldtrips was the highest rated competency (*M* = 4.05); while developing performance based assessment instruments and teaching learning disabled students were the lowest rated competencies (*M* = 3.47).

Table 3. *Agriculture Teachers' Perceived level of Competence*

Competency	*n*	*M*	*SD*
Planning and conducting student field trips	211	4.05	.76
Organizing and supervising teaching laboratories	211	3.94	.75
Teaching students problem-solving and decision making skills	211	3.91	.70
Managing student behavior problems	210	3.84	.77
Assessing and evaluating student performance	211	3.82	.71
Conducting parent/teacher conferences	211	3.80	.79
Motivating students to learn	210	3.71	.79
Teaching students to think critically and creatively	211	3.69	.73
Conducting an adult program	211	3.64	.89
Teaching using experiments	210	3.61	.83
Developing performance based assessment instruments	209	3.47	.83
Teaching learning disabled students	211	3.47	.88

Note. Scale: 1 = Not Competent; 5 = Very Competent.

Objective Four: Determine In-Service Needs of Georgia Agriculture Teachers in Specific Areas of Teaching and Learning

Table 4 reveals the four highest ranking in-service needs, as determined by the mean weighted discrepancy scores (MWDS) - motivating students to learn, teaching students to think critically and creatively, managing student behavior problems, and teaching learning disabled students. Planning and conducting fieldtrips, and conducting an adult program were the lowest ranked in-service needs as perceived by the teachers.

Table 4. *Mean Weighted Discrepancy Scores (MWDS) for Level of Importance and Level of Competence on Selected Teaching and Learning Competencies*

Competency	MWDS
Motivating students to learn	4.53
Teaching students to think critically and creatively	4.21
Managing student behavior problems	3.60
Teaching learning disabled students	3.32
Teaching students problem-solving and decision making skills	2.89
Organizing and supervising teaching laboratories	2.68
Teaching using experiments	2.56
Assessing and evaluating student performance	2.37
Developing performance based assessment instruments	2.28
Conducting parent/teacher conferences	1.93
Planning and conducting student field trips	.60
Conducting an adult program	.50

Conclusions

The purpose of this study was to determine Georgia agriculture teachers' perceived level of importance and competence for 12 teaching and learning competencies and the in-service needs associated with the 12 competencies. All 12 competencies, as perceived by the teachers, were either important or very important components of a total program. Teachers believed they were competent in performing 10 of the 12 teaching and learning competencies, and only somewhat competent in performing the following: developing performance based assessment instruments, and teaching learning disabled students. The teacher in-service needs were determined by the mean weighted discrepancy scores for each of the teaching and learning competencies.

The competency with the greatest need for in-service education, as perceived by the teachers, was motivating students to learn. This conclusion is supported with previous research by Garton & Chung (1996), Edwards & Briers (1999), Joerger (2002), Mundt & Conners (1999), Roberts and Dyer (2002). Managing student behavior problems was identified as the third most needed area of in-service education, again as perceived by the teachers. This result coincides with earlier research by Fritz & Miller (2003), Garton & Chung (1996), Joerger (2002), and

Mundt & Connors (1999). In addition, the findings of this study give further support to previous research (Elbert & Baggett, 2003; Garton & Chung, 1996) that identifies the need for in-service education for teachers working with special needs students. Lastly, the in-service needs of least importance, as perceived by the teachers, were those of conducting parent/teacher conferences, planning and conducting student fieldtrips, and conducting an adult program. Similar results were also reported in other studies (Edwards & Briers, 1999; Garton & Chung, 1996; Joerger, 2002; and Layfield & Dobbins, 2002).

Implications and Recommendations

The results of this study will assist Georgia faculty and administrators in evaluating pre-service agricultural education programs and the professional development opportunities currently offered by the Georgia Department of Agricultural Education. Recommendations are specific to, and appropriate for, agricultural education in Georgia - but other states may also benefit from the findings and suggestions.

According to the findings of this study and the results of similar studies, teacher in-service programs should focus on presenting multiple pedagogical tools for motivating students to learn and think critically at various academic levels and abilities. These competencies should be addressed in university teacher preparation curricula in Georgia to meet the needs of pre-service teachers.

It is also recommended through this study that Georgia agricultural education faculty modify the current curricula to address the competencies in which the agriculture teachers didn't feel very competent (i.e., managing student behavior, assessing and evaluating student performance, and teaching students problem-solving and decision making skills). Finally, the researchers recommend that Georgia agricultural education faculty identify the in-service needs of beginning teachers in their first year of teaching. The data collected from the annual study could then be used to design the summer in-service educational programs in Georgia and other states.

Garton and Chung (1996, 1997) and Dormody and Torres (2002) recommended other states replicate their research by evaluating the in-service needs of beginning agriculture teachers as perceived by those teachers and state agricultural education staff. Current data related to this recommendation have been collected by Edwards and Briers (1999) in Texas; Joerger (2002) in Minnesota; Peiter, Terry & Cartmell (2003) in Oklahoma; and Layfield and Dobbins (2002) in South Carolina. As the number of states with timely and relevant needs assessment data increases, researchers should analyze data to identify national trends in agricultural education. Identifying trends will prove useful in determining the "direction" agricultural education is heading and will help leaders in agricultural education provide better pre-service and in-service training.

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Comparison Of Teacher Efficacy Of Traditionally And Alternatively Certified Agriculture Teachers

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Abstract

The shortage of qualified teachers in agricultural education has led to the hiring of uncertified teachers to fill vacancies. Many states have resorted to alternative certification routes to fill the need for teachers. In Florida, alternatively certified teachers represent over half of all new teachers in agricultural education. This situation has created uncertainty about the status of agricultural education in Florida and provided the motivation for this study. The purpose of this study was to describe traditionally and alternatively certified Florida agriculture teachers, compare their perceptions of teacher efficacy, and examine the relationship between teaching experience and teacher efficacy. Data analysis found that traditionally and alternatively certified teachers differed in age, education level, agricultural occupational experience, and gender and ethnic proportions. Comparison of teachers' self-efficacy found no notable difference between the two groups. Results also showed a low positive association existed between agriculture teaching experience and teacher efficacy. Suggestions for future research include the need for replication of the study with other beginning teachers, increased recruitment of underrepresented populations into teacher preparation programs, and investigation of the curriculum and teaching practices of traditionally and alternatively certified teachers as they may impact teachers' perceptions of efficacy and student achievement.

Introduction/Theoretical Framework

Agricultural education faces an ongoing shortage of qualified teachers to accept positions in the profession (Camp, Broyles, & Skelton, 2002). This dilemma is no more apparent than in Florida, where in 2002, 11 agricultural education students completed undergraduate requirements for certification and entered the teaching profession. In the meantime, the number of agricultural teaching openings grew to approximately 40 statewide (J. Dyer, personal communication, September 23, 2003). Due to this lack of sufficient university-prepared teacher candidates, school administrators hired uncertified teachers to fill vacancies that might otherwise go unfilled (Roberts & Dyer, 2003). Twenty percent of new vocational education teachers hired in Florida in 2001 were not certified in the field to which they were assigned to teach. This represents a significant increase from prior years as this percentage has nearly doubled in the past ten years (Florida Department of Education, 2002).

This situation has created uncertainty about the state of agricultural education in Florida, particularly in regard to uncertified teachers' abilities to effectively deliver curricula, supervise agricultural experience programs, and advise FFA leadership programs and events (McLean & Camp, 2000). Unfortunately, agricultural education is not unique in facing this challenge. The Florida Department of Education (2002) reported critical secondary teacher shortages existed in the subjects of mathematics, science, special education, English for speakers of other languages (ESOL), foreign language, and technology education/industrial arts.

To meet the demand for teachers, many states have resorted to alternative means of teacher certification in hopes of recruiting more teachers into the field. In 2005, 47 states and the District of Columbia reported having some type of alternative certification process for elementary and secondary teachers. These states reported a total of 122 certification routes other than traditional university teacher education programs exist in the United States (National Center for Education Information, 2005).

The influx of alternatively certified teachers entering the teaching profession has stimulated researchers to investigate possible implications, however these studies have yielded mixed results (Nakai & Turley, 2003). In their study of 3,000 beginning teachers, Darling-Hammond, Chung, and Frelow (2002) found that traditionally prepared teachers were more successful and more highly rated than teachers who entered teaching through alternative programs or without preparation. Furthermore, traditionally prepared teachers were found to be superior to alternatively prepared teachers in nearly every dimension of teaching, classroom management, curriculum and assessment development, use of teaching strategies, awareness of differing learning styles, and their knowledge of students. Ashton (1996) came to a similar conclusion finding that state certified teachers received higher supervisor ratings and had higher student achievement than those who did not meet state certification standards.

Conversely, Miller, McKenna, and McKenna (1998) concluded from their comparison of traditionally and alternatively certified teachers that after a three-year period, no distinguishable differences in observable teaching behaviors, student achievement, or self-perceived teacher competence were evident. In their examination of numerous teacher characteristics and student achievement studies, Wayne and Youngs (2003) found students learned more from teachers with certain characteristics; however results for teacher certification were inconclusive in all subjects except mathematics. Goldhaber and Brewer found that students whose teachers had a bachelor's degree in mathematics learned more than students whose teachers had bachelor's degrees in nonmathematical subjects (as cited by Wayne & Youngs, 2003).

Although studies such as the aforementioned have shown to be inconclusive in many fields of education, no such research is evident in agricultural education. Agricultural education is a unique field requiring various competencies not typical in other academic areas (Harper, Weiser, & Armstrong, 1990). The comprehensive agricultural education program includes experiential learning and leadership development components not found in any other discipline (Phipps & Osborne, 1988). These additional program components provide unique challenges for agriculture teachers. These added expectations make agriculture teachers different from any population studied in other disciplines.

Even with these additional expectations and responsibilities, effective agricultural teachers feel capable of handling the challenges associated with teaching agriculture and they cope easily with the changing situations in the classroom environment (Miller, Kahler, & Rheault, 1989). Furthermore, Miller and colleagues reported that effective agriculture teachers were found to be older than the average agriculture teacher and possessed more teaching experience.

Knobloch and Whittington (2002) found novice agriculture teachers who had teaching and student teaching experience were more confident than teachers with a lack of such experience. Similarly, in a 2003 analysis of the School and Staffing Survey (SASS) data, Ingersoll found that new teachers who had pedagogical preparation as well as more clinical practice before they began teaching were more likely to stay in teaching (as cited by Dow & Webb, 2003). Yet, Wilson, Floden, and Ferrini-Mundy (2001) reported that over twenty percent of new teachers in Florida had no student teaching experience, a component of preparation that most novice teachers rate as the most essential.

What effect, if any, does a lack of teacher training and experience have on a teacher's confidence and beliefs about their teaching abilities and effectiveness? The educational theorist, Albert Bandura, has conducted extensive research in this area related to social learning theory and self-efficacy. This study used Bandura's theory of teacher efficacy as its theoretical frame. The conceptual framework constructed in this study was based on the premise that teachers with higher levels of perceived teacher efficacy tend to be more motivated, effective, engaging, persistent, and remain in the profession longer than those with low levels of perceived teacher efficacy.

Teacher efficacy is defined as a self-perceived belief of one's capabilities to bring about desired outcomes, even with students who are unmotivated or present discipline problems (Bandura, 1977). Teacher efficacy has been found to be related to teacher behavior, effort, enthusiasm, innovation, planning, perseverance, resilience, willingness to work with difficult students, and their commitment to the teaching profession (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Teacher efficacy has implications on learning environment management as well. Teachers who believe strongly in their teaching efficacy tend to rely on persuasory means rather than authoritarian control, and to support development of students' intrinsic interest and academic self-directedness (Bandura, 1997). Miller et al. (1989) found motivated and confident teachers were more effective. Teacher efficacy has also been found to impact student performance. Students exhibited greater motivation, achieved more, and had a higher level of self-efficacy when their teacher possessed a higher level of teacher efficacy (Ashton & Webb, 1986; Guskey & Passaro, 1994).

Bandura (1997) also found that teachers' perceptions of the school environment and culture affected their beliefs about their ability to be effective in the classroom. Ashton and Webb (1986) found heavy workloads, bureaucratic practices, variable quality of leadership, insufficient resources and pay, lack of advancement opportunities, problematic students, and low occupational status are just some of the common problems faced by all educators. These challenging school conditions coupled with a lack of confidence may have detrimental effects on a teacher's perceived ability to be effective in the field and may led to the end of a struggling teacher's career. This loss of teaching professionals further compounds the teacher shortage and ultimately provided the impetus for this study.

Purpose/Objectives

The purpose of this study was to describe and compare traditionally and alternatively certified Florida agriculture teachers, and examine the relationship between teaching experience and teacher efficacy. To achieve this purpose, the study had three objectives:

1. To describe traditionally and alternatively certified teachers based on selected demographic characteristics and years of agriculture teaching experience.
2. To compare traditionally and alternatively certified teachers based on their perceptions of teacher efficacy.
3. To examine the relationship between years of agriculture teaching experience and level of perceived teacher efficacy for traditionally and alternatively certified teachers.

Procedures

This descriptive census study utilized a target population of agriculture teachers in their first five years of teaching agriculture (N = 122) in Florida. The accessible population was identified from the 2003-2004 Florida Agricultural Teachers Directory. This group of teachers was selected due to the high attrition rate, nearly 50%, during the first five years of teaching (Ingersoll, 2002). Furthermore, teachers with five years experience or less were selected based upon Miller's et al. (1998) findings that no significant differences in teaching behavior, student output, or attitude existed between traditionally and alternatively prepared teachers after three years in the profession.

The survey instrument was adapted from the Teachers' Sense of Efficacy Scale (TSES) developed by Tschannen-Moran and Woolfolk Hoy (2001) and demographical questions were added for additional analysis. The 12-item TSES asked respondents to rate their beliefs about how well they could perform in various teaching situations using a 5-point Likert-type scale. The scale ranged from "Not at All" (1 point) to "Excellent" (5 points). An expert panel was used to determine the instrument's face and content validity. The instrument was pilot tested with a sample of 10 agriculture teachers from California in their first five years of teaching. Post hoc reliability analysis of the pilot instrument resulted in a Cronbach's alpha of .90, which is equal to the estimate provided by Tschannen-Moran and Woolfolk Hoy (2001).

Data were collected by a mailed questionnaire using Dillman's (2000) tailored design method consisting of five contacts during the spring semester of the 2003-2004 school year. Completed questionnaires were received from 66 of the 122 teachers in the accessible population for a 54% response rate. Given the response rate, a comparison of the early to late responders was conducted to ensure that results were representative of the target population, as suggested by Lindner, Murphy, and Briers (2001), and Miller and Smith (1983). Results of the comparison yielded no notable differences between early and late responders on age, years of teaching agriculture, and summated mean scores on the TSES.

Descriptive statistics were used to analyze data for Objective 1. Categorical data were reported as frequencies and interval data were reported as means and standard deviations. Objective 2 was accomplished by calculating individuals' summated scores for the TSES (Clason & Dormody, 1994). Pearson's product moment coefficient of correlation (Ary, Jacobs, & Razavieh, 2002) was used in Objective 3 to indicate whether a relationship existed between years of teaching experience and teacher efficacy.

For the purposes of this study, a traditionally certified agriculture teacher was operationally defined as a teacher who qualified for certification by completing an undergraduate degree program in Agricultural Education. Teachers who earned their teaching certification through other means were considered to be alternatively certified (Roberts & Dyer, 2003).

Findings

Respondents consisted of 39 alternatively certified teachers and 27 traditionally certified teachers. Alternatively certified teachers were almost evenly split between males (51%) and females, while the traditionally certified teachers were nearly 67% female. As shown in Table 1, both groups were predominately Caucasian. However, alternatively certified teachers did represent a more ethnically diverse group with over 20% being African American, Hispanic/Latino, or other ethnicities. Traditionally certified teachers were nearly all Caucasian (96.3%) with only one respondent reporting Hispanic/Latino.

Table 1. *Ethnicity of Traditionally and Alternatively Certified Agriculture Teachers*

	Traditionally Certified		Alternatively Certified	
Ethnicity	*f*	%	*f*	%
African-American			2	5.1
Caucasian	26	96.3	31	79.5
Hispanic/Latino	1	3.7	4	10.3

Other			2	5.1
Total	27	100.0	39	100.0

On average, alternatively certified teachers were 10 years older than their traditionally certified counterparts (See Table 2). The mean age of traditionally certified teachers was 25 years versus 35 years for the alternatively certified group. Alternatively certified teachers also exhibited a greater range of age (22 to 59 years) compared to traditionally certified teachers who ranged from 22 to 37 years of age. Furthermore, results of the analysis showed greater variability of age in alternatively certified teachers (*SD* = 12.24) when compared to traditionally certified teachers (*SD* = 3.03).

Table 2. *Age of Traditionally and Alternatively Certified Agriculture Teachers*

	Age				
Certification	*n*	Min	Max	*M*	*SD*
Traditional	27	22	37	25.63	3.03
Alternative	39	22	59	35.46	12.24

In addition to being an older group of individuals, alternatively certified teachers possessed more advanced degrees than the traditionally certified teachers (See Table 3). Over 28% of the alternatively certified teachers had earned Master's or other advanced degrees. Conversely, only 15% of the traditionally certified group had received a Master's degree and no other advanced degrees were reported.

Table 3. *Educational Level of Traditionally and Alternatively Certified Agriculture Teachers*

Degree(s)	Traditionally Certified		Alternatively Certified	
	f	%	*f*	%
Bachelors	23	85.2	28	71.8
Masters	4	14.8	8	20.5
Other			3	7.7
Total	27	100.0	39	100.0

Since alternatively certified teachers were operationally defined as those who earned their bachelor's degree in a subject other than Agricultural Education, the respondents were asked to indicate their undergraduate majors. Table 4 shows that respondents earned degrees in 15 different academic areas. Over half of the alternatively certified teachers received degrees in one of the following three majors: Animal Science, Agricultural Business/Economics, and Environmental Horticulture. Approximately 28% of the alternatively certified teachers reported degrees in non-agricultural fields.

Table 4. *Bachelor's Degree Major of Traditionally and Alternatively Certified Agriculture Teachers*

Major(s)	*f*	%
Animal Science	11	28.2
Agricultural Business/Economics	7	18.0
Environmental Horticulture	4	10.3
Liberal Studies	2	5.1
Plant Science	2	5.1
Physical Education	2	5.1
Other agricultural majors[a]	2	5.1
Other non-agricultural majors[b]	7	18.0
No-response	2	5.1
Total	39	100.0

[a]Other agricultural majors include: Agricultural Communications and Agricultural Science
[b]Other non-agricultural majors include one respondent each in Engineering, Environmental Science, History, International Studies, Marketing, Medical Science, and Psychology

Table 5 shows differences in traditionally and alternatively certified teachers were also apparent in terms of their years of occupational experience in agriculture. The alternatively certified teachers averaged 7.6 years of agriculturally related experience while traditionally certified teachers had a mean of only one year. Alternatively certified teachers were also found to have a wider range of experience with 0 to 30 years, while traditionally certified teachers ranged from 0 to 7 years. Similar to the findings for age, alternatively certified teachers were found to have greater variability in their years of experience (*SD* = 8.7) in comparison to the traditionally certified group (*SD* = 1.9).

Table 5. *Years of Agriculturally Related Occupational Experience of Traditionally and Alternatively Certified Agriculture Teachers*

	Occupational Experience				
Certification	*n*	Min	Max	*M*	*SD*
Traditional	27	0	7	1.00	1.86
Alternative	39	0	30	7.63	8.69

An examination of the years of agriculture teaching experience of traditionally and alternatively certified respondents found minimal differences (See Table 6). First year teachers made up the largest proportion of teachers in both groups. Furthermore, approximately 59% of teachers in both groups were first and second year teachers with the remaining proportion being third, fourth, and fifth year teachers. Overall, fifth year teachers were the fewest in number.

Table 6. *Years of Agriculture Teaching Experience of Traditionally and Alternatively Certified Agriculture Teachers*

	Traditionally Certified		Alternatively Certified	
Year	*f*	%	*f*	%
First	12	44.4	15	38.5
Second	4	14.8	8	20.5
Third	6	22.2	8	20.5
Fourth	4	14.8	4	10.3
Fifth	1	3.7	4	10.3

To accomplish the second objective, the summated group means from the TSES (Tschannen-Moran & Woolfolk Hoy, 2001) were compared for traditionally and alternatively certified teachers. Analysis of the data showed there were no notable differences between these two groups (See Table 7). Traditionally certified teachers were found to have a summated mean score of 45.30, while alternatively certified teachers had a summated mean of 45.19. The two groups were found to differ in variance of summated scores with alternatively certified teachers again having greater variability (*SD* = 7.9) than traditionally certified teachers (*SD* = 4.3).

Table 7. *Perceived Teacher Efficacy of Traditionally and Alternatively Certified Agriculture Teachers*

Certification	Teacher Efficacy				
	n	Min[a]	Max[a]	*M*[a]	*SD*
Traditional	27	33	55	45.30	4.26
Alternative	39	29	60	45.19	7.89

[a]Summated score: 12 = lowest possible score … 60 = highest possible score

The final objective of the study was to determine if a relationship existed between years of agriculture teaching experience and perceived teacher efficacy. Results of the correlation matrix yielded a coefficient of .133 when all respondents were included in the analysis. When respondents were divided into their designated certification groups, a slight difference was found. The relationship between years of teaching experience and teacher efficacy was slightly higher for traditionally certified teachers (r = .224) than for the alternatively certified teachers (r = .105).

Conclusions

Based on the objectives and results of this study, several conclusions can be drawn. First, over half of the teachers in this study received their certification through alternative means. This proportion is much greater than the national average of 13% reported by Camp et al. (2001). These results were consistent with the findings of Roberts and Dyer (2003) who in a similar sample found that approximately half of the teachers in Florida were alternatively certified.

The first objective sought to describe traditionally and alternatively certified teachers in terms of their years of agriculture teaching experience and selected demographic characteristics. Alternatively and traditionally certified teachers were found to differ in the proportion of male and female teachers in each group. Teachers receiving their certification through traditional means were predominately female while alternatively certified teachers were nearly equal in gender numbers. Although both groups of teachers were primarily Caucasian, a greater number of minorities were observed in the alternatively certified group. When compared by their mean age, alternatively certified teachers were found to be 10 years older than their counterparts. The difference in age was also reflected in the years of occupational experience possessed by teachers. The younger group of traditionally certified teachers had little to no occupational experience in agriculture, while alternatively certified teachers brought an average of seven years of occupational experience into the classroom. The additional age and experience of the alternatively certified teachers may account for their higher than expected efficacy beliefs. The literature led the researchers to anticipate that the experience gained through a university teacher preparation program would have caused traditionally certified teachers to have greater self-efficacy than their counterparts who received no such training. This may be true, however it appears that the additional life and occupational experience of the alternatively certified group may have impacted their level of efficacy. This conclusion is consistent with Bandura's (1986) belief that learning experiences shape an individual's perceptions of self-efficacy.

Objective 2 compared traditionally and alternatively certified teachers' perceptions of self-efficacy related to teaching. Data analysis resulted in nearly equal summated mean scores for the two groups of teachers. Therefore, traditional and alternatively certified agriculture teachers were not distinguishable when compared on their perceived teacher efficacy. Alternatively certified teachers' lack of formal instruction in agricultural education, teaching methods, and pedagogy did not manifest into lower feelings of teacher efficacy. This leads to the conclusion that alternatively and traditionally certified teachers had similar beliefs in their ability to teach effectively.

The final objective examined years of agriculture teaching experience and teacher efficacy. The findings for both traditionally and alternatively certified teacher groups showed that these variables shared only a low positive association (Miller, 1998). This conclusion is contradictory to Miller et al. (1989) who found that effective teachers possessed more teaching experience, however the limited range of teaching experience of the population may have contributed to this finding.

Implications and Recommendations

Although no notable differences were revealed in teacher efficacy between traditionally and alternatively certified teachers, the results did show that both groups had high efficacy scores considering that nearly 80% of respondents were in their first three years of teaching. Over 50% of new teachers in Florida are alternatively certified and feel highly efficacious about their teaching. Since these teachers do not have a connection with the University of Florida's Agricultural Education faculty, this has strong implications for their participation in professional development activities. Do these alternatively certified teachers feel the need for further education and professional development specific to agricultural education? These findings necessitate future studies to determine whether other groups of beginning teachers are equally efficacious and to determine alternatively certified teachers' willingness and perceived need to participate in the professional development activities provided by university teacher educators.

Traditionally certified teachers tend to be younger and enter the profession with little practical agricultural experience. Conversely, the alternatively certified teachers are typically those who pursue agriculture teaching as a second career choice. The additional life, education, and occupational experience possessed by alternatively certified teachers may have provided them with greater confidence in their abilities to teach agriculture. This conclusion has implications not only for alternative certification programs, but also for traditional teacher preparation programs as well. The importance of advanced degrees and occupational experience should not be overlooked as they may contribute to the efficacy beliefs of all agriculture teachers and deserve the attention of researchers in future studies. Additionally, the age and experience differences found in this study also indicate the potential for an additional option within the University's teacher preparation program that would allow those who wish to pursue teaching as a second career to earn a Master's degree and teaching certification simultaneously.

The demographical differences between these two groups raised some interesting questions. For instance, why are more females choosing the traditional teacher preparation route than males? This appears to be a trend not only in teacher education programs but also in secondary agriculture programs as well. Additionally, why do minority teachers tend to enter agriculture teaching through alternative certification programs? The gender and ethnicity distribution results of this study indicate that more men and minorities are interested in teaching agriculture, but they are not attracted to the University's undergraduate program. Further research is needed to investigate preservice teacher recruitment efforts and how to encourage more men and minority students to enter the agriculture teacher preparation program.

Given that the comparison of teacher efficacy between traditionally and alternatively certified teachers didn't reveal any differences, one would assume that these two groups were equally confident in their teaching ability. However, given the inconclusive nature of the literature and the limited amount of research involving this population of teachers the researchers believe more studies are needed to understand the differences between these two groups of teachers. For instance, do traditionally and alternatively certified teachers have similar perceptions of their job responsibilities and expectations of performance? Roberts and Dyer (2003) stated that alternatively certified teachers might not recognize their own deficiencies since they received no formal training. Traditional teachers may look at their teaching performance more critically due to their pedagogical knowledge, while alternatively certified teachers base their feelings of efficacy on their subject matter knowledge and experience. Is it possible that these two groups of teachers have differing views of what is expected of them as agriculture teachers? This may be an indication of the type of curriculum being taught by alternatively certified teachers. Are they teaching the state approved curriculum or are they teaching what they know based on their experience? This warrants future studies to examine the teaching practices and curriculum delivered by alternatively certified teachers to determine what causes their high level of teacher efficacy and if they view their job expectations in a similar manner as traditionally certified teachers.

In this age of school accountability, people entering the agriculture teaching profession from industry must be prepared to teach the agricultural curriculum and the requisite math, science, and reading skills needed by all students. Without formal preparation in pedagogy, do alternatively certified teachers have the necessary teaching skills needed to do so effectively? This has serious implications for student performance at a time when all elective programs are under a magnifying glass. Future studies should investigate whether students of alternatively certified agriculture teachers perform as well as students of traditionally certified teachers on standardized assessments.

This study examined traditionally and alternatively certified agriculture teachers in Florida. Findings determined that these two groups had similar efficacy beliefs, but were different in terms of their age, educational level, and occupational experience. Recommendations for future research called for the replication of the study with other beginning teachers, increased recruitment of underrepresented populations into teacher preparation programs, and investigation of the curriculum being delivered and teaching practices used by traditionally and alternatively certified teachers as they may impact teachers' perceptions of efficacy and student achievement.

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Assessing Learning Styles and Preparation Techniques of Secondary Students Participating in the Texas FFA Nursery/Landscape Career Development Event

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Abstract

Studies in agricultural education have addressed learning styles of agriculture teachers, prospective teachers, and agriculture majors. This study's purpose was to examine relationships between learning styles of students and preparation techniques in FFA Career Development Events (CDEs). Data came from students in the Texas FFA Nursery/Landscape CDE (n=126), using the Ways of Knowing Learning Style Inventory. Most participants were white females aged 16-18. Trainings aids used (highest to lowest) were garden centers and greenhouses; videos and slides; websites, textbooks, and university living laboratory. Female students who used websites were more likely to use school computers; males used computers at both school and home. Most participants were Concrete Active learners, which agreed with other research. Males were three times more likely than females to be Abstract Reflective learners. Further, there were negligible relationships between the preferred learning styles and frequency of uses of the five training methods. So, teachers should allow students to experience new ideas as active participants in the learning process. Teachers can better prepare students by addressing students' learning styles and providing learning opportunities to complement learning styles. Learning styles of students should be considered as curriculum and online learning aids are developed.

Introduction

The importance of competition for secondary students as an extension of classroom and laboratory learning has long been a generally held tenet of agricultural education and the FFA. The model for Agricultural Science stressed the importance of classroom and laboratory instruction along with application through Supervised Agricultural Experience (SAE), incentives and FFA (Phipps & Osborne, 1988). This model emphasized individualized hands-on activities, along with real-to-life problem solving, leadership and citizenship, and career exploration within a community-oriented program. Students were expected to participate in Career Development Events (CDE) as a means to enhance learning.

This hands-on, problem-solving approach lends itself to the constructivist learning environment (Jacobsen, Eggen, & Kauchak, 2002). Constructivism promoted and facilitated an active role for students. Active learning activities included problem-solving, collaborative learning, experiential learning, and investigation, among others. Such activities create an environment of student autonomy and reflection.

Theoretical Framework

Whittington and Raven described learning style as “the predominant and preferred manner in which individuals take in, retain, process, and recall information” (1995, p. 10). Likewise, Pierson and Frost (1992) theorized that learning style was more than just the way in which an individual perceived information within a learning environment; it also dealt with the way in which an individual was able to process and use the information.

Agricultural educators have acknowledged that learning sequence was significantly valuable and that comprehending the manner in which individuals learn was at the heart of educational enhancement. Learning style was one facet researchers asserted shape student educational performance (Kolb, 1976; Dorsey & Pierson, 1984; Cano, Garton & Raven, 1992a; Cano, Garton & Raven, 1992b; Torres & Cano, 1994; Cano & Garton, 1994; Whittington & Raven 1995; and Garton, Thompson & Cano, 1997). Because learning styles impact how effectively individuals learn in certain circumstances, educators should be responsive to cognitive technique variations (Shih & Gamon, 2001). Additionally, researchers (Cano, Garton & Raven, 1992a; Cano, Garton & Raven, 1992b; Cano & Garton, 1994; Whittington & Raven, 1995) determined the diversity of learning styles of in-service agriculture science teachers and of pre-service agriculture science teachers.

Pierson and Frost (1992) provided the constitutive definitions of the four learning behaviors. Their work, drawing from the work of Kolb (1976), maintained that these learning behaviors are based on two ways of perceiving information—abstract or concrete—and two ways of processing information—active and reflective. Each of the four learning behaviors was explained by the characteristics of those learners who preferred that particular method of perceiving or processing the information (Pierson and Frost) as follows:

> Concreteness—Members of this category focus on the present, prefer to learn by specific real life examples, and enjoy feedback and discussions. They insist on

accepting things at face value and perceive best through the senses. They are oriented toward the immediate experience, have excellent powers of observation, are practical, and detail conscious.

Abstractness—Members of this category focus on the future and prefer to learn when content is broken down into its component parts and critically analyzed. They think for themselves in a logical manner. Additionally, they build concepts from small pieces of information and always have a rationale for their position. They are intuitive, perceive possibilities by way of insight or hunches, and sometimes overlook reality.

Activeness—Members of this category focus on the outer world and prefer to learn by practical application of content and are active participants in the learning process. They also like to try out new ideas to see if they work. Additionally, they learn best when there is a "doing" orientation to the learning activity. They are extraverted, rely on the environment for stimulation, sometimes impulsive, frank, open, and sociable.

Reflectiveness—Members of this category focus on the inner world and prefer to learn by observation of a phenomenon and try to avoid premature closure. They examine things with an unbiased viewpoint to produce purposeful insights. They are introverted, thoughtful, detached, focused on the world of ideas and concepts, and enjoy solitude. (taken from page 2 of "Ways of Knowing" instrument scoring instructions.)

In 2002, Texas had 1,460 agricultural science teachers with more than 100,000 students and 56,000 FFA members (Texas FFA, n.d.). Traditionally, secondary agriculture students competing in the Texas FFA Nursery/Landscape CDE were trained using live greenhouse plants, reference texts, amateur or professionally developed videos and slides, and previous contest materials. A new resource was created in 2002: a CDE preparation website. Research had suggested that university students and pre-service agricultural science teachers preferred different learning aids, based on individual learning style. It seemed reasonable to question whether secondary agriculture students with diverse learning styles would choose certain learning aids, based on their preferred learning style.

Purpose and Objectives

The purpose of this study was to determine if relationships existed between learning styles of secondary agricultural science students and preparation techniques in the Texas FFA Nursery/Landscape Career Development Event. As a means of accomplishing the purpose of the study, the following objectives were developed:

1. To determine demographic characteristics of students participating in the Texas FFA Nursery/Landscape Career Development Event.

2. To assess the learning styles (categorical) and learning behaviors (continuous scores) of students participating in the Texas FFA Nursery/Landscape Career Development Event based on the Ways of Knowing Learning Style Instrument.
3. To assess the extent to which selected training methods (e.g., garden centers/greenhouses, videos/slides, textbooks, university living laboratory, and a specific, university-developed website) were used by secondary students in preparing for the Texas FFA Nursery/Landscape Career Development Event.
4. To examine more fully the use of a website developed specifically for use in training for the Texas FFA Nursery/Landscape Career Development Event.
5. To determine if relationships existed between learning styles (categorical) and preparation methods for the Texas FFA Nursery/Landscape Career Development Event.
6. To determine if relationships existed between learning behaviors (continuous scores) and preparation methods for the Texas FFA Nursery/Landscape Career Development Event.

Methods/Procedures

Instrument. Michael J. Pierson and Christopher J. Frost developed the Ways of Knowing Learning Style Inventory (Pierson & Frost, 1992). The Ways of Knowing instrument was constructed to ascertain an individual's assessment of the way he/she learns. Learning attitudes were identified based on Kolb's (1976) four learning style categories and learning aptitudes. Figure 1 provided an overview of the categories. The inventory was a self-description instrument on which respondents ranked four words in nine different items, based on their perceptions of the primary way they learn. For the purposes of this study, the researchers gained permission from the creators to add a section to the instrument to elicit responses from respondents regarding selected demographic information and use of the website as a study aid. The developers of The Ways of Knowing Learning Style Inventory reported a reliability coefficient of 0.90 using the Kuder-Richardson formula (Dorsey & Pierson, 1984; Pierson & Frost, 1992); thus, the researchers did not re-examine the reliability of the instrument for this study.

<table>
<tr>
<td>Concrete Active (CA)

Left brain preference and emphasizes concreteness and activeness
Likes to do things and will take risks.
Works well with people
Becomes aware through the senses and is extroverted
Generally employed in business-related occupations
</td>
<td>Concrete Reflective (CR)

Right brain preference and emphasizes concreteness and reflectiveness
Likes to create and has great imaginative ability
People-oriented and emotional
Becomes aware through the senses and is introverted
Generally employed in service-related occupations
</td>
</tr>
<tr>
<td>Abstract Active (AA)

Left brain preference and emphasizes abstractness and activeness
Likes to make practical applications
Uses deductive reasoning to solve problems
Thing-oriented and not emotional
</td>
<td><u>Abstract Reflective (AR)</u>

Right brain preference and emphasizes abstractness and reflectiveness
Likes to create theoretical models
Uses inductive reasoning to solve problems
</td>
</tr>
</table>

• Becomes aware through intuition and is extroverted • Generally employed in technical-related occupations	• Theory-oriented • Becomes aware through intuition and is introverted • Generally employed in science-related occupations

Figure 1. Characteristics of learning style types (adapted from Pierson & Frost, 1992).

Method. Historically, students and teachers have used text materials (e.g., state-adopted textbooks), videos and slides available from the state's instructional materials service center, and greenhouses or garden centers available at the school or in the community. Often, however, especially in small, rural communities, neither greenhouses nor garden centers are available for training. So, the researchers developed two training aids that could be used in preparation for the CDE. One of the training aids was a living laboratory at Southwest Texas State University (now, Texas State University); this laboratory provided plant specimens often not available in local communities. Similarly, a website provided by the university at the URL http://ag.txstate.edu/cde/ (Poskey, 2002) was developed with a bank of questions similar to those on a cognitive exam used in the CDE and with pictures of actual plants used in the CDE. Also, pictures of actual landscapes were provided, complete with descriptions and evaluations of the features of the landscapes. A chat room allowed participants and coaches to ask questions of each other and of one of the researchers—a horticulturist involved technically in nursery/landscape instruction and CDEs. The URL for the website was emailed to teachers informing them of these resources.

Students were selected for this research project based on their participation in the Texas FFA Nursery/Landscape Career Development Event. The researchers provided the instrument to the respondents during a rotational "down" period of the CDE. During that time, voluntary completion of the instrument was requested, instructions were given, and confidentiality was assured. The data were analyzed using the Statistical Package for the Social Sciences (SPSS) for Windows Release 11.5 (SPSS, 2002). Statistical procedures included frequencies and percentages, cross tabulations and chi-square analysis, and correlation analysis.

Population and Sample. The Texas FFA Nursery/Landscape CDE was held in May 2002. The event was open to FFA chapters throughout the state. That is, the State FFA CDE was an open entry event; any team could compete at the state event without qualifying through a district or area elimination event. The Texas FFA Nursery/Landscape CDE followed the National FFA CDE rules and format. While the universe for the study was considered contestants in FFA Nursery/Landscape CDEs, the accessible population for this study consisted of all students competing in the 2002 Texas FFA Nursery/Landscape CDE in one southern state (n=126). All contestants voluntarily completed the survey for a 100% response rate. However, three instruments were determined to be unusable because the instruments were incomplete. So, the data sample consisted of 97.6% of the possible participants.

Results/Findings

Of the 123 respondents, 82 were female (67%) and 41 were male (33%). A profile depicting age and ethnicity of the participants is provided in Table 1. A larger percentage of the respondents were 17 years of age, with smaller but similar percentages of 15, 16, and 18 year olds. An overwhelming majority of respondents were White (84.6%), although Hispanic, African American/Black, Asian, and Native American/American Indian ethnicities were also reported (10.6%, 2.4%, 1.6%, and 0.8%, respectively).

Table 1. *Demographic Characteristics of Respondents by Gender*

	Female (*n* =82)		Male (*n* =41)		Total (*n* =123)	
	f	%	*f*	%	*f*	%
Age						
14	2	2.4	2	4.9	4	3.2
15	17	20.7	11	26.8	28	22.8
16	19	15.4	10	24.4	29	23.6
17	29	23.2	10	24.4	39	31.7
18	15	18.3	8	19.5	23	18.7
Ethnicity						
White	71	86.6	33	80.5	104	84.6
Hispanic	6	7.3	7	17.1	13	10.6
African American/Black	2	2.4	1	2.4	3	2.4
Asian	2	2.4	0	0.0	2	1.6
American Indian	1	1.2	0	0.0	1	0.8

The Concrete Active learning style was most prevalent for both female (47.6%) and male (36.6%) respondents (see Table 2). The second highest percentage of both females and males (36.6% and 34.1%, respectively) indicated a preference for the Abstract Active learning style. A vast majority of the respondents (79.7%) preferred to process information actively, while only 20.3% indicated they were more reflective in their processing style. More female respondents preferred perceiving information concretely than abstractly while a higher percentage of male respondents preferred to perceive information abstractly. Table 2 further delineated the respondents' preferred learning styles. In comparison of males and females, only the Abstract Reflective learning style exhibited a substantial difference in percentage of males (24.4%) and females (8.5%).

Table 2. *Cross-tabulation of Participant's Learning Style (Categorical) by Gender*

	Female (*n* =82)		Male (*n* =41)		Total (*n* =123)			
	f	%	*f*	%	*f*	%	χ^2	*p*
Learning Style								
Concrete Active (CA)	39	47.6	15	36.6	54	43.9	6.02	0.11
Concrete Reflective (CR)	6	7.3	2	4.9	8	6.5		
Abstract Active (AA)	30	36.6	14	34.1	44	35.8		
Abstract Reflective (AR)	7	8.5	10	24.4	17	13.8		

Participants were categorized into one of the four learning styles based on their responses to the Ways of Knowing Learning Style Inventory. The instrument was designed to measure learning preferences on four continua of behavioral categories of learning: abstractness, concreteness, activeness, and reflectiveness. Abstractness and concreteness refer to ways of perceiving information while activeness and reflectiveness refer to ways of processing information. Generally, individuals prefer to perceive information either abstractly or concretely and to process information either actively or reflectively, leading to identification of learning style. Data in Table 3 describe the results of the analysis of data from the Ways of Knowing Learning Style Inventory.

Table 3. *Description of Learning Behaviors (Continuous Scores) by Gender and Overall*

	Female (*n* =82)		Male (*n* =41)		Total (*n* =123)	
	M	*SD*	*M*	*SD*	*M*	*SD*
Learning Behavior						
Perception						
Concreteness	22.76	3.87	21.24	5.21	22.25	4.40
Abstractness	21.84	4.97	23.41	4.11	22.37	4.74
Processing						
Activeness	25.73	4.84	25.37	5.50	25.61	5.05
Reflectiveness	19.44	4.58	19.49	4.79	19.46	4.63

The correlation matrix (see Table 4) examining relationships between the four learning behaviors verifies the theory of Kolb (1976) and of Pierson and Frost (1992) that abstractness and concreteness are essentially “opposites” ($r = -0.65$) as are activeness and reflectiveness ($r = -0.67$). However, ways of perceiving are substantially independent of individuals’ ways of processing information.

Table 4. *Correlation Matrix of Learning Behaviors*

	Learning Behavior			
	Concreteness	Abstractness	Activeness	Reflectiveness
Learning Behavior				
Perception				
Concreteness	--	-0.65	0.06	-0.16
Abstractness		--	-0.38	0.01
Processing				
Activeness			--	-0.67
Reflectiveness				--

Next, learners were categorized by their preference for perceiving information and their preference for processing information. The resulting four categories are deemed learning styles—concrete active (CA), concrete reflective (CR), abstract active (AA), and abstract reflective (AR). The learning behaviors of participants categorized by their learning styles are summarized in Table 5.

Table 5. *Description of Learning Behaviors (Continuous Score) by Learning Styles (Categorical), N=123*

	Learning Styles							
	CA (*n* =54)		CR (*n* =8)		AA (*n* =44)		AR (*n* =17)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Learning Behavior								
Perception								
Concreteness	25.04	2.91	24.13	2.80	20.09	3.60	18.12	4.73
Abstractness	18.65	2.94	19.88	2.03	25.68	3.50	26.76	2.72
Processing								
Activeness	28.04	3.55	20.75	4.40	26.57	3.56	17.71	3.04
Reflectiveness	18.37	3.18	22.38	8.90	17.70	2.75	26.06	3.51

Data in Table 6 show that the most commonly used training method was a greenhouse or garden center, with almost 90% of the subjects reporting its use. Videos/slides (75.6%) and a CDE website (70.7%) ranked second and third, respectively. Textbooks were used as training aids by 52.8% of the subjects, while the least used was the university's living laboratory (30.1%). Males (46.3%) were more than twice as likely as females (22.0%) to use the university-provided living laboratory as a training method, while females (93.9%) were somewhat more likely than males (80.5%) to use a greenhouse or garden center.

Table 6. *Training Methods Used by Gender*

	Female (*n* =82)		Male (*n* =41)		Total (*n* =123)	
	f	%	*f*	%	*f*	%
Training Method						
Greenhouse/Garden Center	77	93.9[a]	33	80.5[a]	110	89.4[a]
Videos/Slides	64	78.0[a]	29	70.7[a]	93	75.6[a]
CDE Website	57	69.5[a]	30	73.2[a]	87	70.7[a]
Textbooks	44	53.7[a]	21	51.2[a]	65	52.8[a]
Univ. Living Laboratory	18	22.0[a]	19	46.3[a]	37	30.1[a]

[a] more than one training method could be selected.

In Table 7, data reveal that a larger percentage of females (30.5%) than males (26.8%) indicated they had not used a website in preparation for the CDE. However, a majority of both females and males (69.5% and 73.2%, respectively) reported using a website between one and ten times, while a small number (2.4% for each gender) indicated they had used a website more than ten times.

Table 7. *Frequency and Percentages of Website Use by Gender*

	Female (*n* =82)		Male (*n* =41)		Total (*n* =123)	
	f	%	*f*	%	*f*	%
Number of Uses						
0	25	30.5	11	26.8	36	29.3
1-3	29	35.4	16	39.0	45	36.6
4-6	18	22.0	10	24.4	28	22.8
7-10	8	9.7	3	7.4	11	8.9
> 10	2	2.4	1	2.4	3	2.4
Mean Number of Uses	3.17		3.2		3.18	

Respondents were asked to note the frequency and location for accessing a website in preparation for the CDE. Results are noted in Table 8. A greater percentage of females (15.8% and 50.9%) reported accessing the website from home only or school only (respectively), while a greater percentage of males (43.3%) reported access from a combination of home and school. Looking at female and male respondents together; almost half (49.4%) who used a website in preparation for the CDE accessed the website from their school, while only 13.8% accessed the website only from their home.

Table 8. *Website Access Locations by Gender, N=87*

	Female (*n* =57)		Male (*n* =30)		Total (*n* =87)	
	f	%	*f*	%	*f*	%
Location						
Home Only	9	15.8	3	10.0	12	13.8
School Only	29	50.9	14	46.7	43	49.4
Combination of Home & School	19	33.3	13	43.3	32	36.8

To ascertain whether differences existed between the training methods based on preferred learning style, the researchers examined frequencies and percentages of use of each training method by learning style. The results (Table 9) show that Greenhouse/Garden Centers were used by all four learning styles at approximately the same percentages—83-100%. Videos/slides were used by all of the "CR learners," and approximately three-fourths of those with other learning styles. The CDE website was used by most of the participants, with percentages varying slightly between concrete/active learners (63%) and abstract/active learners (79.5%). Textbooks were more often used by abstract/reflective learners (70.6%) than others (37.5-54.5%). Similarly, "AR learners" (58.8%) were more than twice as likely to use the university-provided living laboratory than were other kinds of learners (24.1-27.3%).

Table 9. *Analysis of Participant's Learning Styles (Categorical) by Training Methods Used*

	CA		CR		AA		AR		Total	
	f	%	*f*	%	*f*	%	*f*	%	*f*	%
Training Method										
Greenhouse/Garden Center	45	83.3	8	100.0	41	93.2	16	94.1	110	89.4
Videos/Slides	39	72.2	8	100.0	32	72.7	14	82.4	93	75.6
CDE Website	34	63.0	6	75.0	35	79.5	12	70.6	87	70.7
Textbooks	26	48.1	3	37.5	24	54.5	12	70.6	65	52.8
Univ. Living Laboratory	13	24.1	2	25.0	12	27.3	10	58.8	37	30.1

The analysis of the training method by learning style led the researchers to examine the data further. Each participant had a score for each of the means of perceiving information (concreteness and abstractness) and a score for each of the means of processing information (activeness and reflectiveness). Each of these four scores was correlated. with the frequencies each of the training methods used. Table 10 displays those data. Negligible (Davis, 1971) correlations existed for the use of any of the training methods by any of the learning behavior scores. All correlation coefficients were .15 or less (absolute value). That is, there is little indication that the use of any of the training methods was related to any of the learning behaviors.

Table 10. *Correlation of Learning Behaviors (Continuous Scores) and Training Methods Used*

	Greenhouse/ Garden Center		Videos/Slides		Website		Textbooks		Living Laboratory	
	r_s	p	r_s	p	r_s	p	r_s	p	r_s	p
Learning Behavior										
Perception										
Concreteness	-0.01	0.89	-0.05	0.57	0.07	0.43	0.12	0.18	-0.04	0.69
Abstractness	-0.14	0.13	0.01	0.90	-0.10	0.26	-0.06	0.53	-0.15	0.11
Processing										
Activeness	-0.01	0.91	-0.04	0.66	-0.02	0.81	-0.07	0.44	0.02	0.80
Reflectiveness	0.13	0.15	0.04	0.70	0.00	0.99	-0.08	0.40	0.12	0.19

Conclusions

1. An overwhelming majority of participants in the 2002 Texas FFA Nursery/Landscape CDE were female and 16 to 18 years old. Additionally, the ethnicity of an overwhelming majority of participants was white.
2. Regardless of gender, a higher percentage of students participating in the CDE were Concrete Active (CA) learners (43.9%), followed by Abstract Active (AA) (35.8%), then Abstract Reflective (AR) (13.8%), then Concrete Reflective (CR) (6.5%).
3. Because participants were almost equally divided between Concrete perceivers (50.4%) and Abstract perceivers (49.6%) categories, mean scores for concreteness (22.25) and abstractness (22.37) were almost identical.
4. On the other hand, there were considerably more Active processors (79.7%) than Reflective processors (20.3%); thus, the mean score for activeness was 25.61 while the mean score for reflectiveness was only 19.46.
5. Mean scores of females and males on concreteness (22.76 and 21.24) and abstractness (21.84 versus 23.41) differed slightly—with females scoring higher on concreteness and males scoring higher on abstractness.
6. The correlation between the two ways of perceiving information (-.65) suggest that "concreteness" and "abstractness" are almost polar opposites on a continuum.
7. Similarly, the correlation between the two ways of processing information (-.67) suggest that "activeness" and "reflectiveness are opposites.
8. Thus, CA-categorized learners score high on concreteness and activeness, CR learners score high on concreteness and reflectiveness, AA learners score high on abstractness and active, and AR learners score high on abstractness and reflectiveness.
9. The training methods used, in rank order were greenhouse/garden centers, videos/slides, websites, textbooks, and the living laboratory. This was true regardless of gender or learning style.
10. A majority of participants were using technology as a training aid, although most who used websites used them in a limited manner (three times or fewer).
11. Those females who used websites in preparation for the CDE generally used school computers only or home computers only, while the males accessing the website had a higher tendency than females to use computers both at school and at home.

12. Concrete-reflective learners tended to use videos and slides more so than other categories of learners; similarly, active-reflective learners were more likely to use textbooks and the university living laboratory than were others.
13. Finally, scores of learning behaviors were not substantially correlated to frequency of use of training methods.

Recommendations and Implications

Past research indicated agriculture students were more likely to be Concrete Active learners. This held true for the participants in this study. However, all four learner preferences were represented with "substantial" numbers. Thus, teachers and coaches should recognize the preferences and try to address those preferences. Agricultural education researchers have stressed the importance of addressing the way agriculture students perceive information (there were essentially equal numbers of concrete and abstract perceivers; however, it may be just as important to address the way in which agriculture students process information. Because an overwhelming majority of FFA members participating in the study were Active in the way they processed information, teachers and coaches should encourage students to try out new ideas as active participants in the learning process—while also recognizing that a small but "significant" proportion of participants process information reflectively.

As would be expected with Active perceivers, hands-on, actively oriented training methods such as visits to greenhouses and garden centers were an important aspect of preparation for the FFA Nursery/Landscape CDE. Agricultural Science teachers should seek out such opportunities as they train an FFA Nursery/Landscape CDE team.

As access to technology and use of technology becomes more prevalent in secondary schools, website tutorials will likely become a more important aspect of CDE preparation. Curriculum developers and university agriculture departments should consider the needs of students with different learning styles as more interactive tutorial websites are brought online.

Additional research is needed to determine the kinds of training aids that are most effective in preparing students and, perhaps, to determine how learning styles of students are related to performance in Career Development Events. These two findings, then, should be used to provide training aids and experiences so that all learning styles can experience success in FFA CDEs. Based on the findings from this study, the researchers plan to replicate the study with larger populations in other Career Development Events.

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Effects of Investigative Laboratory Instruction on Content Knowledge and Science Process Skill Achievement Across Learning Styles

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Abstract

The purpose of this study was to determine the effect of investigative laboratory integration on student content knowledge and science process skill achievement across learning styles. Treatment groups utilized one of three levels of treatment: subject matter approach without laboratory experimentation, subject matter approach with prescriptive laboratory experimentation, and subject matter approach with investigative laboratory experimentation. A nonequivalent control group quasi-experimental design was used. A purposively selected sample based upon the ability of the teacher to effectively deliver the treatments was selected from the population of students enrolled in an introductory agriscience course. Using regression analyses it was determined that learning style, teaching method, ethnicity, content knowledge pretest scores, and science process skill pretest scores accounted for 33% of the variance in content knowledge gain score. Learning style, gender, teaching method, science process skill pretest scores, and content knowledge pretest scores accounted for 36% of the variance in science process skill gain score. Students taught using the subject matter approach or the investigative laboratory approach were reported as having higher content knowledge and science process skill gain scores than students taught using the prescriptive laboratory approach.

Introduction

The idea that teaching is both an art and a science has become increasingly accepted by those in the education profession (Berliner, 1987). The practitioner of this somewhat paradoxical approach requires both preparation and practice to become a master at this craft. Within the field of agricultural education, an additional and somewhat contradictory dialogue is occurring. This discussion attempts to answer the question, “Is agricultural education vocational or academic?”

The answer to this question may be that agricultural education is both – vocational and academic. In its 1988 report, the National Research Council (NRC) called for curricular expansion in agricultural education, with greater inclusion of scientific subject matter into the traditional production agriculture curriculum. Whereas this expansion was not a call to completely abandon its vocational past, it was a call for the “teaching of science through agriculture” (p. 5).

The scientific literacy needs of individuals entering careers in agriculture are becoming increasingly important. Employees in today’s job market need to know how to learn, reason, think creatively, make decisions, and solve problems. Both science and agriscience education can contribute in an essential way to the development of these skills (National Academy of Science [NAS], 1996). Likewise, with the need for inclusion of science-based concepts into the agricultural education curriculum, new methods for teaching these materials need to be investigated. Science education literature tells us that shifting to an emphasis on active science learning requires a shift away from traditional teaching methods (NAS, 1996).

Theoretical/Conceptual Framework

The model proposed by Mitzel (Dunkin & Biddle, 1974) laid the foundation for evaluating teaching effectiveness and provided the theoretical framework for this study. Building upon the teaching effectiveness criteria suggested by Mitzel, the model identifies variables that affect the teaching-learning process and categorizes them into four groups: context variables, presage variables, process variables, and product variables. Context variables are those conditions to which the teacher must adjust. Context variables in this study are formative experiences (age, gender, socioeconomic status, etc.), student characteristics (ability, knowledge, attitudes, etc.), school and community characteristics (ethnic makeup, school size, climate, busing, etc.), and classroom variables (class size, textbooks, technology, etc.).

Presage variables are those characteristics of teachers that may affect the teaching and learning process, such as personal formative experiences, teacher training experiences, etc. Process variables are those activities that influence classroom teaching. They may consist of the classroom actions by both the teacher and the pupil. The final category, product variables, represents the outcomes of teaching and can be grouped into two categories: immediate pupil growth and long-term pupil effects. Examples of product variables include a change in learning, attitudes, skill development, or adult personality development (Dyer, 1995).

According to Bransford, Brown, and Cocking (2000), a major goal of teaching is to prepare students to be able to adapt knowledge to various problems and settings – and using multiple contexts. One of the most effective techniques employed by teachers is the use of laboratory activities (American Association for the Advancement of Science [AAAS], 1993). However, laboratory activities, as they are currently used, often fail to engage students in a "mental struggle," as suggested by Clough (2002). According to Clough, laboratory experiences need to be more than just an activity with a pre-determined outcome. They need to be true experiments, and not cookbook activities that stifle student thinking.

One means to engage students in the manner suggested by Clough (2002) is through the used of investigative activity integration. This is defined as the use of laboratory exercises in which the students develop the questions to investigate, procedures to follow, and means to report findings of their investigation. The classroom teacher provides guidance and advice, but does not inform students of expected outcomes prior to student completion of the exercise (Myers, 2004).

A review of research produced few studies that addressed the effect of investigative activity integration on student content knowledge achievement or science process skill development. Some studies were found that examined the training received by agriscience teachers to prepare them to integrate scientific concepts (Johnson, 1996; Thompson, 1998). However, the majority of studies in this area have examined only teacher attitudes and perceptions toward science integration (Balschweid & Thompson, 1999; Connors & Elliot, 1994; Layfield, Minor, & Waldvogel, 2001; Newman & Johnson, 1993; Thompson & Balschweid, 1999; Welton, Harbstreit, & Borchers, 1994).

A review of research on the use of teaching science principles in an agricultural context, and/or in teaching methods that involve active learning strategies, produced mixed results. Roegge and Russell (1990) reported significantly higher scores in applied biology and overall achievement by students who incorporated biological principles into agricultural instruction. Chiasson and Burnett (2001) found that agriscience students tended to earn higher scores than non-agriscience students. Mabie and Baker (1996) reported that participation in agriculturally-oriented experiential activities positively impacts the development of science process skills. Downing, Filer, and Chamberlain (1997) found a moderately positive correlation between the preservice teachers' competency levels of science process skill and attitudes toward science. Osborne (2000) reported very low science process skill scores, but higher science process skills and achievement scores for students who participated in prescriptive laboratories. Not all studies, however, reported positive results when using science related instruction. Germann (1989) reported that the use of a directed-inquiry approach had no significant effect on the learning of science process skills or on cognitive development. Osborne recommended that a study similar to his be completed and that the effects of learning style be investigated.

Little is known about the influence of learning styles on how students respond to laboratory activities. However, much of the reported learning styles research confirms that students enrolled in agriculture courses and/or colleges tend to be field-independent learners (Cano 1999; Cano & Garton, 1994; Marrison & Frick, 1994; Torres & Cano, 1995; Whittington & Raven, 1995).

One of the simplest and most extensively examined learning style instruments is the Group Embedded Figures Test (GEFT) (Witkin, Oltman, Raskin, & Karp, 1971). This instrument divides students into one of two categories: field-independent or field-dependent. Field-independent learners are more analytical in the way they perceive the world. These learners are able to provide structure and organize information on their own. This ability often leads to field-independent students requiring less teacher guidance in developing strategies to solve problems (Ronning, McCurdy, & Ballinger, 1984).

Individuals classified as field-dependent by the GEFT are normally more social in their nature. They have a global perception of the world which often leads to these individuals finding it more difficult to solve problems (Ronning et al., 1984). This is often a cause of field-dependent learners needing to have structure and organization provided for them by an external source. This could lead to students of this learning style requiring a more student-centered teaching approach and more direction on how to structure and solve agriscience problems.

Dyer and Osborne (1996) determined the learning styles of 258 students in 16 agricultural education classes in Illinois. In addition to the categories of field-dependent and field-independent identified by Witkin et al. (1971), Dyer (1995) identified a third category, field-neutral. This study found that students classified as field-neutral in their learning style had higher achievement scores when taught using the problem solving approach instead of the subject matter approach to teaching.

Research attempting to identify the most effective teaching methods to be used by teachers for science-based agriculture lessons has been, at best, inconclusive. Moreover, most research dealing with student content knowledge achievement in agricultural education has relied on descriptive and causal-comparative methods (Edwards, 2003). Slavin (2003) stated that more studies utilizing experimental designs are needed in this area.

This study sought to determine if integrating investigative laboratories in a manner that would encourage students to engage at a higher cognitive level, would significantly affect content knowledge achievement and science process skill proficiency level. If so, findings from this study could be utilized by agriculture teachers in middle and high school settings, as well as by teacher educators at colleges and universities.

Purpose and Objectives

The primary purpose of this study was to determine the effect of investigative laboratory integration on student content knowledge achievement and science process skill development across different learning styles. The following objectives guided this study.

1. Describe the learning styles and other demographic characteristics of participants in this study.
2. Describe the variance in content knowledge gain score attributed to learning styles and other demographic characteristics.
3. Describe the variance in science process skill gain score attributed to learning styles and other demographic characteristics.

For the purpose of statistical analysis, objectives were posed as null hypotheses. All hypotheses were tested at the .05 level of significance. The following null hypotheses were tested:

HO_1: There is no difference in the content knowledge gain scores of agricultural education students taught using the subject matter, prescriptive laboratory, or investigative laboratory approaches.

HO_2: There is no difference in the science process skill gain scores of agricultural education students taught using the subject matter, prescriptive laboratory, or investigative laboratory approach.

HO_3: There is no difference in the content knowledge gain scores of agricultural education students of various learning styles.

HO_4: There is no difference in the science process skill gain scores of agricultural education students of various learning styles.

HO_5: There is no difference in the content knowledge gain scores of agricultural education students of varying learning styles taught using the subject matter, prescriptive laboratory, or investigative laboratory approach.

HO_6: There is no difference in the science process skill gain scores of agricultural education students of varying learning styles taught using the subject matter, prescriptive laboratory, or investigative laboratory approach.

Procedures

This study utilized a quasi-experimental design, since random assignment of subjects to treatment groups was not possible. Intact groups were used and treatments were randomly assigned to groups. The three treatments used were: (1) subject matter instruction only with no laboratory activities, (2) instruction with prescribed laboratory activities in which activities are conceived and orchestrated by the instructor, and (3) instruction accompanied by investigative laboratories in which the student designs and conducts the laboratory experience. The study followed a variation of the nonequivalent control group design (Campbell & Stanley, 1963). Gall, Borg, and Gall (1996) state that the only essential features of this design are nonrandom assignment of subjects to groups and administration of a pretest and posttest to all groups.

The population for this study was students enrolled in an introductory agriscience course. A purposively selected sample based upon the ability of the teacher to effectively deliver the three teaching approach treatments was selected from the population. Each teacher was randomly assigned one of the three treatments. Ten schools within a state were selected to participate in this study. The factor of individual teaching ability of the teachers involved in the study was addressed by the use of a number of different teachers within each treatment. Furthermore, professional development in the form of personal and videotaped instructions and demonstrations was provided for each teacher as outlined by Boone (1988). All materials needed by the teacher to deliver the treatment (lesson plans [plant germination and plant functions], handouts, assessment instruments, etc.) were provided by the researcher. The subject matter to be taught remained the same among all three sets of instructional plans. The instructional plans were evaluated for content validity by a panel of experts from the state's land grant university and were deemed appropriate for delivery via all three treatments. Furthermore, teachers audio recorded each lesson in which the treatment was delivered. Audio tapes were analyzed to determine if the appropriate treatment was delivered. The treatment was delivered during the fall 2003 semester lasting 4 – 6 weeks in length.

Campbell and Stanley (1963) identify several threats to internal validity. The nonequivalent control group research design controls all of the threats except regression and interaction. Since none of the groups were selected via extreme scores of any kind, regression effects should not be a serious threat (Campbell & Stanley, 1963). The use of multiple classroom settings was use to reduce the risk of interaction. Also, using the covariates of content knowledge achievement pretest and science process skill pretest scores to statistically adjust the means on the posttest addressed this concern (Gall, Borg, & Gall, 1996).

A total of 501 students were enrolled in classes in the selected schools. No data were received from one participating school, and one teacher was determined, through a review of the audio tapes, to not have fully delivered the treatment. Students in these classes were removed from the study. Therefore, it was determined that 352 students received treatment that could be documented.

Parallel instruments were developed to collect pretest and posttest content knowledge achievement data. Response rates of 70.7% and 62.5%, respectively, were secured. Validity was established through review by an expert panel of college of agriculture faculty. Instruments were field tested using students not included in the study. Reliability was calculated using the Kuder-Richardson 20 formula, with a reported reliability coefficient of .92.

The Test of Integrated Process Skill (TIPS), developed by Dillashaw and Okey (1980), was used to assess the science process skill ability of students pre- and post-treatment. Parallel forms of this instrument were used to collect the data. A reliability of .72 was calculated KR-20. Response rates for pre- and post-treatment TIPS administration were 79.8% and 50.9%, respectively.

The Group Embedded Figures Test (Witkin, Oltman, Raskin, & Karp, 1971) was used to assess the student learning style. Usable data were collected with a response rate of 81.0%. Data concerning the variables of student ethnicity, gender, and other demographic information were reported to the researcher by the school's student services department from student records.

Findings

The first objective sought to describe the purposively selected sample of this study. A majority (62.7%) of students involved in this study were in the ninth grade, followed by the tenth grade (19.9%), eleventh grade (12.1%), and twelfth grade (5.3%). The majority of students in the study were male (66.5%) and "White, non-Hispanic" (56.0%), followed by "Hispanic" (34.5%), "Black" (7.9%) and "Other" (1.6%). The mean Group Embedded Figures Test (GEFT) score for respondents of this study was 7.6. Using GEFT scores, student learning style was classified using the following scale suggested by Dyer (1995): Field-dependent: 0-8; Field-neutral: 9-11; & Field-independent: 12-18. A majority of students (60.7%) were categorized as field-dependent in their learning style. Field-independent learners constituted the second largest group (23.2%) followed by field-neutral learners (16.1%).

Student content knowledge achievement was determined using the researcher developed content knowledge achievement pretest and posttest instruments. The maximum possible score on these parallel instruments was 50. The pretest mean was 16.39 (SD = 5.04), followed by a posttest mean of 20.59 (SD = 6.79). (See Table 1.) The mean content knowledge gain score was 3.93 (SD = 6.15).

Students' science process skill levels were determined using the TIPS instrument. The maximum score of this instrument is 36. The pretest mean was 15.57 (SD = 5.66) across all students. A posttest mean of 15.81 (SD = 6.66) was reported across all respondents. The mean science process gain score was -0.17 (SD = 6.33).

Table 1. *Instrument Scores by Treatment Group (n = 352)*

	Treatment Group							
	SM		PL		IL		Total	
Instrument	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Content Knowledge Pretest	18.09	5.07	15.98	4.93	15.47	4.86	16.39	5.04
Content Knowledge Posttest	24.63	5.93	18.30	6.00	20.53	7.16	20.59	6.79
Science Process Skills Pretest	16.17	5.38	16.39	5.58	14.01	5.73	15.57	5.66
Science Process Skills Posttest	18.62	6.17	14.34	6.66	15.59	6.07	15.81	6.66
Content Knowledge Gain Score[a]	6.27	4.84	1.72	6.36	5.04	5.89	3.93	6.15
Science Process Skill Gain Score[a]	2.02	5.19	-2.50	6.20	3.20	5.80	-0.17	6.33

Note. SM = Subject Matter; PL = Prescriptive Laboratory; IL = Investigative Laboratory
[a] Gain score = Posttest score minus pretest score

The second objective sought to describe the variance in content knowledge gain score attributed to leaning styles, ethnicity, and other demographic characteristics. A backward regression procedure produced a model consisting of field-dependent learning style (t = -2.35, p = .02), subject matter treatment group (t = 2.40, p = .02), prescriptive laboratory treatment group (t = -3.86, p <.001), ethnicity (t = 2.27, p = .02), science process skill pretest score (t = 5.07, p <.001), and content knowledge pretest score (t = -7.77, p <.001). This model accounted for 33% of the variance in content knowledge gain score (see Table 2).

Objective three sought to describe the variance in science process skill gain score attributed to leaning styles, ethnicity, and other demographic characteristics. A backward regression model consisting of field-dependent learning style (t = -3.01, p = .003), prescriptive laboratory group membership (t = -5.30, p <.001), gender (t = -2.52, p = .01), science process skill pretest score (t = -6.51, p <.001), and content knowledge pretest score (t = 2.38, p =.02) was identified and accounted for 36% of the variance in science process skill gain score (see Table 3).

Table 2. *Backward Regression Analysis to Predict Content Knowledge Gain Scores (n = 352)*

Variable	*B*	*SE*	*β*	*t*	*p*
Constant	9.42	2.04		4.62	<.001
Learning Style[a]	-2.25	.96	-.15	-2.35	.02
Treatment Group					
Subject Matter[b]	2.45	1.02	.18	2.34	.02
Prescriptive Laboratory[b]	-3.63	.94	-.29	-3.86	<.001
Ethnicity[c]	2.14	.94	.14	2.27	.02
Science Process Skill Pretest	.41	.08	.35	5.07	<.001
Content Knowledge Pretest	-.67	.09	-.54	-7.77	<.001

Note. $F_{(190)}$ = 16.71, p <.001; R^2 = .35; Adjusted R^2 = .33
[a] Coded as 1 = field-dependent; 0 = field-independent; [b] Coded as 1 = member of group; 0 = not a member of group; [c] Coded as 1 = white, non-Hispanic; 0 = minority

Table 3. *Backward Regression Analysis to Predict Science Process Skill Gain Scores (n = 352)*

Variable	*B*	*SE*	*β*	*t*	*p*
Constant	11.20	2.34		5.00	<.001
Learning Style[a]	-3.11	1.03	-.21	-3.01	.003
Treatment Group					
Prescriptive Laboratory[b]	-4.42	.83	-.35	-5.30	<.001
Science Process Skill Pretest	-.58	.09	-.49	-6.51	<.001
Content Knowledge Pretest	.22	.09	.18	2.38	.02
Gender[c]	-2.18	.87	-.16	-2.52	.01

Note: $F_{(157)}$ = 18.39, p <.001; R^2 = .38; Adjusted R^2 = .36
[a] Coded as 1 = field-dependent; 0 = field-independent; [b] Coded as 1 = member of group; 0 = not a member of group; [c] Coded as 1 = male; 0 = female

The first two null hypotheses of no difference in content knowledge gain scores and no difference in science process skill gain scores among the subject matter, prescriptive laboratory, or investigative laboratory treatment groups were tested using a MANCOVA procedure. Hotelling's Trace statistic for group effects on the dependent variables was .12, $F_{(4, 154)}$ = 2.34, p = .05, with an effect size of .06 and power level of .67. Follow up univariate analyses of covariance revealed significant differences between treatment groups in both content knowledge gain scores and science process skill gain scores. Therefore, both null hypotheses were rejected.

Null hypotheses three and four stating that no differences existed in either the content knowledge gain scores or the science process skill gain scores across learning styles was also tested using the MANCOVA procedure. Hotelling's Trace statistic for learning style effects on the dependent variables was .18, $F_{(4, 154)}$ = 3.37, p = .01. The effect size was .08 and the power was .84. Follow up univariate analysis of covariance failed to reveal significant differences across learning styles for either content knowledge gain scores or science process skill gain scores. The two null hypothesis failed to be rejected.

Null hypothesis five and six respectively stated that no differences existed in either the content knowledge gain scores or the science process skill gain scores across the learning styles of students taught using the subject matter, prescriptive laboratory, or investigative laboratory approach. Both hypotheses were tested using the MANCOVA procedure which produced a Hotelling's Trace statistic of .07, $F_{(8, 154)} = .65$, $p = .73$. The power was calculated at .29, with an effect size of .03. Since the multivariate analysis of covariance failed to reveal significant differences, the null hypotheses failed to be rejected.

Conclusions / Implications / Recommendations

Participants in this study were predominantly white, male, and enrolled in the ninth grade. The majority of students were field-dependent in their learning style. The finding that approximately 17% of the students in the study were upperclassmen (11^{th} and 12^{th} graders) was somewhat surprising due to the introductory nature of the course. However, since this course counts as a science credit toward graduation, these upperclassmen may be enrolling in this course merely to earn a science credit, rather than because of an interest in agriculture. Other possible explanations may be that, due to more strict graduation requirements or possibly school overcrowding, these upperclassmen were not able to enroll in this introductory course at an earlier date, or that these students perceive the agriscience course to be a less difficult science alternative. Further research is needed to understand the motivation of students enrolling in this type of agricultural education course.

Overall, posttest scores for students involved in the study were very low. Further investigation is needed to address why students achieved so poorly. It is of concern when a great deal of time is spent in teaching a unit of instruction and the result is a small amount of knowledge gain. The finding that students with less prior knowledge in the content area had higher content knowledge gain scores at the conclusion of instruction is contradictory to the findings of Roberts (2003) who reported the opposite in his study. However, students with greater science process skill achievement prior to instruction showed higher content knowledge gain.

Gender did not contribute significantly to explaining the variance in content knowledge achievement. However, learning style was found to play a role in knowledge gain. Students with a field-independent learning style were predicted to have more than double the content knowledge gain as compared to field-dependent learners when all other variables are controlled.

The regression equation predicted that white, non-Hispanic students would have content knowledge gain scores 2.14 times greater than that of minority students when all other variables are held constant. Further research is needed to better understand the cause of this gain discrepancy. Of particular interest is the effect of socioeconomic status of students on achievement. Are ethnicity and socioeconomic status coterminous as Abbot and Joirman (2001) suggest? If that is the case, what can educators do to mitigate the effect?

The regression equation predicts that female students are likely to attain 2.18 times the science process gain scores as compared to males, when all other variables are held constant. This contradicts the commonly held belief that females under-perform their male counterparts in science. However, it should be noted that agriculture often attracts females who tend to be field-independent in their learning style and therefore may not represent a normal distribution. Further research should be conducted to explain this large difference in gain between the genders.

The findings of this study suggest that students taught using either the subject matter approach or investigative laboratory approach to teaching had higher content knowledge gain scores than students taught using the prescriptive laboratory treatment level. This finding did not support the research conducted by Osborne (2000) involving similar secondary students.

Whereas it was reported by the teachers involved in this study that the investigative approach took a substantially longer period of time to implement than did the subject matter approach (1900 minutes, as compared to 1410 minutes, respectively), it would follow that most teachers would select the shorter time frame. However, upon investigation as to the level of cognitive ability at which content knowledge was assessed, the vast majority of questions on the assessment instruments addressed only the lower levels of Bloom's Taxonomy (Anderson & Krathwohl, 2001). The question remains as to how these teaching approaches affect student understanding at the higher levels of Bloom's Taxonomy. Further research is needed to assess this question. Whereas it is understood that knowledge at the lower levels is needed to form a strong foundation upon which to build, it is equally important to address knowledge and understanding at the higher levels.

The findings of this study suggest that students taught using the investigative laboratory approach or the subject matter approach to teaching had higher science process skill gain scores than students taught using the prescriptive laboratory treatment level. This finding did not support the research conducted by Osborne (2000) or Germann (1989) involving similar secondary students. In light of these conflicting findings, further research into the effect of teaching method on student science process skill development is warranted.

Student learning style was not found to have significant influence on science process skill gain score either alone or in interaction with level of treatment (teaching method). The mean GEFT score was 7.6, indicating that, in general, this group was strongly field-dependent. Dyer (1995) stated that field-dependent learners tend to work better in situations where structure is provided for them, such as in the subject mater and prescriptive laboratory methods. Field-independent learners on the other hand tend to prefer a hypothesis-testing approach to learning and are better able to provide their own structure in learning activities such as in the investigative laboratory approach. Therefore, it stands to reason that field-independent learners would enjoy and perhaps experience more success in classrooms in which the investigative approach was utilized. Further investigation into this phenomenon is suggested.

Whereas the variables addressed in this study were able to describe 33% and 36% of the variance in content knowledge and science process skill gain score, respectively, further research is needed to attempt to understand the unaccounted for variance. Research on the relationship between teaching methods, content knowledge, and science process skill achievement of high school students in agricultural education programs should continue. Other variables of interest are the effect of these teaching methods on student attitude as well as long and short term content knowledge retention. As a clinical study, this study should be replicated using procedures that allow a higher degree of randomization and ultimately more generalizability. As noted by Edwards (2003), the research base in agricultural education is dominated by descriptive type research. More research using experimental methods are needed to assist the profession in advancing in the area of agriscience achievement. Additionally, investigative activity integration focuses on student inquiry as a learning method. The *Standards* (National Academy of Science, 1996) state that inquiry is key to student understanding of science. However, the *Standards* do offer a caution, indicating that conducting hands-on activities does not guarantee inquiry nor are hands-on activities the only way in which students can engage in inquiry. What is key is that inquiry activities are conducted to answer authentic questions generated from student experience.

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Effects Of Lecture Versus Experiential Teaching Method On Cognitive Achievement, Retention, And Attitude Among High School Agriscience Students

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Abstract

This study compared the experiential teaching method with the lecture teaching method on student cognitive achievement on immediate and delayed posttests, and on student attitude toward the subject matter. Four high school agriscience classes from two schools in two different states participated. A pretest, posttest control group design with internal replication was utilized for two different researcher developed lesson plans, a soil erosion lesson and a lesson on enzymatic browning of fruit, in both experiential and lecture versions. Students within each class were randomly assigned to two groups. Group A received the hands on teaching method for lesson one while group B received the lecture method. For lesson two, the groups were reversed for teaching method. Across the two schools, the main effect of teaching method did not make a difference in student cognitive achievement, retention, or attitude. However, there was a significant interaction between teaching method and school on three of the four posttests of cognitive achievement and retention. This indicates that no single teaching method is necessarily more effective in all classes or subject matter areas, but argues for careful selection and use of a variety of teaching methods, based on the students, subject matter, and classroom situation.

Introduction / Theoretical Framework

Agricultural education in the public schools has persevered through years of social and technological change. Curriculum and teaching methods in agricultural education have mirrored these changes. Prior to the Smith-Hughes Act, agricultural education focused on scientific principles underlying agriculture and the application of experimental sciences such as chemistry and physics (True, 1929).

In the early 1900s the industrial revolution brought about social changes and technological advancements (Kliebard, 1995). To reflect this change, the social efficiency movement in education favored training students for a vocation by tracking them according to their socioeconomic status (Camp, 1982). The Smith-Hughes Act reflected many of these philosophies from the social efficiency proponents. The movement brought about changes in the agriculture classroom. Thus, many of the hands-on activities utilized in the classroom today foster the development of procedural and psychomotor skills as they relate to traditional agricultural occupations, instead of technical and scientific principles as agricultural education did originally (Johnson, Wardlow, & Franklin, 1997).

The trend in agricultural education curriculum once again reverted back to scientific experimentation in the 1980s. Advances in the agricultural sciences called for incorporating more scientific content, agribusiness, horticulture, landscaping, and natural resources into the agriculture curriculum (National Research Council, 1988). To parallel this, most teacher education programs now stress applied learning of the agricultural sciences and technologies (National Research Council, 1988).

The call for teaching agriculture to include experimentation of scientific concepts requires teaching methods that support hands-on activities. One such method is the experiential teaching method. This method is also referred to as the hands-on or problem-based teaching method. Historically, it is among the oldest of teaching methods and, because of this, is sometimes viewed as outdated (Hendricks, 1994). To counter this, proponents often turn to the experiential learning theory to support their advocacy of this method.

Mezirow (1994) and Freire (1970) asserted that experience and how it is critically reflected upon is the core of all learning. This assertion refutes the sole reliance upon lecture-based methods for instruction of agricultural sciences and technologies. David Kolb (1984), often credited with developing contemporary experiential learning theory, also added the stages of abstract conceptualization and active experimentation to Mezirow and Freire's theory.

Borzak (1981) reported that active experimentation allows students to take an active role in what is being learned and to take ownership of their education -- solving problems on their own. Additionally, Rogers and Frieberg (1994) indicated that self-initiated learning is the most lasting and pervasive, with "lasting" presumably referring to knowledge retention. Logic follows that teaching with experiential methods is conducive to knowledge retention. Students are more likely to remember what they did rather than what they heard or read. To further support this, a University of Oregon study found that students retain information better if they physically connect with the material and are more physically active in the classroom (Hancock & Wingert, 1996).

Another argument to support the use of the experiential teaching method is that it elevates students' cognition levels. Problem-based teaching approaches develop students' critical thinking abilities and therefore elevate the learner to a higher cognition level (Ngeow & Kong, 2001). The increased use of critical-thinking skills enhances a student's ability to obtain, retain, and retrieve knowledge (Halpern, 2003). Thus, experiential teaching may increase cognitive achievement and retention.

Previous studies comparing experiential teaching methods and lecture-based teaching methods have produced mixed results. A study conducted in Illinois agriculture programs found an increase in knowledge retention using a problem-solving method (Flowers & Osborne, 1988). However, a similar study reported that students instructed with the lecture method scored significantly higher than students instructed with a problem-based teaching method (Sundblad, Sigrell, Knutsson, & Lindkvist, 2002). A different study found no differences in student cognitive achievement on either immediate or delayed posttests, but did find that students who engaged in hands-on activities had significantly more positive attitudes toward the subject matter (Johnson, Wardlow, & Franklin, 1997). These mixed results indicate a need to further compare teaching methods to determine the effectiveness of the experiential teaching method versus the lecture method.

The literature is inconclusive regarding the effectiveness of the experiential teaching method on cognitive achievement compared with the lecture method. However, the literature does indicate that the experiential teaching method promotes a positive attitude toward the subject matter. In order to evaluate the two teaching methods in question, this study compared them in high school agriscience classrooms.

Purpose and Hypotheses

The purpose of this study was to compare the experiential teaching method with the lecture teaching method on student cognitive achievement on immediate and delayed posttests, and student attitude toward the subject matter. The following null hypotheses were developed and tested at the .10 alpha level:

> H_{o1}: There will be no significant differences in scores on either immediate or delayed posttests of cognitive achievement by school, teaching method, or the interaction of school and teaching method between students who have been taught a lesson on soil erosion using the experiential method of teaching and students who have been taught using the lecture method of teaching.
>
> H_{o2}: There will be no significant differences in attitude toward soil erosion by school, teaching method, or the interaction of school and teaching method between students who have been taught a lesson on soil erosion using the experiential method of teaching and students who have been taught using the lecture method of teaching.

H_{o3}: There will be no significant differences in scores on either immediate or delayed posttests of cognitive achievement by school, teaching method, or the interaction of school and teaching method between students who have been taught a lesson on enzymatic browning using the experiential method of teaching and students who have been taught using the lecture method of teaching.

H_{o4}: There will be no significant differences in attitude toward enzymatic browning by school, teaching method, or the interaction of school and teaching method between students who have been taught a lesson on soil erosion using the experiential method of teaching and students who have been taught using the lecture method of teaching.

Procedures

This study compared two instructional methods commonly used in agriscience and technology education on student cognitive achievement and student attitude toward the subject matter. Two versions of two different lesson plans were developed by the researcher: soil erosion and enzymatic browning of fruit. One version of each lesson plan utilized the lecture method of teaching while a second version of each plan utilized an experiential method of teaching. The technical content for each lesson plan, across both the lecture and experiential teaching methods, was based on the same educational objectives.

The target population for this study included all students enrolled in a high school introductory agriscience course within a 100-mile radius of Fayetteville, Arkansas. The accessible population was further limited. Only schools with at least two sections of the introductory course were considered for the study. In addition, because the pretest, instruction, and immediate posttest needed to be administered within a complete class period, only schools on 90-minute block scheduling were considered. Four classes from two schools in two different states were selected to participate. Since this was a convenience sample, results of this study may be limited to these schools.

A pretest, posttest control group design with internal replication was utilized for this experiment. According to Shutt (2001), randomization in such a design assumes equivalence of groups. Campbell and Stanley (1963) assert this design controls for all threats to internal validity. The design was slightly modified for this study by adding a delayed posttest and an internal replication.

All lesson plans and instruments related to the lesson plans were researcher developed. The researcher-made tests were based on the instructional objectives for each lesson. Pre-tests, immediate post-tests, and delayed post-tests for each of the different technical subjects served as the instruments for the study. These included both questions that required recall of knowledge and questions that utilized a performance-based assessment. These three tests were equivalent (testing over the same objectives for each lesson), but slightly revised from one another.

The pretest for both soil erosion and enzymatic browning consisted of ten multiple-choice items with four response choices, including an "I don't know" response to control for random guessing. The immediate posttest for the soil erosion lesson consisted of fifteen multiple-choice items that required students to recall factual information about soil erosion with five response choices, including an “I don’t know” response choice. The test also contained a mathematical problem to be solved. In addition, students had to compare two stream tables and determine which one displayed characteristics of a higher erosion rate. The delayed posttest had the same format as the immediate posttest, except the ordering of the first fifteen questions differed, different values for the math problem were used, and two different stream tables were compared.

The enzymatic browning immediate posttest had thirteen multiple-choice questions that required the recall of factual information with four response choices, including an “I don’t know” response choice. Students also had a problem-solving section where they had to choose the proper preservative and apply it to a piece of fruit utilizing the correct procedure. The delayed posttest had the same format except the ordering of the first thirteen questions varied and students were given a similar but different problem to solve.

The validity of each of these instruments was established prior to data collection. Face validity of the instruments was determined by comparing the individual questions to the instructional objectives of the lesson. The instrument had to measure each lesson objective. A panel of experts determined the instruments possessed content validity. The attitude instruments were a modified version of the “Attitude Toward Any School Subject Instrument” (Purdue Research Foundation, 1986). The instruments consisted of 5 Likert-type items (1 = strongly disagree; 5 = strongly agree) that measured student attitude toward soil erosion and enzymatic browning. Higher scores on the summated scale represented a more positive attitude.

A pilot test was conducted at a school similar to those in the main experiment to test the lesson plans and instruments. Selection for the pilot test school had the same two criteria that the selection for the schools in the study had: 1) have at least two sections of the introductory agriscience course and 2) class is conducted in 90-minute blocks.

Minor editing to improve clarity of the instruments was done based on the results of the pilot test. Cronbach’s alpha and KR-20 was used to establish the reliability of the instruments. The KR-20 reliability estimates for the soil erosion pretest, immediate posttest, and delayed posttest were .62, .60, and .63 respectively. The reliability estimates for the enzymatic browning pretest, immediate posttest, and delayed posttest were .55, .73, and .64 respectively. Cronbach’s alpha reliability estimate for the soil erosion attitude survey was .93 and the estimate for the enzymatic browning attitude survey was .94.

Students in the main experiment were randomly assigned to either the control group or treatment group by using the Researcher Randomizer (www.randomizer.org, 2003). Students in the control group received the soil erosion lesson via the lecture teaching method, while the treatment group received the soil erosion lecture via the experiential teaching method. For the enzymatic browning lesson, the original control group served as the treatment group, while the original treatment group served as the control group.

For both lessons taught, students were given a pretest to determine prior knowledge and establish equivalence of groups. To control for the potential effect of having different teachers, the researcher taught all lessons. To control for any potential effect of teacher bias for one method, the teacher strictly adhered to the written lesson plans. Upon completion of instruction, students were administered an immediate posttest to measure cognitive achievement. Two class periods following the instruction, meaning 4-6 days on block scheduling depending if a weekend fell in between class periods, a delayed posttest was administered to measure cognitive achievement for knowledge retention. Students completed the attitude surveys upon completion of their respective delayed posttests.

Findings

To analyze the results of the two pretests, 2 x 2 factorial ANOVAs were used. There were no significant differences in student's prior knowledge of soil erosion by school, F (1, 68) = 0.01, $p > .10$; by the teaching method group to which they were assigned, F (1, 68) = 0.68, $p > .10$; or by the interaction of school and teaching method group, F (1, 68) = 2.77, $p > .10$. In addition, there were no significant differences in student's prior knowledge of enzymatic browning by school, F (1, 72) = .039, $p > .10$; by teaching method group, F (1, 72) = 1.77, $p > .10$; or by the interaction of school and method group, F (1, 72) = 1.66, $p > .10$.

A 2 x 2 factorial MANOVA was utilized to test the first null hypothesis, differences in cognitive achievement on the soil erosion lessons (Table 1). The results indicated no significant difference for the main effect of school, Wilks' Lamda = 0.95, F (2, 68) = 1.67; $p > .10$; and no significant difference for the main effect of teaching method, Wilks' Lamda = 0.95, F (2, 68) = 1.67; $p > .10$. However, there was a significant interaction between school and teaching method, Wilks' Lamda = 0.70, F (2, 68) = 14.37, $p < .10$. The results of the MANOVA revealed the interaction occurred at both school A and B. As a result, the null hypothesis was rejected.

Table 1. *Summary of Results for Soil Erosion and Enzymatic Browning Experiments*

Experiment	Dependent Variable	Factors School (A or B)	 Method (Hands-on vs. Lecture)	 School by Method (Interaction)
Soil Erosion	Immediate post test	Not significant	Not significant	Significant School A: hands on > lecture School B: lecture > hands on
	Delayed post test	Not significant	Not significant	Significant School A: hands on > lecture School B: lecture > hands on
	Attitude	Significant B >A	Not significant	Not significant
Enzymatic Browning	Immediate post test	Not significant	Not significant	Significant School A: lecture > hands on School B: hands on > lecture
	Delayed post test	Significant A > B	Not significant	Significant School A: lecture > hands on
	Attitude	Not significant	Not significant	Not significant

To further analyze the interaction between school and teaching method, one-way ANOVAs on the immediate posttest and delayed posttest were used to determine the nature of the difference. There were no significant differences on either the immediate or delayed posttests for the main effects of school, $F\ (1, 68) = 0.43$, $p > .10$, or teaching method, $F\ (1, 68) = 0.04$, $p > .10$. However there was a significant interaction for school by teaching method on the immediate posttest, $F\ (1, 68) = 25.61$, $p < .10$, and the delayed posttest, $F\ (1, 68) = 20.55$, $p < .10$.

The LS Means procedure was used to compare immediate and delayed posttest scores by teaching method in each school. Within schools, students in school A receiving the experiential teaching method performed higher than the students receiving the lecture-method on the immediate, $F\ (1, 71) = 15.56$, $p < .10$, and delayed posttests, $F\ (1, 71) = 9.58$, $p < .10$. In school B, students receiving the lecture-method performed higher than the students receiving the experiential method on both the immediate, $F\ (1, 71) = 10.59$, $p < .10$, and delayed, $F\ (1, 71) = 10.98$, $p < .10$, posttests.

A 2 x 2 factorial ANOVA was used to test the second null hypothesis, attitude toward the subject matter for the soil erosion lessons. The results revealed a significant main effect for school, $F\ (1, 45) = 3.00$, $p < .10$. No difference in attitude by teaching method was found, F (1,

45) = 2.19, $p > .10$, nor was there a significant interaction between school and teaching method, F (1, 45) = 0.14, $p > .10$. The means and standard deviations indicated students at school B had a more positive attitude toward the subject matter, soil erosion.

Null hypothesis three, difference in cognitive achievement on the enzymatic browning lessons, was tested with a 2 x 2 factorial MANOVA. The results indicated there was no significant difference for the main effect of teaching method, Wilks' Lamda = 0.97, F (2, 71) = 0.94, $p > .10$. However, there was a significant difference for the main effect of school, Wilks' Lamda = 0.90, F (2, 71) = 3.93, $p < .10$. Also, there was a significant interaction between school and teaching method, Wilks' Lamda = 0.90, F (2, 71) = 4.00, $p < .10$. Due to these results, null hypothesis three was rejected. The results of the MANOVA also revealed there was a significant multivariate group effect only at school B.

One-way ANOVAs were utilized on both the immediate and delayed posttests to determine the nature of the interaction. The results indicated there were no significant main effects for school, F (1, 72) = 1.14, $p > .10$, or for teaching method, F (1, 72) = 0.30, $p > .10$ on the immediate posttest. However, there was a significant interaction for school by teaching method, F (1, 72) = 8.08, $p < .10$ on the immediate posttest.

The delayed posttest had a significant main effect for school, F (1, 72) = 5.40, $p < .10$. The results also revealed a significant interaction for teaching method by school, F (1, 72) = 6.15, $p < .10$. However, there was no significant main effect for teaching method, F (1, 72) = 0.06, $p > .10$.

The LS Means procedure was used to compare immediate and delayed posttest scores by teaching method in each school. Students in school A scored significantly higher than students in school B on the delayed posttest. Within each school, students receiving the lecture teaching method in school A performed significantly higher on the immediate, F (1, 72) = 3.03, $p < .10$, and delayed posttests, F (1, 72) = 4.23, $p < .10$ than the students receiving the hands-on teaching method. In school B, students receiving the hands-on teaching method performed higher than the students receiving the lecture teaching method on the immediate posttest F (1, 72) = 5.09, $p < .10$, yet did not score differently on the delayed posttest F = (1, 72) = 2.23, p > .10.

A 2 x 2 factorial ANOVA was used to test the fourth null hypothesis attitude toward the subject matter for the enzymatic browning lessons. The results indicated no significant difference in attitude by school, F (1, 56) = 0.36, $p > .10$. In addition, no difference in attitude by teaching method was found, F (1, 56) = 1.69, $p > .10$. Finally, there was no significant interaction between school and teaching method, F (1, 56) = 0.00, $p > .10$. The null hypothesis was retained.

Conclusions, Discussion, and Recommendations

For the students across the two schools used in this study, the main effect of teaching method did not make a difference in student cognitive achievement and retention. However, there was a significant interaction between teaching method and school for three of the four post tests of cognitive achievement and retention.

Therefore, these data indicate the lecture and experiential teaching methods affected student achievement differently within each of these two schools. Thus, it could be concluded that the effectiveness of the teaching methods by which students are taught, with regard to student cognitive achievement and retention, differs between schools.

In as much as teaching method appears to make a difference in student achievement, which method is most effective varies within and across schools and subject matter areas. There was no "best" teaching method across groups of students or different subject matter. The individual teachers are in the best position to determine the most effective teaching method for their particular group of students and their unique subject matter. This finding may even extend to groups of students within classes and change from one subject to the next. This makes a case for the use of a wide variety of methods in teaching all subjects.

Students at one school had a significantly more positive attitude for learning about soil erosion than students in the other school, but not based on the method by which they were taught. When investigating the school districts' agricultural base, it was found that this school district has large portions of row crop operations, whereas the other school district is largely pasture land. These students are more likely to have seen the consequences of soil erosion in the community, thus impacting their attitude toward learning about it. Teachers should be aware of the community's and students' interests and needs when implementing courses and developing lessons.

Further research is recommended to extend this study by including more schools, more classrooms, different agriscience classes, and different subject matter to determine if these results are generalizable. The length of any future study should be extended to an entire unit of instruction or even to a semester to determine if long-term use of lecture or experiential teaching method indicates an advantage to either method.

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Meaning as a Factor of Increasing Retention

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Abstract

Retention is important to teachers. The identification of factors that lead to improved retention has been sought after for years. One factor associated with improving retention is meaning. Education, as a whole, focuses on the importance of meaning; time and time again the latest educational area of inquiry, brain-based research, has noted the importance of meaning in the learning process. An investigation of retention from the factor of meaning is sought. In particular, meaning is viewed through the context of brain-based research. The purpose of this theoretical study was to develop a framework for understanding meaning, girded by brain-based research that has the target of improving retention. The conclusions apply the framework to a possible scenario as the implications and recommendations looks at how agricultural education should respond.

Introduction/Theoretical Framework

The importance of retention in the teaching and learning process is clear. Why teach something if the student is not going to retain it? Retention, itself, is associated with memory. In particular, retention is the process where long-term memory is able to accurately find data in the future, or find what has been learned in the future. This is in contrast to learning, which may not involve the futuristic or long-term component (Sousa, 2001). Just because it is once learned, does not necessarily mean it will be retained for later use. When teachers want information to be coded into the memory and want those memories to stay, then retention becomes a goal. Therefore, helping teachers find ways to improve retention becomes apparent.

For years, educators have focused on improving retention (learning) through the manipulation and/or study of factors such as clarity, organization, wait-time, praise, stimulation, and content, just to name a few (Cruickshank, 1990). One factor that has some attention in pedagogy textbooks (Newcomb, McCracken, Warmbrod, & Whittington, 2004; Phipps & Osborne, 1988) is the concept of meaning. In agricultural education, when what is being taught has meaning for the student, then the likelihood for retention is increased (Newcomb, et al., 2004). Agricultural education has several examples, program-wide, that allow for meaning to inherently occur. In particular, when students are given choices in the types of projects for their Supervised Agricultural Experience (SAE) program, what they are learning through SAE activities relates to them and their goals. That material then has meaning to that student and his or her life.

Brain-based literature has noted meaning as a factor of improving learning and retention (Caine, 2000; Caine & Caine, 1990; Caine & Caine, 1999; Caufield, Kidd, & Kocher, 2000; Hardiman, 2001; Jensen, 1998; Kruse, 1998; Reardon, 1998-99; Sousa, 1998; Weiss, 2000; Wolfe, 2001). In Figure 1, Cruiskshank (1990, p. 7) presents a basic model where variables influence teacher performance and student's learning. Selected variables, within this model, have been elaborated upon (as shown by the jutted boxes) with the words in bold reflecting the connection between retention and meaning, using brain-based research as a frame. The jutted boxes include content found in teacher training literature (Santrock, 1997; Hedges, 1995), but are not limited to that content therein. The dotted-line arrows indicate the hypothesized linkage between the variables. These proposed linkages are supported by Sousa's (1998) claim that, "Retention is also likely to be greater if teachers work harder at helping students find meaning (relevancy) in the learning" (p. 26).

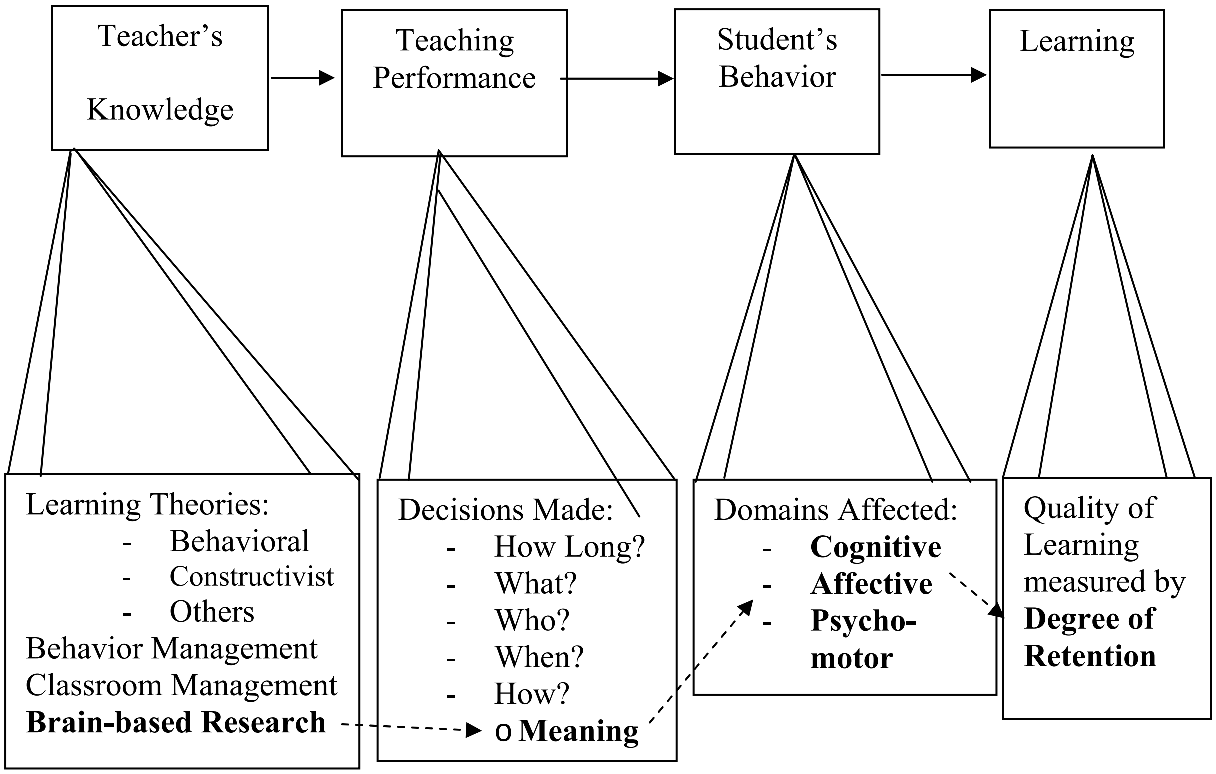

Figure 1. *Variables influencing teaching performance and children's learning in reference to retention and meaning (adapted from Cruickshank, 1990).*

Purposes/Objectives

The purpose of the study is to construct a framework that improves retention of learning through meaning. In particular, the framework is developed within the context of brain-based research. To fulfill this purpose, the following objectives were developed:

1. Describe meaning in and outside the context of brain-based research
2. Investigate current brain-based research theories and/or frameworks related to the improvement of retention by establishing meaning.
3. Develop a framework for instilling meaning, within the context of brain-based research.

Methods

In developing this manuscript, the authors reviewed literature related to brain-based learning and the construct meaning outside of and within the discipline of agricultural education. An initial model was constructed based upon reviewed literature. Upon completion, the model was scrutinized for logical downfalls based upon the literature. A new model was constructed and the process was repeated. The following sections are a result of the process of model construction and deconstruction. The end product was a model that encompasses what is known about meaning.

Support Material

Meaning

Newcomb, et al., (2004) identified meaning as a component of their *Principles of Teaching and Learning*. In particular, the subject matter the teacher is going to present must have meaning if the information is going to be learned "more rapidly" and "retained longer" (p. 27). In particular, the subject matter needs to have implications in a real-world setting and such implications should be clear and evident to the learner.

Although Phipps and Osborne (1988) do not refer to the term "meaning" within their chapters on effective teacher practices, the implied use is presented. Motivation is presented as a factor of good teaching. Furthermore, motivation is more than being interested in the topic; it is "an internalized desire to learn based upon perception of personal relevance and application" (p. 147). Therefore, meaning is presented in terms of how relevant the content is to the student and how he or she will use information now or in the future.

At the collegiate level, McKeachie (2002) suggests that university teachers link the content of the course with the interests of the students. When students are given the opportunity to link course content to aspects of their lives, motivation and cognitive effort is increased (Husman, Derryberry, & Crowson, 2002; cited in McKeachie, 2002). Examples of such links include using educational, personal, social and occupational goals and future and present interests (McKeachie, 2002).

Related, Hartlep and Forsyth (2000) investigated the effect of self-reference, or the practice of relating materials to one's personal life, on retention. Deductively, the investigators linked concepts that result in the premise that when material has meaning, the retrieval process is improved and therefore learning becomes more permanent. In this particular investigation, meaning was studied within the context of self-referencing. The results of the study support the notion that self-referencing (meaning) improved students' retention of materials presented via a textbook.

Brain-based Research

Weiss (2000) remarked that "educators are relying on brain-based learning theory" to explain the process of learning and teaching (p. 21). Although a relatively new area in education, one of the earliest pieces of literature addressing brain-based research is only a little over a decade old (Caine & Caine, 1990). In essence, brain-based research could be considered as a marriage of education and neurosciences. For close to a decade, brain-based research has allowed educators to use neuroscience to guide decisions in the classroom; decisions that match the operations of the brain. Given this, brain-based research gives educators a higher chance of success, through retention, in the classroom (Jensen, 1998).

Meaning in the Context of Brain-based Research

When information has meaning, or “fits into or adds to an existing network” of knowledge in the brain, the chances of long-term storage are much higher than if there were no meaning at all (Wolfe, 2001, p. 103). For the brain to begin to associate meaning to content, the learner must pay attention to whatever it is that should be learned and retained. This may seem a simple concept, but the mind is constantly bombarded with sensory input or information, such as room temperature, amount of light, what the skin is touching, and so on. The brain sorts out the relevant information and brings it to attention. For example, the brain will attend to the sensation of a hot oven over attending to the comfortable temperature of the room or ambient noises of the background. If the brain processed every single piece of sensory information, it would become overloaded and therefore one would find it difficult to attend to one specific sensory input at one time. This is why adding meaning to information is crucial for students; if students do not first pay attention to the learning environment, they cannot remember and/or retain the information being taught (Wolfe, 2001). By estimation, “99 percent of all sensory information is discarded almost immediately upon entering the brain” (p.79). If the learning environment is not set apart from other sensory inputs, such as noise distractions, then retention does not occur. Meaning begins with giving the learner a reason to attend to what is being taught.

Furthermore, students want to learn things that are meaningful (Jensen, 1998); the brain opposes or resists information that lacks meaning (Caine & Caine, 1990). Both Wolfe (2001) and Jensen (1998) describe the biology of the brain and how information having meaning causes a mechanism to release chemicals that can actually adjust the structure of the brain. Wolfe continued with this notion and takes a different approach in explaining this aspect by describing work by Ebbinghaus, which was done in the area of forgetting. In this research, a dramatic drop-off in syllable retention occurred when the material was not given meaning.

Types of meaning

Jensen (1998) refers to two types of meaning. Kosslyn (1992, p.228; cited in Jensen, 1998) referred to them as reference and sense meaning, while Caine and Caine (1994; cited in Jensen, 1998) provide the terms “surface” and “deeply felt” to the types of meaning, respectively. Reference meaning is a mere “dictionary definition” of a thought, idea, or thing (Jensen, 1998, p. 91). The meaning is surface and implies that a person knows what it is, however implications beyond its mere identification are not present. Sense meaning is deeper, which implies there is knowledge beyond what it is. Jensen (1998) referred to examples of sense meaning that include ways that involve emotional response and relevance to one’s life.

Examples of the two meaning types, sense and reference, can be applied to agricultural education settings. One may understand the function (dictionary definition) of a Supervised Agricultural Experience (SAE) program but SAE may be nothing more than a definition. This degree of meaning coincides with reference meaning. If a teacher introduced the benefits of SAE, discussed the impact of SAE, or provided ways to experience an SAE first hand, then the meaning becomes richer and depth is achieved. This coincides with sense meaning. From a practical standpoint, agriculture teachers may find themselves attempting to reach sense meaning with a student when attempting to require the participation in an SAE. These examples demonstrate meaning, but is there a way to improve meaning through what is known about the brain from research and practice?

The Development of the Theoretical Framework

Factors in Applying Meaning

In an attempt to achieve more depth to sense meaning, Jensen (1998) introduced three factors of meaning that, in essence, are sub-groups of sense meaning. Using the Jensen model, meaning can be accomplished through three factors. The first is through context and patterns, the second through relevance and the third through emotion. These three factors have explainable, biological connections to the brain (Jensen, 1998). Emotional connections occur through the release of neuro-chemicals in the brain; context, pattern, and relevance connections occur through what is known about how information is coded in the brain (Jensen, 1998; Wolfe, 2001). Figure 2 conceptualizes the idea of these three factors, which is slightly modified from Jensen's (1998) model. These slight modifications are in the style of this model; Figure 2 makes the same connections as the original model, it was simplified through the removal of the clipart.

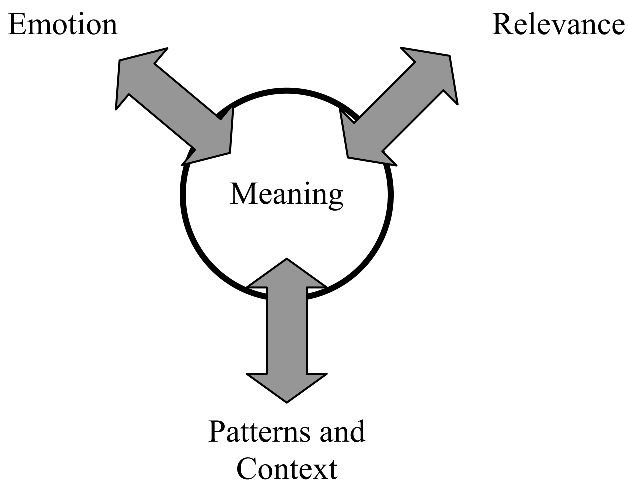

Figure 2. *The meaning model (modified from Jensen, 1998, p. 97).*

This model demonstrates the theoretical and bi-directional relationship between meaning and the three factors of patterns and context, relevance, and emotion. However, it should be noted that the model implies no relationship among the three factors. In a natural, non-systematic way, this model simply outlines the three routes that the brain can develop meaning.

Caine and Caine's (1990) twelve principles of brain-based learning lend support to this model for meaning (Figure 2). In particular, three of their principles relate to meaning and its importance. These principles reflect the support for the factors of patterns and context, and emotion. The following are Caine and Caine's (1990) principles:

- Principle Three: The search for meaning is innate.
- Principle Four: The search for meaning occurs through patterning.
- Principle Five: Emotions are critical to patterning.

In addition, Weiss (2000) stated that information would be meaningless if not for context, patterns and emotions.

Jensen (1998) connected meaning with emotion as a way of explaining why information with meaning is coded in the brain better. Responses such as fight-or-flight and stress can be traced to neurochemistry in which moments that involve high degrees of these processes stamp strong mental imprints into memory. Additionally, Wolfe (2001) connects biology with emotion and retention when noting the close proximity, and therefore quick reaction, of the thalamus and amygdala. Other brain-based literature stresses the importance of positively engaging emotion to improve learning and retention (Caine & Caine, 1990; Caufield, et al, 2000; Hardiman, 2001; Reardon, 1998-99; Sousa, 1998; Weiss, 2000)

Beyond emotion, another factor where meaning is made is relevance (Jensen, 1998). The biology of relevance seems simplistic enough. According to Jensen (1998), relevance happens on a cellular level. If content is irrelevant, then the likelihood of the neurons (related to the irrelevant information) connecting to other neurons is unlikely. When information is relevant, more connections are created and made stronger. When these links are activated, more physical neural area within the brain is involved. Therefore, the likelihood of the information coding better is increased.

In a more practical sense, there are several ways of introducing meaning involving the use of emotion and relevance. Wolfe (2001) endorsed the use of adding an emotional component to learning. Examples of such additions include solving real-life problems, simulations, and role-playing. Jensen's (1998) ideas, independent of Wolfe, include the following areas related to emotion: allowing for expression, movement activities (i.e. field trips), higher stakes learning (choices), novelty, sharing, apprenticeships, and thinking big (complexity).

Jensen (1998) added that meaning can be made through context and patterns. Context can be implicit, through showing mental models and asking students to do the same. Patterning is a means of organizing information so it is not randomly stored in the brain. It has been suggested that patterning is an innate human behavior (Jensen, 1998). Therefore, if the teaching and learning process lends itself to patterning, which is natural to human behavior, learning is more effective because of the innate nature of patterning.

One Approach: Factors Combined

In synthesizing the three factors of providing meaning, the lines between what relevance, emotion, and context/patterns are unclear at this point. Questions such as, how can one have relevance without a frame of context or how does one tap into emotion without the situation having relevance could come to mind. Given these questions and the obscurity of boundaries among the three factors, the following Venn diagram has been constructed to represent Jensen's original framework with more complexity (Figure 3).

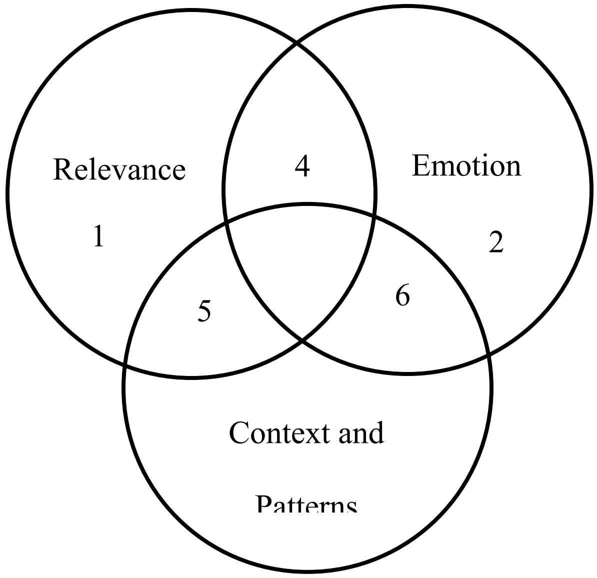

Figure 3. *The relational meaning model (modified from Jensen, 1998, p. 97).*

In Figure 3, the Venn diagram makes several relational implications. One such implication is that there are moments in the teaching and learning process where meaning can be provided by the three factors as separate entities, as represented by areas 1, 2, and 3 of the figure. In addition, this model (Figure 3) implies that there are moments where combinations of the three factors can provide meaning, such as in areas 4, 5, and 6. Finally, there are moments of learning that could encompass all three factors, which is representative of area 7 in Figure 3. Given these assumptions, for example, if a student is learning a certain subject, the teacher can establish meaning through the three factors individually or through combinations of the three factors. However, an argument could be crafted that if one wishes to systematically and purposely evoke emotion to provide meaning, how can this happen without the student first understanding the context or patterns or it being relevant to him or her?

The *Relational Meaning Model* (Figure 3) implies more of a systematic approach than compared to Jensen's model (Figure 2). In this case, instead of simply having three routes in which meaning can occur, the implied purpose of the model (Figure 3) would be to target a specific area to systematically evoke meaning. However, it also implies a degree of haphazardness or random occurrence. In revisiting the criticism that questions how one could systematically evoke the factors of emotion and context and patterning simultaneously, the argument can be made that if meaning happens as illustrated by Figure 3, it would occur haphazardly or without structure. Just because a teacher lights a firecracker for attention, and as a result evokes emotion, this does not mean that the lesson automatically has relevance and context. The task then becomes how to add more structure to the model (Figure 3) to eliminate this haphazardness and allow teachers to systematically approach meaning.

A Framework for Applying Meaning: Hierarchy of Factors

The framework. As Figure 3 provides relationships among the three factors of meaning, a more structured construct can be crafted when the information is re-synthesized with the target of systematically providing meaning. The *Hierarchical Framework for Providing Structured Meaning* model (Figure 4) represents a structured approach in which meaning can be introduced. Jensen (1998) noted the importance of a structured versus haphazard approach for introducing meaning. In particular, it is important to not just "simply evoking emotions randomly;" instead one should "productively invit[e] or purposely engag[e in] emotions" (p. 94). In this case, Jensen described meaning through the emotion factor.

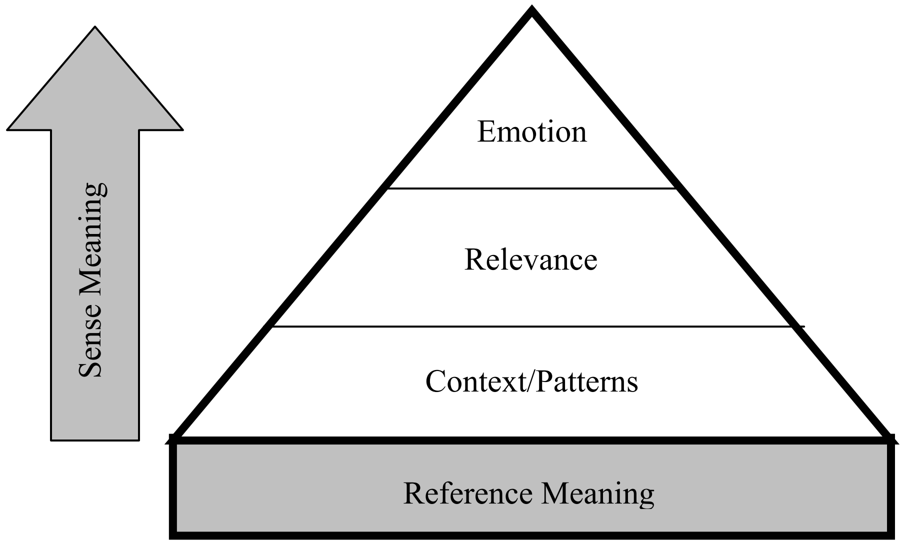

Figure 4. A *hierarchical framework for providing structured meaning.*

Context and patterns involves a simple organizing and arranging information, such as categorizing. The information is compared to what is already known and if there is a context or pattern, the information is linked to that existing group of information. The word relevance occurs biologically when one neuron, memory, or piece of information connects with another. Similar to context and patterns, relevancy involves a comparison of what is known, with the addition of having a personal connection (Jensen, 1998). Just because one understands that a cow is animal, which is context and patterns, does not mean that it is understood how that cow relates to his or her life, needs, or goals, which are examples of relevance. The connections up through relevancy seem simple, but when emotions are added, the situation changes.

As a result of emotions, the brain is signaled that certain information is important. One may understand why something is important because he or she can relate it to what is known and how it relates to him or her. Emotions provide that neuro-chemical boost in providing meaning (Jensen, 1998). For example, one can figure out how to set a goal and why goals are important to him or her, but it might be some emotional stimulus that drives a person to complete that goal.

To help establish this framework, it is important to revisit the criticism of the previous model (Figure 3) by asking, if one wants to evoke emotion to provide meaning in a structured way, how can this happen without, first, the student understanding the context or patterns or it being relevant to him or her? For change to occur there is an implied, pre-existing basis of knowledge or information, which takes the form of relevance and context. Given this deduction, it is implied there is a certain hierarchy to this framework.

In combining the theoretical background of the three factors with their definitions, a hierarchical framework can be constructed to describe the relationship between the three factors and the types of meaning. As a result, this model (Figure 4) re-introduces the notions of sense and reference meaning.

The base level is that of reference meaning as defined previously. Although this level is important, it is not a major focus. The three factors are represented in the upper three levels of the hierarchy triangle. The ascending arrow to the left indicates that the three factors, or now in this setting, levels, are degrees of sense meaning. In constructing differences and a hierarchy among and the four levels, the following questions can be raised about a particular piece of information or concept that is to be learned:

- Reference: What is it? (dictionary-type definition)
- Context/Patterns: What is it compared to what I already know?
- Relevance: What is it compared to what I already know in relation to aspects of my life?
- Emotion: What is it in terms of how it emotionally affects me?

Given these questions, it is easier to differentiate the degree to which a teacher provides meaning.

Taking the framework for providing meaning, an example has be articulated of how "haphazard meaning" compares to "structured meaning." This particular example looks at a non-traditional agricultural education student. Previous to taking an agricultural education course, this student has little to no experience with production agriculture. In this scenario, haphazard meaning occurs prior to a dairy production unit; the structured so that it occurs after the unit.

In this haphazard meaning example, the student has emotional meaning of what milk is. This student is satisfied (psychological change) with milk whenever he/she drinks it. However, the agriculture aspect has little to no meaning:

- Context/Patterns: What is it compared to what I already know?
    - Milk is a product that my parents purchase at the grocery
- Relevance: What is it compared to what I already know in relation to aspects of my life?
    - Milk is a product that is good for my health
- Emotion: What is it in terms of how it emotionally affects me?
    - When I drink milk, I am happy and satisfied

In the structured meaning example, this same student is introduced to milk through his agricultural teacher. In this case, the teacher reshapes the student's perception:

- Context/Patterns: What is it compared to what I already know?
    - Milk is a product of the dairy industry ; I learned about this in ag class
- Relevance: What is it compared to what I already know in relation to aspects of my life?
    - Milk is a product that is good for my health; in agricultural education class we talked about other products of milk I consume, as well
- Emotion: What is it in terms of how it emotionally affects me?

- When I drink milk, I am happy and satisfied

In comparing the two scenarios, the student has now patterned in his/her mind why milk, and subsequently the dairy industry, is important. This has been provided through a structured setting instead of a haphazard way. When teachers are able to structurally provide meaning, and reach that level of emotion, then, according to the brain-based research, students' retention of the information increases.

Support, criticism and cautions

Weiss' (2000) comments are consistent with the framework from the standpoint that it is believed emotion is very important when establishing meaning. This point is stressed more so than any other component. Subsequently this high degree of importance on emotion supports it being on the top of the hierarchy. Weiss stated that learning (retention) engages feeling (emotion); that emotions drive not only meaning, but memory and attention as well. In addition, Reardon (1998-99), in discussion of Caine and Caine's brain-based principles, supported this statement as well. Reardon claimed that learning and retention are occurring already, but that when emotions are factored in, the process is more effective and hopefully permanent. This implies that something happens before emotions are introduced, and hence a hierarchical approach occurring. Further, the importance of emotion and its placement at the top of the hierarchy comes from Caufield, et al. (2000) who caution that education will be compromised if educators do not create an environment that is emotionally positive, in terms of the safety, well-being and growth of the student. For a support of the lower-level of the hierarchy of simple patterns and context, Reardon (1998-99, p. 16) noted that as patterns are achieved, then meaning has been established. This implies that for meaning to occur in the first place, it needs to start with patterns.

Caine and Caine's (1990) principles support this framework (Figure 4) through the fourth principle, which states "meaning occurs through patterning" (p. 67). Since patterns (and context) are at the base of the hierarchy, for meaning to occur, it must first happen through the context/pattern levels. Related to this principle, Caine and Caine (1990, p. 67) noted that "a learner must be able to create meaningful and personally relevant patterns." This too, supports the hierarchical framework (Figure 4) in that relevancy adds to the potency of meaning, which is based on patterning.

A principle which could be interpreted as confounding to the framework (Figure 4) is the one that stated, "emotions are critical to patterning" which implies a reversal of sorts in the hierarchy. Reardon (1998-99), however, approached Caine and Caine's principle by explaining that emotions aid in neural mapping, versus an explanatory relationship between emotions and patterns.

In addition, this hierarchy hedges towards the behavioral learning by Bandura, which has three steps: attention, retention, and production. Attention involves gaining students' attention; retention involves linking prior knowledge and ensuring long-term retention; production involves ensuring a positive attitude and troubleshooting (Arends, 2001). These three steps speak to concepts related to the hierarchy and feeds well into the concept of providing structured meaning through attention, retention, and then, once meaning has been established, through context and relevance, production occurs, where emotions will solidify that meaning. However, this hierarchy could be applied to constructivist teaching as well. Constructivism is an approach whereas the student is actively constructing his or her knowledge (Santrock, 1997). In structuring constructivist instruction strategies such as problems-based learning or cooperative learning, teachers can ensure materials and resources provided provide a solid foundation in context and patterns. After that, relevancy can be established by making it a part of process (assignment, presentation, etc.) to explain how the information being learned will influence their lives. Finally, emotional meaning will hopefully be achieved after the completion of the problems-based or cooperative learning process. Although it does not apply to constructivism as easily as it does to behaviorism, the hierarchy can still be used.

Conclusions

Retention of learning is important in the teaching and learning process in all disciplines of education, including agricultural education. There are multiple ways to improve retention, one of which is through providing meaning of the content to the student. Over the past thirteen years, educators have been looking towards the functioning of the brain to explain certain phenomenon of learning. From this, brain research has surfaced that meaning is important in the learning process and that meaning is a natural function of brain when it encodes information. Identifying ways and means of providing meaning effectively becomes a priority.

Jensen (1998) identified three factors in applying meaning, which are patterns and context, relevance and emotion. Although Jensen merely identified them, if synthesized, the factors can be linked to provide for relationships among themselves. After a review of literature, a hierarchy was developed and a more structured, effective way of providing meaning in is created. Arguments can be made in support or refutation of the hierarchy framework, however, the hierarchy model is such that it is just one way to systematically and purposefully introduce meaning in a lesson versus simply letting it happen haphazardly. In other words, the hierarchy or steps that occur in a "natural" or unstructured setting may not be the same as that in the proposed hierarchy. This is just one framework based upon the research at hand. Jensen (1998, p. 92) encapsulated this idea by remarking that this area of meaning is quite complex; although there have been correlations made, no causal relationships have been identified.

Recommendations/Implications

This hierarchy is theoretical in nature. It should serve as a starting point in helping teachers understand how to become more efficient in providing meaning; therefore scrutiny should be welcomed as a means of facilitating a scholarly discussion on providing meaning. Both teachers and teacher educators alike should look into, be metacognitive about and welcome introspection about this topic of meaning. Only then will a marriage between theory and application begin.

Like any educational strategy, beyond research, practical application needs to occur. It is recommended that the framework (Figure 4) be used in aiding pre-service and practicing teachers to develop a more structured, systematic approach to incorporating meaning in their lessons. Teacher educators should use this framework in not only teaching pre-service teachers about meaning, but also how to better achieve it. However, the research and validation aspect should not be ignored. Research on the effectiveness of the framework should be conducted. In particular, a descriptive approach at the current use of meaning, in reference to the framework, should be investigated. An instrument should then be developed to ascertain levels of meaning provided in lessons. In combining the practical use and research aspects of studying this framework, the effectiveness of the application of this framework should also be investigated.

Beyond the reason of wanting to increase retention, one implication for agricultural education is accountability. Accountability is on the forefront of administrators' concerns; the bottom line becomes to what degree does instruction assist in the achievement of standardized tests? Agriculture could serve as a context for providing meaning behind what core classes are teaching. The proposed hierarchy of this study supports doing so and could support keeping agriculture classes to assist in the development of core subject concepts. Not only could agriculture teachers provide meaning, they could provide it more efficiently through the use of this study's hierarchy model, and therefore, improve retention.

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The Influence of Student Learning Experience Level and Learning Style on Achievement

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Abstract

An emerging trend on university campuses has been to offer courses totally online, or with a blend of online and face-to-face components. In 2002, over 80% of public universities offered both blended and online courses to their on-campus students. It is reasonable to assume that students enrolled in an online class have a different learning experience and experience the course content differently than students enrolled in a face-to-face class, recognizing that different does not necessarily imply better or worse. The purpose of this quasi-experimental study was to determine if that difference in experience with the course content affects the amount of learning for students of differing learning styles. The sample used in this study consisted of undergraduate students enrolled in an introductory food science course. The control group consisted of students enrolled in a section of the course taught with a traditional lecture (N = 253). The experimental group consisted of students enrolled in a section of the course taught asynchronously using WebCT® and web pages (N = 247). Results indicated no differences for Concrete Sequential, Concrete Random, and Abstract Sequential learners. A significant, but impractical difference was found for Abstract Random learners, who achieved higher in the control group.

Introduction

In 2000, 15.3 million students were enrolled in post-secondary degree-granting institutions, which represented an 11% increase since 1990 (National Center for Educational Statistics, 2002). Further, over 51% of these students were enrolled at larger universities with enrollments of over 10,000 students (which represented only 11% of all universities). Larger campuses may offer an efficiency of scale; however, larger enrollments can make offering sufficient courses challenging.

An emerging trend on university campuses has been to offer courses totally online, or with a blend of online and face-to-face components (Allen & Seaman, 2003). In 2002, over 80% of public universities offered both blended and online courses to their on-campus students. They go further to assert then given a choice between an online and a traditional course that students will enroll in the online version, as evidenced by the 1.6 million students that took an online course in the Fall of 2002. This phenomenon is also pertinent to university agricultural education programs where Roberts and Dyer (2003) reported that distance and technology delivered courses are prevalent.

It is reasonable to assume that students enrolled in an online class have a different learning experience than students enrolled in a face-to-face class, recognizing that different does not necessarily imply better or worse. Further, as different learning experiences occur, it is reasonable to presume that as students construct meaning from their respective experiences that certain experiences may be better suited for certain students.

Theoretical Framework

This study was guided by the grand-level theory of constructivism, with its central precept that students actively construct meaning from their experiences (Doolittle & Camp, 1999). More specifically, student learning experiences consist of complex interactions between other students, the instructor, and the content (Moore, 1989). In some instances, student learning experiences also involve interaction with technologies (Hillman, Willis, & Gunawardena, 1994). It was also recognized that student learning experiences do not occur in isolation, but rather in complex social environments (Vygotsky, 1978)

Additionally, student experience with content can occur at different levels from direct to indirect (Dale, 1946). Presented as a *Cone of Experience*, Dale posited that at the most direct level students learn through direct participation or concrete experience with the content, while at the most in-direct stage students experience the content abstractly through verbal symbols. Thus, student interaction with content can occur on a continuum from direct, concrete experience to abstract, vicarious experience.

The theory that students have a preferred way of inputting, processing, and storing information also framed this study (Gregorc, 1982a). Often referred to as learning or cognitive style, this preference is not synonymous with academic ability. Numerous taxonomies have been developed to differentiate learning styles (Dunn & Dunn, 1993; Gregorc, 1982a; Kolb, 1984; Witken & Goodenough, 1981). Gregorc's work has identified four categories of student learning styles: concrete sequential (CS), concrete random (CR), abstract sequential (AS), and abstract random (AR).

According to Gregorc (1982a), CS learners approach learning in a logical, concrete, objective fashion. They utilize their senses to collect data. CS learners prefer orderly, quiet learning environments. CR learners also approach learning in a logical fashion, but they utilize intuition and instinct to collect data. CR learners prefer active learning environments, but are adept at learning by themselves. AS learners approach learning from an abstract perspective, relying on symbols and signs. They think logically and are comfortable working with theories. AS learners prefer lectures and reading assignments. AR learners approach learning with their feelings and emotions. They organize content in non-liner fashions. AR learners prefer learning in groups with much interaction.

In summary, students learn by constructing meaning from their experiences, which can occur at different levels. Further, students have preferred learning styles. As depicted in Figure 1, conceptually, students enter a learning environment with a preferred way of learning. In that learning environment, they experience the content somewhere on a continuum from concrete to abstract. In turn, they learn the content to some proficiency.

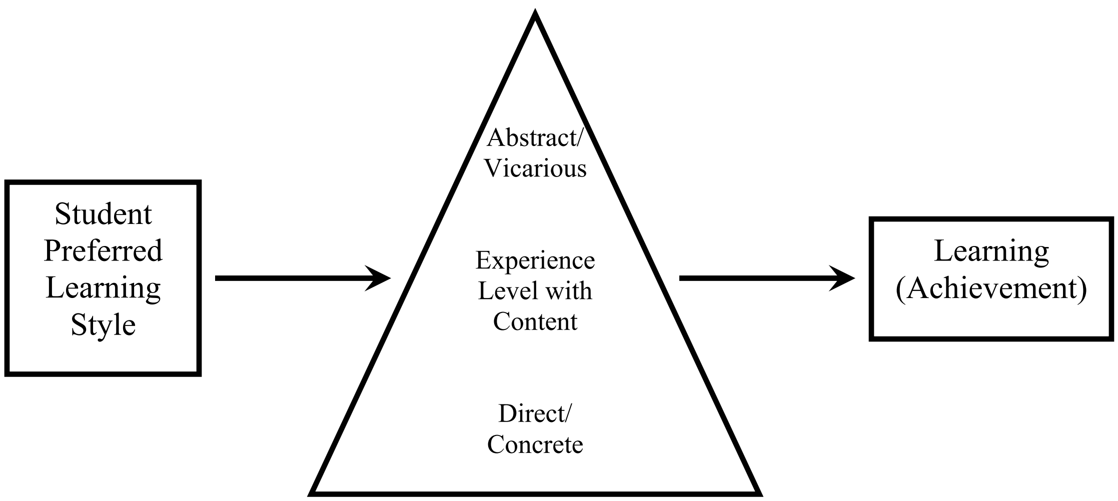

Figure 1. *Model of the Relationship between Learning Style, Experience Level, and Learning*

Previous research has documented the influence of learning styles when student learning experiences are affected by teaching approach. For example, Dyer and Osborne (1996) found that field-neutral students scored significantly higher on achievement tests when students were taught with the problem-solving approach, which provides more concrete interaction with the content. In an earlier study, Marrison and Frick (1994) compared students of differing learning styles (field independent/dependent) on achievement and perceptions when course content was presented as a lecture verse a "multimedia" approach (that consisted of text, still pictures, and graphics). They reported no difference in achievement. However, field dependent learners expressed a desire for sound in the "multimedia" approach.

Student experiences in a course are affected by the method used to deliver course content. As such, researchers have compared courses delivered face-to-face and those mediated through technology. Results generally support the premise that courses delivered through technology can be equivalent to courses taught face-to-face (Born & Miller, 1999; Miller & Pilcher, 2000; Miller & Shih, 1999; Russell, 1999).

Recognizing that delivering course content mediated through technology was a different learning experience for students, several researchers examined if differences existed in achievement based on learning style. Results of this line of inquiry produced conflicting results. For example, Daniel (1999) as well as Oxford, Park-Oh, Ito, and Sumrall (1993) reported an influence, while Day, Raven, and Newman (1998) along with Freeman (1995) found no relationship. The variability in conclusions drawn by these researchers clouds the picture of the influence of learning styles. Therefore, a conclusive statement regarding the influence of learning styles cannot be made.

Existing research examined student experiences at the macro-level (entire courses), either comparing technology mediated courses to face-to-face courses or examining the influence of learning styles in course achievement. However, examining these variables at the macro-level does not provide insight in to specific learning activities delivered at different levels of experience (concrete verse abstract). Missing from the literature are studies examining how the type of experiences provided to students at the micro level (units of instruction) affect achievement.

Purpose

The purpose of this study was to determine if the level of experience with course content affects the amount of learning for students of differing learning styles. Initially, one null hypothesis was used to guide this study.

Ho: There is no difference between groups in achievement across learning styles.

Upon initial data analysis, it was determined that students of each learning style should be examined individually. Consequently, four null hypotheses were developed that address each learning style, respectively. These hypotheses were used to further guide this study.

Ho_1: There is no difference between groups in achievement for Concrete Sequential students.

Ho_2: There is no difference between groups in achievement for Concrete Random students.

Ho_3: There is no difference between groups in achievement for Abstract Sequential students.

Ho_4: There is no difference between groups in achievement for Abstract Random students.

Methodology

To address the purpose of this study and test the null hypotheses, a quasi-experimental design was used. Specifically, a nonrandomized control group, pre-test – post-test design was chosen (Ary, Jacobs, & Razavieh, 2002). This design was necessary, because participants were already assigned to intact groups, so random assignment was not possible. Without random assignment, groups cannot be considered equivalent prior to beginning the study, but differences can be statistically controlled for (Ary et al., 2002). This study consisted of two groups – a control group and an experimental group.

Ary et al. (2003) indicated that if the groups do not differ on pre-test scores the selection threat to internal validity is eliminated. They go further to posit that because the study occupied the same period of time and both groups take the same pre-test and post-test that maturation, instrumentation, pretesting, history, and regression should not be threats to internal validity.

Both the control and experimental groups were taught by the same instructor and consisted of students enrolled in an introductory undergraduate food science course taught at a large university. The treatment period consisted of one-third of the content covered in the course and was two weeks in duration. Both groups had access to the same supplemental texts.

The control group consisted of students enrolled in a section of the course taught with a traditional lecture (N = 253). Class sessions were held in a lecture hall and consisted of the instructor presenting the content using PowerPoint® slides as a visual supplement to the lecture and class discussions. In this group, student experiences consisted of direct interaction with the instructor and with fellow students throughout the class sessions. For this group, the treatment period of two weeks consisted of 9 class sessions that lasted approximately 1 hour and 15 minutes, although some of this time was used for announcements and other housekeeping activities typically associated with teaching a class.

The experimental group consisted of students enrolled in a section of the course taught asynchronously using WebCT® and web pages (N = 247). The content was delivered using streaming videos that consisted of an auditory recording of the instructor delivering the lecture and the same PowerPoint® slides as the control group. This delivery method provided a more abstract experience than the control group and has been previously called an illustrated web lecture (Roberts, 2003). In this group, student experiences consisted of reading and listening with little or no direct interaction with other students or the instructor. However, they did have the opportunity to interact through electronic mail. For this group, the treatment period of two weeks consisted of nearly six hours of streaming videos that the students could view at their own pace. Students also had access to web pages that contained the same announcements as were delivered to the control group.

As indicated previously, this study used a pre-test – post-test design. The instructor of the course developed the instrument used as the post-test. This was deemed appropriate, as the instructor was the subject matter expert. The researcher then created a parallel form to use as the achievement pre-test. Ary et al. (2002) defined a parallel form as one that is as similar as possible in content, difficulty, length, and format. This was achieved in this study by altering the ordering of the questions, altering the ordering of the responses for each question, and rewording questions from the post-test. The instruments consisted of 100 single-response multiple-choice questions. Both instruments were evaluated for face validity by an expert panel. The instructor of the course evaluated the instruments for content and construct validity. Post hoc reliability analysis yielded a Kuder-Richardson-20 score of .82. Both the pre-test and the post-test were administered as web-based forms.

Learning styles were assessed using the Gregorc Style Delineator (Gregorc, 1982a). This instrument was chosen based on its ability to separate learners into four distinct learning styles and the relative ease to create an electronic version of the instrument. The instrument identifies people as Concrete Sequential (CS), Concrete Random (CR), Abstract Sequential (AS), and Abstract Random (AR). Gregorc (1982b) has previously established the validity and reliability of this instrument (alphas for each construct ranged from .89 to .93). A web-based version of this instrument was used in this study.

A researcher-developed web-based instrument was utilized to collect demographic data in this study. An expert panel evaluated the instrument for face and content validity. Because questions had "an accurate, ready-made answer", the questions did not elicit demands for considerable time, thought, nor variation and therefore posed no reliability risks (Dillman, 2000).

Results

Because groups were not randomly assigned, groups were first examined for comparability. The control group consisted of 80 males and 173 females, while the experimental group contained 100 males and 147 females (see Table 1). When comparing the gender makeup of the two groups, a difference was observed ($X^2_{(1, N = 500)} = 4.53$, $p = .033$). However, subsequent correlation analysis revealed that gender was not practically or significantly correlated with post-test score ($r = -.05$, $p = .225$). Therefore, gender was excluded from further analysis.

Table 1. *Gender Frequencies by Group*

	Control Group		Experimental Group	
Gender	*F*	%	*f*	%
Male	80	31.62	100	40.50
Female	173	68.37	147	59.50

Note. Groups differed on gender ($X^2_{(1, N = 502)} = 4.53$, p = .033, Effect Size = .082)

The two groups were also compared to determine if there was a difference in learning styles among students in each group. The control group had 86 CS students, 64 CR students, 30 AS students, and 73 AR students (see Table 2). The experimental group had 88 CS students, 60 CR students, 43 AS students, and 56 AR students. Chi-square analysis revealed that the two groups did not significantly differ ($X^2_{(3, N = 500)} = 4.636$, $p = .200$).

Table 2. *Descriptive Statistics of Pre-test Scores by Group*

Learning Style	Control Group			Experimental Group		
	N	*M*	*SD*	N	*M*	*SD*
Concrete Sequential	86	35.56	10.40	88	34.93	10.49
Concrete Random	64	32.80	13.30	60	33.43	9.82
Abstract Sequential	30	36.67	13.08	43	37.77	13.64
Abstract Random	73	33.37	10.68	56	36.09	12.31
Total	253	34.36	11.62	247	35.32	11.39

Note. Learning style frequencies did not differ between groups ($X^2_{(3, N = 500)} = 4.636$, $p = .200$, Effect Size = .096)

Pre-test scores were normally distributed around the mean. As seen in Table 2, the lowest mean score was observed for CR students in the control group ($M = 32.80$, $SD = 13.30$), while the highest was observed for AS students in the experimental group ($M = 37.77$, $SD = 13.64$).

Two-factor Analysis of Variance was conducted to determine the effects of group, learning style, and the interaction between the two on pre-test scores (see Table 3). No significant differences between groups were observed. Results indicated no main effect for group ($F_{(1, 492)} = .775$, $p = .379$), no main effect for learning style ($F_{(3, 492)} = 2.015$, $p = .111$), and no main effect for the interaction between group and learning style ($F_{(3, 492)} = .524$, $p = .666$).

Table 3. *Two-factor Analysis of Variance of Pre-test Scores*

Source	Df	**F**	*p*	η^2
Intercept	1	4160.098	.000	.894
Group	1	.775	.379	.002
Learning Style	3	2.015	.111	.012
Group*Learning Style	3	.524	.666	.003
Error	492			
Total	500			

Post-test score data was collected for 496 students, which represented a loss of four participants. Descriptive statistics are presented in Table 4. Post-test means were normally distributed around the mean. The lowest mean score was observed for AR students in the experimental group ($M = 54.42$, $SD = 7.93$), while the highest was observed for AR students in the control group ($M = 57.67$, $SD = 8.54$).

Table 4. *Descriptive Statistics of Post-test Scores by Group*

	Control Group			Experimental Group		
Learning Style	N	*M*	*SD*	N	*M*	*SD*
Concrete Sequential	86	57.52	8.67	87	56.78	9.21
Concrete Random	63	55.25	8.77	60	56.78	8.81
Abstract Sequential	30	56.07	8.13	42	55.86	8.50
Abstract Random	73	57.67	8.54	55	54.42	7.93
Total	252	56.83	8.61	244	56.09	8.71

Ho: There is no difference between groups in achievement across learning styles.

Two-factor Analysis of Covariance was conducted to determine the effects of group, learning style, and the interaction between the two had on post-test scores, while controlling for pre-test scores (see Table 5). Results indicated an effect for pre-test score ($F_{(1, 487)}$ = 32.248, p = .000). In contrast, it indicated no main effect for group ($F_{(1, 487)}$ = 1.159, p = .282) and no main effect for learning style ($F_{(3, 487)}$ = .748, p = .524). As such, the null hypothesis was not rejected.

Table 5. Two-factor Analysis of Covariance of Post-test Scores

Source	Df	**F**	p	η^2
Intercept	1	1635.504	.000	.771
Pre-test	1	32.248	.000	.062
Group	1	1.159	.282	.002
Learning Style	3	.748	.524	.005
Group*Learning Style	3	2.064	.104	.013
Error	487			
Total	496			

Although not significant at α = .05, the effect of the interaction between group and learning style ($F_{(3, 487)}$ = 2.064, p = .104) and the limited research in this area presented grounds to further explore the effect of learning style. As such, the simple main effects of group were examined for each learning style. To test the effect of group membership for students of each learning style while controlling for pre-test score, four additional null hypotheses were developed, addressing CS, CR, AS, and AR students, respectively.

Ho_1: There is no difference between groups in achievement for Concrete Sequential students.

For CS students, the control group mean was 57.52 (*SD* = 8.67) and the experimental group mean was 56.78 (*SD* = 9.21). Analysis of Covariance indicated no main effect for group ($F_{(1, 170)}$ = .186, p = .667) while controlling for pre-test score (see Table 6). Therefore, the null hypothesis (Ho_1) was not rejected.

Table 6. *Analysis of Covariance of Post-test Scores for Concrete Sequential Students*

Source	Df	**F**	p	η^2
Intercept	1	451.460	.000	.726
Pre-test	1	10.511	.001	.058
Group	1	.186	.667	.001
Error	170			
Total	173			

Ho_2: There is no difference between groups in achievement for Concrete Random students.

In the control group, the mean post-test score for CR students was 55.25 (*SD* = 8.77), while a mean of 56.78 (*SD* = 8.81) was observed for the experimental group. No main effect for group ($F_{(1,\ 120)}$ = .853, p = .357) was detected through Analysis of Covariance (see Table 7). As such, the null hypothesis (Ho_2) was not rejected.

Table 7. *Analysis of Covariance of Post-test Scores for Concrete Random Students*

Source	Df	**F**	*p*	η^2
Intercept	1	461.949	.000	.794
Pre-test	1	8.170	.005	.064
Group	1	.853	.357	.007
Error	120			
Total	123			

Ho_3: There is no difference between groups in achievement for Abstract Sequential students.

For AS students, the control group exhibited a mean of 56.07 (*SD* = 8.13) and the experimental group exhibited a mean of 55.86 (*SD* = 8.50). As seen in Table 8, Analysis of Covariance indicated no main effect for group ($F_{(1,\ 69)}$ = .071, p = .791). Consequently, the null hypothesis (Ho_3) was not rejected.

Table 8. *Analysis of Covariance of Post-test Scores for Abstract Sequential Students*

Source	Df	**F**	*p*	η^2
Intercept	1	295.032	.000	.810
Pre-test	1	8.526	.005	.110
Group	1	.071	.791	.001
Error	69			
Total	72			

Ho_4: There is no difference between groups in achievement for Abstract Random students.

Examination of AR students yielded a mean of 57.67 (*SD* = 8.54) for the control group and 54.52 (*SD* = 7.93) for the experimental group. Analysis of Covariance indicated a main effect for group ($F_{(1,\ 125)}$ = 6.357, p = .013), thus indicating a statistical difference in post-test means between the two groups (see Table 9). Accordingly, the null hypothesis (Ho_4) was rejected. AR students in the control group scored nearly 6% higher than AR students in the experimental group. However, only a small effect size (η_p^2 = .048) was observed (Cohen, 1988).

Table 9. *Analysis of Covariance of Post-test Scores for Abstract Random Students*

Source	Df	**F**	*p*	η^2
Intercept	1	476.918	.000	.792
Pre-test	1	5.669	.019	.043
Group	1	6.357	.013	.048
Error	125			
Total	128			

Conclusions, Discussion, and Implications

Readers are cautioned that without random assignment, conclusions drawn are only applicable to the sample. Based on the results of this study, we can conclude CS, CR, and AS students do not differ in achievement based on the level of their experience with content. We can, however, conclude that AR students achieve at a slightly higher level (although not practical) when they experience content in a more concrete fashion, particularly when that experience involves interaction with the instructor and other students.

These conclusions provide a basis for discussion. Previous research was inconclusive of the influence of learning style on achievement. For CS, CR, and AS learners, the current study was in concordance with those showing no difference (Day, Raven, & Newman, 1998; Freeman, 1995). Theory purports that AR learners prefer interactive, socially dynamic learning environments (Gregorc, 1982a). Affirming theory, the results of this study suggest providing a more socially interactive experience for AR learners will increase their achievement. This assertion aligns with the findings of Marrison and Frick (1994) who found that field-dependent learners preferred a more socially dynamic environment by requesting the sound be added to textual representations in the "multimedia" approach.

The conclusions of this study imply that with this group of students that experiencing the content concretely in a face-to-face format and abstractly through representations delivered online can be equally effective, although AR students did slightly better in the more concrete face-to-face group. Thus, continuation of this delivery method as a means of efficiently delivering the content of this course is recommended.

Although not provocative, this study suggests that some learning experiences may be better suited for some students and that selecting appropriate experiences for students is important for learning. However, further research is needed to determine which types of experiences are best suited for which people. Why can some people learn from watching someone else, while others must practice over and over to achieve even limited proficiency? Why can the same person learn some information by watching others, but can never master other information, even with extensive practice? Why can some people learn by reading a book while others require more concrete experiences? Which content can be effectively presented in abstract forms? Which content is best learned through concrete experience?

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Academic Achievement and Efficiency of College of Agricultural and Life Sciences Students: A Multi-Year Study

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Abstract

The purpose of this study was to examine the academic achievement and academic efficiency of students entering the College of Agricultural and Life Sciences at the University of Idaho over a 17-year period. Findings of the study showed that students with agricultural education program experience and FFA membership had significantly lower first semester, average semester, and cumulative semester grade point averages (GPA) than students who were not in agricultural education or the FFA. Students from non-farm or ranch backgrounds were found to have significantly higher first semester GPAs, but no significant differences were found in average semester or cumulative GPAs as a function of type of residence. No differences in the academic achievement of new freshman as compared to transfer students were found. Students with agricultural education program experience and FFA membership attended fewer semesters and declared fewer majors than students who were not in agricultural education or the FFA. Students from farm or ranch residences declared significantly fewer majors than students from non-farm or ranch residences.

Introduction and Theoretical Framework

The consequences of not graduating from college are not the same today as they were 30, 20, or even 10 years ago. In the past, those students who attempted college and failed to attain a degree still had the opportunity to find employment in middle-management jobs and move up the preverbal "career ladder" within a company. In the past, a lack of success in college was viewed only as an individual disappointment, not as a national dilemma (Carey, 2004). Today, new advances in telecommunications and technology have made it possible to outsource most white-collar jobs to overseas countries with college graduates who will work at a fraction of the wage of a similar worker here in the United States.

Goecker, Whatley, and Gilmore (1999) estimated that from 2000 to 2005 there will be approximately 57,785 annual openings in agricultural sciences in the United States, but only 57, 175 qualified graduates to fill these positions. This estimated deficit of 610 individuals means that it is imperative for colleges of agriculture to attract, enroll, retain, and graduate qualified individuals. The goal of academic advisors and college faculty members is to assist students in their course selection and to ensure student success in the college curriculum, ultimately providing quality employees to the global agriculture industry. According to Manderscheid (1988), "attention to a total undergraduate program recognizes the need for advising and counseling services that assist students, whether eighteen or fifty-eight, identify further opportunities and the educational path to achieve their new goal" (p. 991). But, as Carey (2004) pointed out, any additional time to graduate, beyond four years, adds significant costs to both the students and to the colleges and universities. This would suggest that in addition to achievement in college, academic efficiency should also be a concern for colleges of agriculture.

Dunkin and Biddle (1974) proposed a model for the study of teaching and learning in a classroom setting which served as the theoretical framework for this study (see Figure 1). According to their model, the study of teaching and learning involves four major types of variables: presage, context, process, and product. Presage variables are related to the characteristics of the teacher while context variables are related to the learners, school and community. Process variables focus on the teaching portion of the teaching and learning process and describe what students and teachers "do" in the classroom and how they interact with each other. Product variable focus on the learning portion of the teaching and learning process and describe the growth and development of student knowledge, attitudes, and skills.

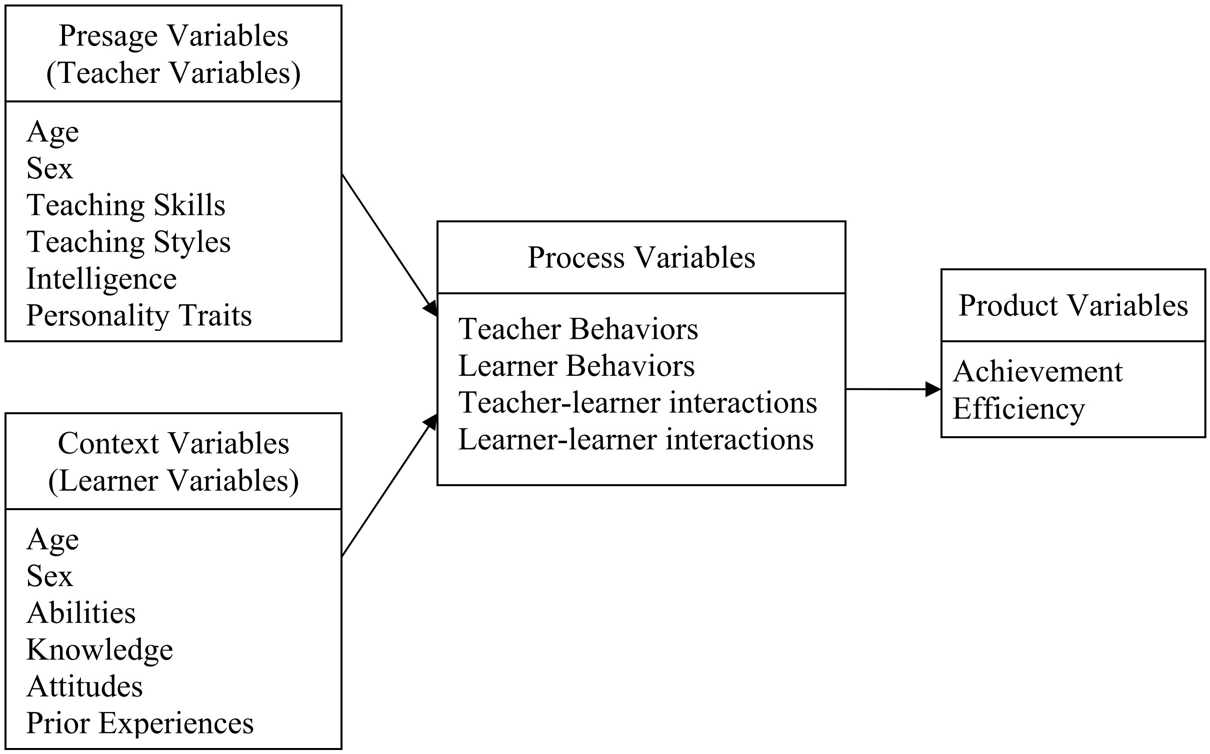

Figure 1. *A Model for the Study of Classroom Teaching (Dunkin & Biddle, 1974).*

Influence of Context Variables on Academic Achievement

Numerous studies have examined the influence of context variables on academic achievement. Academic achievement is often defined in terms of whether or not a student graduates, and how well the student did in their studies as they sought the degree. Characteristics such as first semester grade point average (GPA), average semester GPA, cumulative GPA, and whether or not a degree was conferred are used to describe a student's academic achievement. Several studies conducted within agricultural education have examined the influence of context variables such as gender, high school GPA, college entrance exam scores, agricultural education program participation, agricultural youth organization participation, type of residence, college entry status, and residency classification on measures of academic achievement.

Studies have shown the best predictor of academic performance during the first year of college to be a combination of high school core grade point average and ACT scores (Garton, Ball, & Dyer, 2002; Garton, Dyer, & King, 2000). Similarly, Strauss and Volkwein (2002) reported that a student's high school percentile rank and college classroom experiences predict more accurately the cumulative GPA of a student at a 4-year institution, while at a 2-year institution, student effort is a better predictor of GPA. Rush (1991) reported that students with a high school GPA of below a 3.00 achieved a mean college GPA of 2.06 while students who had a high school GPA equal to or above a 3.75 attained a mean first semester GPA score of 3.27. Touchstone (1997) found that students with a high school GPA of below 3.0 were still able to earn a passing GPA of 2.17 in their first semester and that their GPA increased over the duration of their enrollment in college.

Despite numerous assertions that involvement in high school agricultural education better prepares a student for college, empirical evidence supporting this notion is lacking. Dyer, Lacey, and Osborne (1996) found no significant difference in the high school GPA of students who had enrolled in agriculture classes and those who had not. However, of the students surveyed, 53.5% felt that high school agriculture classes were good preparation for college study in agriculture. Over forty percent (40.6%) of the students felt that college-bound students should be encouraged to enroll in high school agriculture programs, while 46.7% of the students surveyed agreed that students can complete a high school agriculture program and still meet college preparatory requirements. However, findings of their study led Dyer, Breja, and Andreasen (1999) to conclude that freshmen entering the College of Agriculture at Iowa State University after having been active in FFA and/or 4-H were more likely to graduate with degrees from the College of Agriculture than those students who were not involved in the FFA and/or 4-H.

Findings of several studies have led researchers to conclude that students who have been involved in agricultural youth organizations, such as the FFA and 4-H, often perform better and are retained at higher rates in college (Ball, Garton, & Dyer, 2001; Dyer and Breja, 1999; Dyer et al., 1996). These findings are consistent with those of Rush (1991). Rush further reported that students who scored below a 19 on the ACT were more likely to have a low first semester GPA (M=1.83), and their GPA remained low for the first five semesters.

Studies have been conducted that have addressed the issue of whether students who enter a four-year institution straight out of high school are different from students who enter as a transfer student. Manski and Wise (1983) reported that students entering four-year institutions had higher SAT scores than students entering two-year institutions. Rocca and Washburn (2004) reported that students entering the College of Agricultural and Life Sciences at the University of Florida as new freshmen straight out of high school had higher ACT and SAT scores than students who entered the college as transfer matriculants. Little empirical evidence exists related to the academic performance of new freshmen versus new transfer students in colleges of agriculture.

Influence of Context Variables on Academic Efficiency

Fewer studies exist, especially in colleges of agriculture, that have examined the influence of context variables on academic efficiency. However, as Gillmore and Hoffman (1997) pointed out, academic efficiency is nonetheless important. Frick and Crawford (2001) suggested that retention is becoming a major concern for universities due to new information placing high financial value on the retention of every student. Garton et al. (2000) suggested that the correct criteria is being used to select students for admission to college, but that the criteria has limited power and value to predict student retention. To quote Carey (2004), "The fundamental truth is that students will not learn what institutions want them to learn it they are not around to learn it" (p 7). It is a disservice to invest time and money in recruiting high school students who exhibit those traits of strong academic success if those students do not remain in college to attain a degree. While academic achievement is often measured in terms of GPA, academic efficiency can be described in terms of time to degree and retention.

Rush (1991) reported that the retention rate of students who scored below a 19 on the ACT was much lower then the students who had scored above a 19. In his study, 83.2% of the students who scored above 19 on the ACT would return for a second year of studies while only 55.8% of those students who scored below 19 on the ACT would return for a second year of school. Rush also found a correlation between high school GPA and the number of credits successfully completed by College of Agricultural and Life Sciences students at the University of Idaho. Students that achieved the highest GPA in high school successfully completed more college credits per semester than those students who earned a lower high school GPA.

Cole and Boker (1989) found that high school agriculture students tend to select a major, change that major less often, and complete a university degree in fewer semesters than non agriculture students. Students had no perception of a difference in the ability of agriculture programs and college preparatory programs in preparing them for college. A significant relationship between retention for the sophomore year and a students' involvement in agricultural youth organizations like FFA/4-H has been found (Ball et al. 2001). Cole and Fanno (1999) published findings of a study at Oregon State University which found that students with a strong background in FFA and 4-H did not leave the college at as high a rate as those who did not have that background. Students that came from schools that offered agricultural education and FFA, where they were active participants, had more perseverance and motivation to reach the goal of attaining a degree rather than quitting college after a year or two. These students once recruited stayed the course and were often retained within the college of agriculture.

According to Ball et. Al. (2001),

> Colleges of agriculture across the nation must find ways to respond to the challenges of a population and a workforce in the midst of a "brain drain." Consequently, a research base is needed to identify characteristics that can be used in predicting the academic performance and retention of students in colleges of agriculture. (p. 56)

This study contributes to this knowledge base by using data collected over a 17-year period to examine the relationship between context variables on the product variables of academic achievement and academic efficiency.

Purpose and Objectives

This study was conducted as part of a larger study designed to describe incoming students in the College of Agricultural and Life Sciences at the University of Idaho and assess their ultimate success in college. The purpose of this study was to examine the relationship between pre-collegiate demographic characteristics commonly used as predictors of student success and the academic achievement and efficiency of students entering the college over a 17-year period. The specific objectives of this study were to:

1. Examine the relationship between academic achievement and selected pre-collegiate demographics of students who began study in the fall semesters of 1985-2002.
2. Examine the relationship between academic efficiency and selected pre-collegiate demographics of students who began study in the fall semesters of 1985-2002.

Methods and Procedures

Population and Sample

The target population for this study included all incoming students new to the College of Agricultural and Life Sciences at the University of Idaho during the fall semesters 1985 through 2002 with the exception of students in the School of Family and Consumer Sciences. A total of 2,027 students were identified and included in the population frame and 1,459 instruments were returned. Complete data was collected from 1,444 participants for an overall response rate of 71.12%. Nonresponse error was addressed in this study by comparing early responders to late responders for statistical differences (Ary, Jacobs, & Razawieh, 1996; Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). For the purposes of this study, late responders were defined as the later 50% of the respondents (Lindner et al.). No statistical differences in data obtained from the early responders and that obtained from the late responders was found.

Instrumentation

The data used in this study was collected from two different sources. The first instrument was a survey of pre-collegiate demographic characteristics developed by the Department of Agricultural and Extension Education as part of a multi-year study of incoming students to the College of Agricultural and Life Sciences. The instrument gathered data such as gender, high school attended, types of courses taken in high school, FFA and/or 4-H participation, high school GPA, types of visits made to the university while in high school, whether or not a family member attended the university, and type of residence. The validity and reliability of the instrument was established by a panel of experts and pilot studies conducted by the department. The second source of data was obtained from the students' permanent university records and was supplied by Management Information Services at the university. Management Information Services was provided a list of student identification numbers, and using that list compiled the following data for each study participant: official high school GPA, first semester college GPA, average college GPA, cumulative college GPA, number of semesters on probation, number of disqualifications, number of Dean's referrals, degree(s) attained, number of credits per semester, total number of credits earned, and number of majors declared.

Data Collection and Analysis

The survey instruments were coded with individual identification numbers for follow-up purposes. Participants were mailed a cover letter, survey instrument, and return envelope. As the researcher received completed instruments, the participants were removed from the list for future contacts. Approximately three weeks after the first mailed contact, nonresponders received replacement packets. In an effort to increase the overall response rate, two additional contacts were made by mail, for a total of four, with participants who had not responded. Once received, survey questionnaires were coded for electronic data entry and entered into a database. A total of 1459 were returned and entered. Missing data were coded as system missing. All 1459 survey questionnaires were considered usable. However, when pairing this data with the data obtained from Management Information Services, complete data was not available for 15 of the 1459 participants, yielding 1444 complete sets. Data were analyzed using SPSS® statistical package for Windows™. The .05 level of significance was selected apriori for use in interpreting the data.

Because the most often time frame used to measure graduation rates is six years (Carey, 2004), participants in this study were divided into two groups for analysis related to academic efficiency in terms of degree attainment. The first group, students who entered in 1995-1998, have had six or more years to complete their degree. The second group, students who entered in 1999-2000, have not had the standard six years in which to complete their degree. However, it must be noted that both groups include new transfer students who would be expected to graduate in less than the standard six year time frame.

Results and Findings

Objective One

One-way analysis of variance between each of the selected academic achievement variables and the context variables are presented in Table 1. The First Semester GPA, (F=21.99, p<.05), Average Semester GPA (F=18.44, p<.05), and Cumulative GPA (F=23.15, p<.05) were significantly higher for students who reported not enrolling in a high school agricultural education program as compared to those students who did enroll in a high school agricultural education program. When analyzed as a function of FFA participation, students who reported having been in FFA had significantly lower First Semester GPA, (F=21.67, p<.05), Average Semester GPA (F=15.75, p<.05), and Cumulative GPA (F=18.50, p<.05), than their counterparts who reported not having participated in the FFA.

First Semester GPA, (F=4.40, p<.05) was significantly different as a function of whether or not students came from a farm/ranch background. In this achievement area, students who reported having come from a non-farm/ranch background had significantly higher first semester grade point averages than those students who had a farm/ranch background. There were no statistical differences found in any of the other academic achievement variables as a function of type of residence.

When analyzed by gender, females had significantly higher First Semester GPA, (F=26.77, p<.05), Average Semester GPA (F=14.10, p<.05), and Cumulative GPA (F=12.75, p<.05), than their male counterparts. No statistical differences were found in any of the achievement variables as a function of whether a student entered as a new freshman or as a new transfer student.

Table 1. *One-Way ANOVA of Academic Achievement Variables by Context Variables*

Context	First Semester GPA						Average Semester GPA						Cumulative GPA					
Variable	n	M	SD	F	df	sig	n	M	SD	F	df	sig	n	M	SD	F	df	sig
No HS Ag	691	2.96	0.85	21.99	1	0.00	691	2.83	0.81	18.44	1	0.00	690	2.95	0.73	23.15	1	0.00
HS Ag	748	2.74	0.88				751	2.64	0.85				749	2.75	0.80			
No FFA	763	2.95	0.85	21.67	1	0.00	763	2.81	0.81	15.75	1	0.00	762	2.93	0.74	18.50	1	0.00
FFA	676	2.73	0.89				679	2.64	0.86				677	2.75	0.81			
Female	739	2.96	0.83	26.77	1	0.00	740	2.81	0.81	14.10	1	0.00	739	2.92	0.75	12.75	1	0.00
Male	693	2.72	0.91				695	2.64	0.86				693	2.77	0.80			
Farm/Ranch	704	2.80	0.88	4.40	1	0.04	706	2.71	0.84	0.66	1	0.42	704	2.81	0.79	3.32	1	0.07
Non-Farm	735	2.89	0.87				736	2.75	0.84				735	2.88	0.76			
Freshman	1032	2.84	0.87	0.06	1	0.81	1033	2.72	0.83	0.76	1	0.38	1032	2.82	0.78	2.27	1	0.13
Transfer	407	2.85	0.89				409	2.76	0.86				407	2.89	0.77			

Objective 2

One-way analysis of variance between each of the selected academic efficiency variables and the context variables are presented in Table 2. Total semesters of college attended, (F=5.20, p<.05), and number of majors declared (changed) (F=5.86, p<.05), were significantly different as a function of participation in high school agriculture programs. Those students without high school agriculture classes attended significantly more semesters and declared more majors than those students who had enrolled in agriculture classes in high school. There were no statistical differences found in any of the other academic efficiency variables as a function of high school agricultural education program participation.

The same findings were obtained when the data was analyzed for FFA participation. Students with FFA membership attended significantly fewer semesters (F=3.85, p<.05) and changed their major fewer times (F=6.65, p<.05) than those students without FFA membership. There were no statistical differences found in the other efficiency areas based on whether or not participants had been FFA members.

One-way analysis of variance between each of the selected academic efficiency variables and type of residence revealed that number of majors (F=9.17, p<.05) and average semester credits (F=5.82, p<.05) were significantly different as a function of type of residence. In these efficiency areas, those students from a farm/ranch background had significantly fewer numbers of majors and took more average semester credits than those students without a farm/ranch background. There were no statistical differences found in total number of credits or total semesters attended as a function of residence type.

Only total credits, (F=4.86, p<.05) and average semester credits (F=4.03, p=.05), were significantly different as a function of gender. In these efficiency areas, females had significantly fewer total credits but took more credits each semester, on average, than males. There were no statistical differences found in any of the other efficiency variables based on gender.

When analyzed by entry status, total credits (F=109.46, p=<.05), total semesters attended (F=74.86, p<.05), number of majors (F=14.36, p<.05), and average semester credits (F=33.67, p<.05), were significantly different. Students who entered the college as new freshman had significantly fewer total credits, attended more total semesters, had more majors, and enrolled in more semester credits on average than students who entered as new transfer students.

Frequencies of degree attainment by year group using the six year graduation rate are presented in Table 3. Of the 1,444 new students who entered during the fall semesters 1985 through 2002, only slightly more than half (52.8%, n=762) have attained a degree. However, when divided into year groups, almost two-thirds (63.5%, n=694) of participants in the 1985-1998 year have attained a degree whereas over three-quarters (80.6%, n=282) of participants in the 1992-2002 year group have not attained a degree.

Table 2. *One-Way ANOVA of Academic Efficiency Variables by Context Variables*

Context	Total Credits						Average Semester Credits					
Variable	n	M	SD	F	df	sig	n	M	SD	F	df	sig
No HS Ag	691	107.58	48.71	3.59	1	0.06	691	13.33	3.54	1.09	1	0.30
HS Ag	752	102.50	52.80				751	13.13	3.72			
No FFA	763	107.05	49.31	2.82	1	0.09	763	13.17	3.57	0.34	1	0.56
FFA	680	102.55	52.61				679	13.29	3.72			
Female	740	102.04	50.72	4.86	1	0.03	740	13.41	3.59	4.03	1	0.05
Male	696	107.97	51.06				695	13.02	3.68			
Farm/Ranch	706	104.04	50.63	0.42	1	0.52	706	13.46	3.55	5.82	1	0.02
Non-Farm	737	105.78	51.22				736	13.00	3.71			
Freshman	1033	96.41	51.23	109.46	1	0.00	1033	13.57	3.39	33.67	1	0.00
Transfer	410	126.40	43.43				409	12.35	4.07			

Table 2 (continued)

Context	Total Semesters Attended						Number of Majors Declared					
Variable	n	M	SD	F	df	sig	n	M	SD	F	df	sig
No HS Ag	691	6.69	3.43	5.20	1	0.02	692	1.69	0.84	5.86	1	0.02
HS Ag	752	6.27	3.47				752	1.58	0.81			
No FFA	763	6.64	3.43	3.85	1	0.05	764	1.69	0.83	6.65	1	0.01
FFA	680	6.28	3.48				680	1.57	0.82			
Female	740	6.42	3.41	0.33	1	0.57	741	1.67	0.82	2.28	1	0.13
Male	696	6.53	3.50				696	1.60	0.84			
Farm/Ranch	706	6.34	3.38	1.91	1	0.17	707	1.57	0.78	9.17	1	0.00
Non-Farm	737	6.59	3.53				737	1.70	0.87			
Freshman	1033	6.95	3.57	74.86	1	0.00	1034	1.68	0.87	14.36	1	0.00
Transfer	410	5.25	2.81				410	1.50	0.69			

Table 3. *Degree Attainment by Year Group Using Six Year Graduation Rate*

		Years					
		1985-1989		1999-2002		Total	
Achievement Variable	Value Labels	n	%	n	%	n	%
Degree Attained	Yes	694	63.4	68	19.4	762	52.8
	No	400	36.6	282	80.6	682	47.2

Conclusions, Implications, and Recommendations

Findings of this study showed that students with high school agricultural education program experience and FFA membership performed at significantly lower levels as compared to students without agricultural education and FFA experience. Students that had enrolled in high school agriculture programs had slightly lower first semester GPAs, average semester GPAs, and cumulative GPAs. Of the students that enrolled in agricultural education classes in high school, slightly over half of those students became members of the National FFA Organization. Those students who were FFA members in high school also had significantly lower first semester GPAs, average semester GPAs and cumulative GPAs. While statistically lower GPAs were identified, it must be noted that GPAs of students with high school agricultural education experience and FFA membership were still more than meeting the minimum standards of a student in good standing with the university.

When comparing the GPA’s of farm/ranch residence and non-farm/ranch residence, significant differences were found. Participants from a non-farm/ranch residence had higher first semester GPA, average GPA, and cumulative GPA’s than those students from farm/ranch backgrounds. While there is a significant statistical difference in these measures of academic achievement, there is not a significant practical difference. Both groups have acceptable GPA’s that are well within the acceptable GPA range for a student in good standing. A difference of 0.07 in Cumulative GPA has no practical application in determining that the type of residence indicated the success of a student.

Significant differences were found in the academic achievement of females as compared to males. Females out-performed their male counterparts in first semester GPA, average GPA, and Cumulative GPA. Females had an average GPA that is 0.2 points higher than males on a 4.0 GPA scale. While statistically different, the Cumulative GPA of both males and females were still more than meeting the minimum standards of a student in good standing with the university.

When comparing the entry status of students, there was no statistical difference found between new freshman and those new students that had transferred to the university. However findings of this study are consistent with Rocca and Washburn (2004) who reported that incoming freshmen had higher standardized tests scores than incoming transfer students. It has long been proposed that taking core general education classes at a junior college is advantageous for many reasons such as lower costs, smaller class sizes, and increased individualized attention, thus helping transfer students to increase academic aptitude to meet the admission requirements of four-year institutions. Findings of this study show that students entering the university as transfer students do not have an advantage in terms of academic achievement over those students who enter as freshmen. Each group is more than meeting the minimum standards set by the university to be a student in good standing.

The academic efficiency of students was also evaluated to determine if pre-collegiate demographics exerted significant influence. High school agriculture enrollees attended fewer semesters than those students who did not enroll in agriculture education while in high school. Students who did not enroll in agriculture classes changed their major significantly more often than high school agriculture students. FFA members show the same type of statistical differences in both total semesters attended and the number of majors attained in considering the academic efficiency. These findings are consistent with the findings of Cole and Boker (1989) and would suggest that high school agricultural education students and FFA members were more efficient in college and more sure of their major, but while there is a statistical difference, the practical significance is minimal.

When comparing efficiency variables by gender, females accumulate fewer total credits than males. However, females take slightly more average semester credits than their male counterparts.

New freshmen were found to have a significant statistical difference in that they took fewer credits, attended more semesters, declared a slightly higher number of majors, and took more credits per semester than new transfer students. It is not surprising that transfer students attended fewer semesters. It is to be expected that transfer students would already have several credits completed as opposed to new freshman who are just starting on their college curriculum and core requirements. Transfer students also tended to declare fewer majors. Perhaps this is because they were more focused on their future career plans and already well on their way with the classes needed. New freshman, on the other hand, may have still been exploring their options and not yet committed to just one field of study.

Based on the findings and conclusions of this study, it is recommended that the college continue to utilize strategies that recruit those students with agriculture experience, such as being involved in a high school agricultural education program, being a member of the National FFA Organization, and being raised on a farm/ranch. While this study showed that over the last 17 years combined, these students did not perform as well as students without such experience, they were still successful in college and more than met the minimum academic achievement standards. Recruitment efforts should focus on attracting students with agricultural backgrounds, especially those that bring higher academic abilities to college.

Findings of this study also identified transfer students as successful students within the college. While the students who entered the university as transfer students had lower high school GPAs and standardized tests scores that may have prevented them from enrolling as a freshman, they nevertheless performed equally as well as students that did enter as new freshmen. It is recommended that future recruitment efforts include strategies to attract, enroll, retain, and graduate transfer students.

Retention in this study appeared to be an area of concern. Over one-third of the students who entered the college from 1985-1998 failed to earn a degree. It is not enough to get students into the college. Emphasis should also be placed on keeping them enrolled and in good standing with the university. It is recommended that students not be forgotten once attracted and enrolled. Cole and Fanno (1999) reported that students without a strong background in FFA left college at a higher rate than students with such a background. Further study should investigate the relationship between college students who were enrolled in high school agricultural education classes and FFA members and their attrition rate once enrolled in the college.

It is recommended that future studies involve the collection of data related to the out-of-class activities of participants while in college. Data such as whether or not a student is employed, and, if so, how many hours they work per week, as well as overall involvement level in collegiate activities and organizations and personal responsibilities is needed to better understand a student's academic performance in terms of achievement and efficiency. One of the limitations of this study is that it used two sources of information and conducted post hoc analyses of the data to examine relationships between variables. There were not enough controls in the data set to control for extraneous variables. Future studies should involve the collection of data such that multiple variables could be controlled.

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Creative Thinking and Learning Styles in Undergraduate Agriculture Students

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Abstract

Creativity is multidimensional and still not completely understood by psychologists. Much research has given evidence that cognitive style of creative thinking is independent of cognitive level of creative thinking. However, is a student's learning style similar to their cognitive style of creative thinking? This study attempted to examine the presence or absence of relationships between student learning styles and student creative thinking. To determine this relationship the Torrance Test of Creative Thinking and the Gregorc Style Delineator were given to students enrolled in an oral communication course offered by the Department of Agricultural Education and Communication at the University of Florida.

The researchers found no significant relationships between creative thinking ability and learning style, except for Abstract Random learners who scored lower in the creativity constructs of fluency and elaboration. Also, students scored high in the creative construct of elaboration with mean scores in the 99th percentile and originality was the only creativity construct with mean scores below the 75th percentile. The results of this study indicate that more research is needed in the area of learning styles and creative thinking.

Introduction and Theoretical Framework

New ideas continually change our world. In every domain, the increase of knowledge and the communication of this knowledge lead to scientific breakthroughs that make our lives better. This phenomenon requires business firms to seek creative individuals to generate more ideas to maintain the firm's competitive advantage. How do colleges and universities supply firms with graduates capable of producing new ideas? What are the cognitive skills of a creative person?

Scholars in agricultural education have investigated higher order thinking skills, styles of learning, and student achievement, but there have been few attempts involving more than one trait that have been completed to allow faculty members in agricultural disciplines to utilize the findings in college classrooms (Rudd, Baker, & Hoover, 2000). This study attempted to examine both student learning styles and their ability to think creatively and then to identify relationships between the two. That is, does the style by which a student learns correlate with how they creatively think? This inquiry should help faculty preparers to teach for creativity in light of the relationship (or absence of a relationship) with student learning style.

Learning Styles

Learning style theory asserts that students become successful academically in learning environments that match their own learning style (Kolb, 1984). Although students have a learning style preference, all learners have the ability to learn in settings that conflict with their preferred learning style. Rudd, Baker, and Hoover (2000) found that there was no relationship between learning styles and critical thinking or intelligence. Scholars in agricultural education have concluded that learning styles effect student learning (Cano, 1999; Dyer, & Osborne, 1996; Garton, Spain, Lamberson, & Spiers, 1999). These studies found significance between multiple learning styles and student achievement.

The Gregorc (1982a, 1982b) Style Delineator divides learning styles into how people acquire information (perception) and how people store information (ordering). Perceptual capabilities are categorized as abstract or concrete while ordering capabilities may be sequential or random. Quadrants are thus formed yielding four mediation channels: Concrete Sequential (CS), Concrete Random (CR), Abstract Sequential (AS), and Abstract Random (AR). Gregorc further asserts that many individuals have a preference for one or two of these channels with little flexibility in adapting to learning situations encompassing different learning styles.

Gregorc (1979) proposes that behaviors assist in determining how a person's mind learns, operates and adapts to the environment. According to Gregorc (1982a), an individual dominant in one of the four mediation channels will have distinct learning preferences. An individual with a CS learning style will approach learning sequentially in a step-by-step linear format. Their thinking process is instinctive and deliberate and their creative skills are focused on the refinement and duplication of an already existing idea. Concrete Random (CR) learners approach learning in random three dimensional patterns. Learners with a CR preference think intuitively and impulsively and their creativity is described as inventive, original and visionary. Individuals possessing an AS learning style order information sequentially with various branches. They think logically and are analytical. An AS learner will express creativity by synthesizing ideas based on theory. The AR learner orders information randomly in web-like structures. A learner with AR characteristics will think using emotion and will be critical. Their creativity originates in imagination and the fine arts. Gregorc further elaborates that there are other factors not measured by the Gregorc Style Delineator that affect behavior, however they are not as salient as perception and ordering.

Even though learning styles have been suggested as a factor affecting student learning, the literature has expressed restrictions on the theory. Price (2004) found discrepancies between students' self-reported learning style and actual study processes. She concluded from the use of the Learning Style Questionnaire, the Group Embedded Figures Test and the Cognitive Style Analysis that "the value of learning style tests is limited" (p. 696). Jones, Reichard, & Mokhtari (2003) found that learning styles are "subject area sensitive" (p. 373) with students moving from one learning style quadrant to another based on the learning strategies required for the particular situation.

Creative Thinking

Creativity is still perplexing to many psychologists with many theories unable to completely explain the construct. Research into creative thinking can be divided into the creative product, process, person and place (environment). This study focused on creative thinking skills of the person. Kirton (1994) in his theory of adaptors and innovators separates creative thinking into cognitive style and cognitive level with the two being unrelated statistically. He further elaborates by describing innovators as undisciplined, looking for alternative avenues of solution and approaching tasks from unsuspected angles; alternatively, he describes adaptors by precision, reliability, efficiency, prudence, discipline and conformity (p. 10). An individual who has taken the Kirton Adaption-Innovation (KAI) Inventory is placed on a continuum of adaption and innovation in terms of how they view problems.

Much research pertaining to an individual's creative level has been attributed to the work of Guilford (1950; 1975) and Torrance (1998) in developing constructs such as fluency, flexibility, originality, elaboration and redefinition. The Torrance Test of Creative Thinking (TTCT) is an instrument used to measure these constructs. More specifically the TTCT measures creative thinking capabilities including: fluency, flexibility, originality, elaboration, abstractness of title, resistance to closure, emotional expressiveness, articulateness, movement or action, expressiveness, synthesis or combination, unusual visualization, internal visualization, extending or breaking boundaries, humor, richness of imagery, and fantasy. Torrance et al., (1990) states that the possession of these abilities does not guarantee creative behavior and that motivations and skills are necessary for creative achievement.

There has been little research presented concerning creativity in the agricultural education literature despite the close link between creativity and problem solving. There is no differentiation between the cognition required for problem solving and that needed for creativity (Kirton, 2003; Torrance & Goff, 1989). However, Baker, Rudd and Pomeroy (2001) used the TTCT and the California Critical Thinking Disposition Inventory (Facione, Facione, & Giancarlo, 1996) to determine the relationship between critical thinking and creative thinking. Their analysis found no significant relationship between the two manners of thought.

The increased interest in cognitive level and cognitive style in the creative thinking literature have lead researchers to examine other measures that could possibly provide insight into these two facets of creativity. Correlations have been found between the TTCT and KAI in the constructs of originality (.35), flexibility (.33), and elaboration (.35) (Kirton, 2003). Kirton argues that because these correlations exist, the TTCT is not a pure measure of cognitive level (p. 161). Isaksen and Puccio (1988) conclude that there needs to be a better understanding between the relationship of cognitive level and cognitive style.

Torrance (1982) found relationships between the Human Information Processing (HIP) Survey (Torrance, Taggart, & Taggart, 1984), a measure of an individual's problem solving style by left brain, right brain, integrated or mixed, and the Gregorc Style Delineator. Concrete Sequential (CS) styled learners held significant positive correlations (r = .49 and .67) with the Left Hemisphere scale and correlated negatively (r = -.40 and -.35) with the Right Hemisphere scale. The CR learning style held significant negative correlations (r = -.41 and -.68) with the Left Hemisphere scale and correlated positively (r = .38 and .33) with the Right Hemisphere scale.

In a study of undergraduate students (N = 135 and N = 109) enrolled in a problem solving class, Joniak and Isaksen (1988) studied the relationships of the Gregorc Style Delineator and the KAI. They found correlations with CS (-.56) scores and AS (-.38) scores inversely related to KAI total scores, while correlations with CR (.55) and AR (.29) scores were positively related to the KAI total scores (p. 1046). This provides evidence that individuals with sequential ordering are typically adaptors on the KAI and individuals with random ordering appearing to be innovators. However, Joniak and Isaksen discovered the reliability of the Gregorc Style Delineator in this study had low alpha coefficients (.23 to .66).

Purpose and Objectives

This purpose of this study was to explore the relationship between undergraduate students' level of creative thinking and their learning style.

The specific objectives of this study were to:

1. determine selected demographic information;

2. determine student level of creative thinking;

3. determine student learning styles, and;

4. compare student learning styles, student level of creative thinking, and selected student demographic information.

Methods

Students enrolled in Effective Oral Communication (AEE 3030) during the fall semester of 2003 were selected for this census study. All students at the University of Florida enrolled in the College of Agriculture and Life Sciences are required to take AEE 3030 or an equivalent oral communication course, therefore the class was selected to represent a broad range of majors.

Instrumentation

Demographic data were collected with an instrument developed by the researchers. Items on this instrument were chosen by the researchers based on demographic information frequently found in the literature concerning learning styles (Cano, 1999) and creativity (Baker, Rudd, & Pomeroy, 2001).

The Gregorc Style Delineator was administered to measure the dominant learning style of students into combinations of Concrete Sequential, Concrete Random, Abstract Sequential and Abstract Random. A score of 27 or higher in one of the four categories specifies a dominant learning style with each category having a range from 10-40. It is possible for participants to have more than one learning style (two categories having scores at or above 27) or an individual not having any preference for a learning style (no categories have a score at or above 27).

The author of the Gregorc Style Delineator developed the instrument with a phenomenological approach rather than an empirical approach (Benton, 1995). Gregorc (1982b) reported reliability alpha coefficients .89 to .93. and predictive validity correlations .55 to .76. However, many questions have been raised concerning this instrument. Because the sum of scores for each construct always equals 100, there is no reflection of intensity of a learning style in relation to the other scales questioning if a higher score really indicates a dominant style (Benton, 1995). In a factor analysis, Joniak and Isaksen (1988) found only 4 to 6 of the 40 words used as describers on the Gregorc Style Delineator loaded on each of the four constructs. The author of the instrument has promised that the Gregorc Style Delineator "should not be relied on for predictive or diagnostic purposes" (Ferro, 1995) until further research is conducted. Despite these limitations, the Gregorc Style Delineator's correlation with other levels of cognitive style justified the use of this instrument.

The TTCT provides quantitative standardized scores and national percentiles for the following constructs: 1. fluency – the ability to produce a number of interpretable and meaningful ideas; 2. originality – unusualness or uncommonness of response; 3. elaboration – number of details that contribute to an idea or response; 4. abstractness – ability to produce good titles capturing the essence of the idea or response; 5. resistance to premature closure – ability to delay closure long enough for original ideas to be possible. Intra-rater reliability coefficients are reported by the developer above the .90 level with content and construct validity established (Torrance et al., 1990).

Torrance (1974) determined predictive validity of the TTCT by measuring quantity of creative achievements, quality of highest creative achievement, and creativeness of future aspirations ($N = 46$). After six years, results yielded validity coefficients of .50, .46, and .51 respectively with the total creative thinking score. In a longitudinal case study of 40 years ($N = 18$), Millar (2002) found predictive validity of the TTCT by interviewing participants and observing creative achievements of students who scored high on the TTCT in 1958. Problems with the TTCT include measuring the construct of originality based on frequencies of 500 unspecified participants with no frequency criteria used (Chase, 1985). The variable "creative strength" (Chase, 1985) is also unclear. The TTCT does not measure every facet of creativity (Treffinger, 1985), which has never been the claim of the developer. Clapham (2004) found that divergent thinking is multidimensional and instruments measuring creativity are not interchangeable. This includes the TTCT Verbal instrument and the TTCT Figural instrument which only shared 12.96% of their variance even though the two instruments presume to measure divergent thinking. Given the above limitations, the TTCT is "the most researched and analyzed instrument among those available" (Treffinger, 1985) in measuring creative thinking.

The Torrance Test of Creative Thinking – Form A (Figural), Gregorc Style Delineator and an instrument asking demographic information were administered to the oral communication class in the fall semester of 2003. The TTCT was scored by the researchers who were trained by Scholastic Testing Service, Inc. and cross checked by another trained individual not associated with this study. A bi-variate correlation procedure was used to calculate Pearson's correlation coefficient to determine relationships. Descriptive statistics and cross-tabulations were used to determine frequencies.

Results and Findings

The TTCT had a post-hoc reliability alpha coefficient at .81 and the Gregorc Style Delineator had post-hoc reliability alpha coefficients for the constructs of CS (.72), AR (.70), AS (.49) and CR (.64).

The first question addressed by this study was to determine selected demographic information of the participants. A total of 110 students participated in the study. The population consisted of 69 females and 41 males. The majority of the students were sophomores (51.8%) with a mode age of 19 years. A total of 27 majors were represented with only one major (microbiology) contributing to more than 10% of the population. The self-reported ethnicities of the students were Caucasian (59.1%), Hispanic (13.6%), Asian (11.8%), African American (10.9%) and other (4.5%). Students in this class held a self-reported cumulative GPA mean of 3.28 (SD = 0.47).

The second question addressed by this study was to determine the student level of creative thinking as determined by the TTCT. The mean total score of the TTCT of this population was 122.1 (SD = 17.9) ranking them in the 80th percentile. The scores ranged from a low score of 51.0 (1st percentile) to a high score of 160 (99th percentile). A total of 22 students scored below the 50th percentile, while a total of 16 students scored at the 99th percentile. Means of the subscale scores for the population include: elaboration 137.0 (99th percentile), resistance to closure 111.6 (85th percentile), abstractness of title 110.9 (83rd percentile), fluency 108.7 (78th percentile), and originality 102.4 (60th percentile). See Table 1.

Table 1. *Average Scores of Creative Thinking N = 110*

Creative Thinking Construct	M	National %	SD	Min	Max
Elaboration	136.96	99	20.93	68	160
Resistance to Closure	111.58	85	21.80	67	148
Abstractness of Title	110.93	83	28.30	0	160
Fluency	108.69	78	22.03	56	154
Originality	102.35	60	23.63	40	150
Total Score	122.10	80	17.87	51	160

The third question addressed by this study was to determine learning styles of the participants. The Gregorc Style Delineator categorizes participants who score between 27 and 40 points a dominant learning style. Students in this population were categorized as a combination of CS and AS styles (20.9%), a combination of AR and CR styles (20.0%) and an additional 17.3% of the students were categorized as CS styles. See Table 2 for additional frequency information concerning gender.

Table 2. *Learning Styles by Gender N = 110*

	Total		Male		Female	
Learning Style	*f*	%	*f*	%	*f*	%
CS-AS	23	20.9	10	24.4	13	18.9
AR-CR	22	20.0	9	22.0	13	18.9
CS	19	17.3	6	14.6	13	18.9
CR	13	11.8	8	19.5	5	7.2
AR	11	10.0	2	4.9	9	13.0
CS-CR	9	8.2	3	7.3	6	8.7
AS	5	4.5	1	2.4	4	5.8
CS-AR	3	2.7	0	0	3	4.3
AS-CR	3	2.7	2	4.9	1	1.4
AS-AR	2	1.8	0	0	2	2.9

Note. Scores at 27 or higher determined dominant learning style.

The fourth question addressed by this study was to compare student learning styles, student level of creative thinking, and selected student demographic information. Slight significant positive and negative correlations were found within the data when comparing dominant learning styles with demographic information. Considering gender, 36.2% (n=25) of the females held an AR dominant learning style. There was small significant correlation (r = .249) between females and the AR style. Males in the population displayed a small significant correlation (r = .206) with a CR dominant style, with 53.7% (n=22) of the males in the population as CR dominant learners. The data shows a small, significant correlation between the CS dominant and self-reported cumulative GPA (r = .239). A large majority 87.0% (n=47) of the CS dominant learners reported a GPA higher than a 3.0. Students categorized as a CR dominant style had a small negative correlation (r = -.267) with GPA. Nearly 1/3 (n=13) of the CR learners reported a GPA below 3.0. Students with an AS dominant style had a small correlation (r = .228) with 45.5% (15) of AS dominant students having a GPA between 3.0 and 3.5. See Table 3.

Table 3. *Dominant Learning Style by GPA N=110*

	GPA >3.75		3.5-3.75		3.0-3.5		2.0-3.0		1.0-2.0	
Learning Style	f	%	f	%	f	%	f	%	f	%
CS	13	24.0	10	18.5	24	44.4	5	9.3	0	0
CR	4	8.5	7	14.9	23	48.9	11	23.4	2	4.2
AS	7	21.2	7	21.2	15	45.5	2	6.1	0	0
AR	3	8.3	8	22.2	16	44.4	8	22.2	1	2.8

Note. Individuals can be classified in more than one dominant learning style resulting in greater frequencies than individuals. Percentages reported as total within GPA category.

One significant correlation was discovered when comparing TTCT scores to students' demographic information. Considering gender, a correlation was found with the creative thinking construct of elaboration (r = .374) with 69.6% (48) of females scoring in the 99th percentile; while less than half (43.9%) of males scored in the 99th percentile in elaboration. See Table 4.

Table 4. *Correlations of Creative Thinking and Selected Demographics N = 110*

Creative Thinking Construct	Gender	Cumulative GPA	Major	Class Status
Elaboration	.374*	.067	.164	-.127
Resistance to Closure	-.004	-.134	-.024	.008
Abstractness of Title	-.047	.114	.068	-.134
Fluency	.077	.122	.095	.054
Originality	.080	.050	.054	.050
Total Score	.125	.078	.118	-.097

* designates significance at .05.

Minor correlations were discovered comparing constructs of creative level to dominant learning styles. Students categorized as an AR dominant style learner expressed a small negative correlations with fluency and originality (r = -.206 and -.223). See Table 5.

Table 5. *Correlations of Creative Thinking and Learning Styles*

	Learning Style			
Creative Thinking Construct	AR	CR	AS	CS
Fluency	-.206*	-.011	.031	.182
Originality	-.223*	-.128	.180	.186
Elaboration	.072	.043	.030	-.139
Abstractness of Title	-.060	-.028	.084	.012
Resistance to Closure	-.071	.093	-.124	.083
Total Score	-.111	.023	.048	.042

Note. N = 110. * designates significance at .05.

Conclusions

The students participating in this study were predominantly female (62.7%) and represented 27 majors. The mode was 19 years of age. Individuals were mostly Caucasian

(59.1%) with the remainder of the students attributing to a diverse population of Hispanic (13.6%), Asian (11.8%), African American (10.9%), and other (4.5%). No correlations were found between ethnicity and creative thinking ability.

According to the TTCT, students' mean total creative thinking ability score (122.1) was relatively high at the 80th percentile. Students scored incredibly high in the TTCT construct of elaboration with the mean (136.96) at the 99th percentile. Specifically, 48 females (69.6%) scored in the 99th percentile in the construct of elaboration, while 18 males (43.9%) scored at the same level in elaboration.

Approximately one third (36.2%) of the females in the population were AR dominant learners, while approximately half (53.7%) of the males in the population were CR dominant learners. There were significant correlations concerning learning style and self-reported cumulative GPA. In a particular area of interest, correlations were found with students having a CS dominant learning style and self-reported higher cumulative GPA with 87.0% (47) having above a 3.0. Furthermore, 27.7% (13) of students having a CR dominant learning style held a cumulative GPA at or less than 3.0.

There were no correlations between learning styles and creative thinking ability; except for AR learners who had lower scores in fluency and originality. According to Kirton's (1994) adaption-innovation theory of cognitive style, all people have original ideas. However, adapters tend to produce a smaller number of original ideas that tend to be more relevant, sound, and useful; while innovators generate a larger number of original ideas of which many are not as sound, relevant or useful. If adaptors tend to have sequential perceptual capabilities and innovators tend to have random perceptual capabilities (Joniak, & Isaksen, 1988) then this study's findings conflict with previous research.

The Gregorc Styles Delineator suffered from poor reliability alpha coefficients for the constructs of AS (.49) and CR (.64). Despite the questions raised concerning this instrument, it may have potential to be a measure of cognitive style of creative thinking defined by Kirton (1994), if further researched and developed.

Implications

- This study is limited to the population studied and the reader should not apply the results beyond this population of students.

- Gender is a significant variable in the creative ability construct of elaboration. Females tended to score high in elaboration with 69.6% (48) of the females scoring in the 99th percentile. Why does this exist? More research is needed to account for variables that can distinguish these differences.

- Originality is the only creative thinking construct with mean scores below the 75th percentile. Why is this construct lower than other constructs of creative thinking? More research is needed to examine the construct of originality and how it can be measured.

Faculty at the University of Florida may need to focus instruction to support students' ability to form original ideas.

- It is important to realize the slight relationship between learning style and creative thinking. Is learning style and cognitive style of creative thinking synonymous? Learning style research may have a potential impact on creativity if learning styles can be accurately measured. More research is needed to understand the significance of learning styles as a cognitive style of creativity and its implications in creatively solving problems.

- Learning styles were significantly related to the students' self-reported cumulative GPA with CS learners having higher cumulative GPA and CR learners having a lower cumulative GPA. If this is true, university faculty need to rethink their teaching methodology and design instruction to meet the needs of other learning styles, especially if learning style is not related to intelligence.

- Many questions were raised about the Gregorc Style Delineator, but it may have potential to measure cognitive style of creative thinking. The researchers recommend that the Gregorc Styles Delineator not be used until it is further researched and developed.

- Creative thinking is multidimensional with many factors contributing to the construction of an idea. Why did the creative thinking construct of elaboration score high in this study? More research is needed to determine if course design and teaching methodology has an affect on elaboration as well as other constructs of creative thinking.

- This study raises many questions for additional research. It is the researchers' hope that further investigation of cognitive style and cognitive level will improve curriculum to meet the demands of businesses' need for creative individuals.

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The Effects of Cue Summation on Student Cognition and Satisfaction in an Electronically-Delivered Secondary Agricultural Sciences Unit of Instruction

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Abstract

The development of electronic curriculum materials holds great promise and rewards for both educators and learners alike, but little research has been conducted to determine the effectiveness of incorporating multimedia components within an electronically-delivered unit of instruction. This research tested the theory of cue-summation (multiple cues across multiple channels) in a high school agricultural education setting and measured the effectiveness of the instruction and satisfaction level of the student.

Curriculum materials were created and placed on CD-ROM for asynchronous delivery capability. Materials comprised a week-long unit of instruction on milk processing and were developed in three treatments; text-only materials, text and an audio/video component, and audio/video and still images. These three treatments represented single cue, redundancy and cue summation, respectively.

one hundred five high school agriculture education students participated in the study. Instrumentation used included a pretest/posttest for cognition as well as researcher-developed satisfaction and demographic instruments.

The researchers found that students in treatments containing audio/video components scored significantly higher on the posttest than students who received text-only. Redundancy and cue-summation produced statistically similar posttest scores; however, students in the cue summation treatment group reported significantly higher satisfaction scores than students in the redundant condition group.

Introduction

In the ever-changing world of education, trends and innovations seem to come and go as often as classes of students. Teachers have little time to adopt new instructional techniques and curriculum before they are outdated and replaced with the "next big thing." In this fluid environment, one innovation seems to have the potential to become not only a common educational instrument, but one that holds great promise for the future of education. Distance education is not a new concept. The origins of the methodology can be traced back to correspondence courses, the so-called "home-study," first formalized by the Chautauqua Institute in 1883 (Moore & Kearsley, 1996).

With the rise of the Internet, educational institutions now have the ability to not only transfer text-based materials, similar to the original correspondence courses, but to provide the student with hypertext, audio, video, interactive chat and many other methods of instructional delivery. The teacher has now become a facilitator with the responsibility of collecting and disseminating information to the students in the most effective manner. Selecting a mode of delivery has become as important as the content.

For many facilitators, it remains difficult to adequately learn and apply the knowledge needed to incorporate multimedia aspects into a distance-delivered course. Computer programs, hardware, video cameras, microphones and web-servers all play major roles in adding multimedia to a distance course. If facilitators are expected to invest a great deal of time and expense into producing a distance course, they should expect that their efforts will result in an increase in learning and retention by the student when compared to the traditional, text-only version.

Theoretical Framework

This research was based on two theories of cognitive psychology. The overall theory was the theory of information processing. This theory focuses on how the human memory system acquires, transforms, compacts, elaborates, encodes, retrieves and uses information. The model divides the memory system into three main storage structures: sensory memory, short-term memory and long-term memory. Each structure is synonymous with a type of processing (Burton, Moore, & Holmes, 1995).

In the first type of memory, sensory memory, input is accepted primarily through sight and sound and is processed within three to five seconds. The sensory registers briefly hold the information until the stimulus is recognized or forgotten. According to Klatzky (1980), this assigns meaning to stimulus. For example, the letter "A" is recognized as a letter rather than just a group of lines. From the sensory memory, information travels to the short-term memory.

Information that is recognized and transferred to short-term memory can remain active for 15-20 seconds without rehearsal (Klatzky, 1980) and must be rehearsed, elaborated, used for decision making, or stored in long-term memory before it is forgotten. For this reason, Klatzky termed short-term memory, "working memory." According to Miller (1956), the short-term memory has room for about seven chunks of information, plus or minus two, depending on the individual. Because of this limited cognitive capacity, information must be coded and stored into long-term memory.

Long-term memory is an unlimited and permanent storehouse of information that is complex in structure and function. Long-term memory receives information from both sensory memory and short-term memory. Information in the sensory registers is compared to information in long-term memory for recognition, and long-term memory stores input from sensory memory and short-term memory.

The second theory that applies to this study is cue summation. This is an information processing theory that deals specifically with learning and retention in a multimedia environment. The cue summation theory states that learning is increased as the number of available stimuli are increased (Severin 1967a). Severin (1967b) goes on to state that: "Multiple-channel communications appear to be superior to single-channel communications when relevant cues are summated across channels, neither is superior when redundant between channels, and are inferior when irrelevant cues are combined (presumably because irrelevant cues cause interference between them)," (p. 397). In other words, the stimuli provided on different channels have to be relevant to each other or the distraction would cause a decrease rather than an increase in learning and retention.

Severin (1968) found that the combination of auditory signals with a visual presentation, providing a different but related cue to the stimulus object, was more effective in producing recognition than a combination with a visual presentation of the same cue – a redundant condition.

A unit of instruction on dairy processing was created using material provided by Instructional Materials Service (IMS). Three versions of this unit were copied to CD-ROM and distributed to high school agricultural education students. The three treatment levels reflected the characteristics of the theory of cue summation (Severin 1967a). The first treatment was a simple, text-only version of the curriculum. The second level included both text and an audio/video stream of the material. The third treatment level used the same audio/video stream but replaced the text with relevant pictures. Students were asked to view the unit and complete the posttest on the material. Scores for high, low, and total cognition were recorded; however, the findings reported in this study are limited to total cognition and total satisfaction.

Table 1 demonstrates the levels of the treatment where the first level was a single cue consisting of the visual channel in the digital mode (single cue). The second level combined text with the spoken word using both the audio and visual channels but within the same mode (redundancy). The third level used the audio channel and digital mode for the first cue and the visual channel and iconic mode for the second cue (cue-summation).

Table 1. *Treatment Levels Based on Cues Combinations in Channels and Modes.*

		Channels		
		Audio		Visual
	Digital	Spoken word "pasteurizer" [2,3]		Printed word "pasteurizer" [1,2]
Modes				
	Iconic	Sound of a pasteurizer in operation		Picture of a pasteurizer [3]

[1]Single Cue - Visual Channel, Digital Mode
[2]Redundancy – Audio and Visual Channel, Digital Mode
[3]Cue Summation – Audio and Visual Channel, Digital and Iconic Mode

Purpose Research Hypotheses

The purpose of this study was to provide an asynchronous, electronically delivered unit of instruction to high school agricultural education students and compare performance based on the combination of channels used to provide the information. These channels (text, audio, video and images) were incorporated in an instructional unit on milk processing and delivered to the students on CD-ROM.

Research Hypotheses
As a means of accomplishing the purpose of the study, two major hypotheses were tested:

1. Within the constructs of a multimedia course, total student cognition will significantly increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.
2. Students in treatment groups with material presented using cue summation will experience significantly greater course satisfaction than those presented with the redundant treatment and a single cue.

Methods and Procedures

Population and Sample
The population for this quasi-experimental, non-equivalent control group design study included primarily first-year agricultural education students. The unit of instruction was administered by student teachers at six student teaching centers. Within these six schools, the entry-level agriculture course was taught in 12 classes, making up the sample for this study. Each of the 12 classes was then randomly assigned to a treatment group.

This sampling plan yielded a sample size of 169 students, with 50 students in treatment group one, 64 students in treatment group two and 55 students in treatment group three. During the course of the research, several issues came to light that would reduce the number of students in each treatment group. Mortality based on student transfers, failure to complete consent forms, and absences reduced the number of observation in each treatment group. Two classes were also removed for failure to complete the unit according to the instructions. These reductions resulted in 105 students that participated in all aspects of the study.

According to Gall, Borg, and Gall (1996), a group size of at least 15 observations is needed to accurately conduct experimental research, but in general, each group should be maximized as much as possible given researcher time and financial constraints. According to Kirk (1995), sample size can be calculated based on the number of levels of the independent variable being tested and the desired alpha level (α). In this case, the researchers were testing three levels of the independent variable and set the *a priori* alpha level at .05 for determining significance. In this case, group sizes of 21 subjects per treatment were required in order to meet these qualifications. The actual treatment groups of 26, 49, and 30 were more than required for this study.

Instrumentation

The original pretest/posttest consisted of 10 true/false, 10 multiple-choice and three short answer questions. The true/false and multiple-choice questions were derived from the two IMS curriculum unit tests provided in the teacher's guide. The true/false questions were used exactly as presented by IMS, but the multiple choice questions were created from short answer and fill-in-the-blank type questions. This was done in order to ensure accuracy and constancy of scoring the instrument. The first 20 questions were all lower-level cognition items. These questions were written to match the objectives of the unit as stated by IMS.

The last three questions were researcher-developed, open-ended questions that allowed for higher order thinking in the responses as defined by Newcomb and Trefz (1987). The information in these three questions was not taught directly in the course of the unit, but required students to evaluate the information they had learned and apply it to a new situation.

Great care was taken by the researchers to ensure that items accurately reflected the constructs within the curriculum. Content and face validity of the pretest/posttest was verified by a national panel (Gall et al., 1996) of food science, dairy science and dairy processing faculty members. Minor changes were made based on the panel's recommendations.

A sample of eighteen students was selected to pilot test the instrument for reliability. The students were instructed to carefully consider each question and make their best attempt to determine the correct answer. These scores were entered into Microsoft Excel® as 1 (correct answer) and 0 (incorrect answer). SPSS was used to determine the KR-20 coefficient alpha. The results of this analysis yielded an $r = .52$. This process also determined that three of the original 20 questions were negatively impacting the reliability of the instrument. Eliminating these questions resulted in an $r = .83$. The three items which negatively impacted the reliability of the instrument were permanently deleted from the pretest/posttest before it was administered to the study participants. This yielded 17 true/false, multiple-choice questions as well as three open-ended, short answer questions. The post-hoc reliability score decreased slightly to $r = .77$.

Following the completion of the unit, students were administered an instrument to determine satisfaction levels. This instrument was designed to determine student satisfaction in three areas: Clarity, Delivery, and Content. Each section was comprised of five questions and allowed students to answer using a Likert-type scale with one being "Strongly Disagree" and five being "Strongly Agree." Face and content validity were verified using a team of three faculty members who possessed knowledge and experience in creating similar instruments. In order to determine reliability, a pilot test was conducted using 35 agriculture students enrolled in similar distance education courses. Cronbach's alpha was calculated on instrument and was $\alpha = .90$. This remained constant in a post-hoc reliability test.

Data Collection

Students in the selected schools were given an informed consent form to be read and signed by their legal guardians. The researchers traveled to each school to collect these forms as well as data on demographics.

During these visits, the researchers administered the pretest. Data from these two instruments were coded and entered into SPSS for analysis at a later time. The informed consent forms were collected from the students and coded 1 (allowed) and 0 (disallowed) into the same database. Only data collected from students who were allowed to participate were included in the final statistical analysis.

The student teachers involved in the data collection process participated in a training session during the four-week, on-campus "block" before their field work began in the fall of 2003. During the week of Oct. 6-10, 2003, the student teachers facilitated the unit of instruction, conducted the laboratory experiment, collected homework and administered the posttest. All materials were returned and the tests were graded by the team of researchers.

Analysis of Data

Data were collected and imported to SPSS version 11.0 for Windows for analysis. In order to analyze the data on student cognition, several techniques were used. The student pretest was correlated to the posttest to determine the relationship between the two instruments. Trochim (2001) suggests that in order to use ANCOVA, the pretest should be highly correlated to the posttest. If a high correlation exists ($r >= .7$), it is recommended that ANCOVA be used to hold previous student knowledge constant by mathematically adjusting the posttest scores. A moderate or low ($r =< .7$) allowed the researchers to disregard the pretest scores and conduct a one-way ANOVA to determine the effect of the treatment groups on the posttest score. Contrast coding was used to determine differences in groups when the ANOVA indicates a statistically significant difference between treatment group scores. Treatment one was compared to treatments two and three, then treatment two was compared to treatment three.
Another purpose of using contrast coding was to check for the presence of trends in the data. The shape of the functions relating the treatment levels to the level of cognition were of interest to the researchers. SPSS for Windows 11.0 was used to determine effect size and was reported as eta squared ($\acute{\eta}^2$). In general, $\acute{\eta}^2$ is interpreted as the proportion of variance of the dependent variable that is related to the factor. Traditionally, $\acute{\eta}^2$ values of .01, .06, and .14 represent small, medium and large effect sizes, respectively (Green, Salkind, & Akey, 2000). In order to analyze the data on student satisfaction a similar technique was used.

Result/Findings

Research Hypothesis 1. Within the constructs of a multimedia course, total student cognition will increase as the number of differentiated channels used to deliver instruction increases, holding previous knowledge of the subject matter constant.

A Pearson Product Moment Correlation was calculated to determine the relationship between the pretest total score and the posttest total score. The resulting value for this calculation was determined to be $r = .16$. Because this value was less than $r < .70$ (Trochim, 2001), a one-way analysis of variance was conducted to evaluate the relationship between total cognition and the three treatment levels of the independent variable. The dependent variable for this research hypothesis was the student's total cognition for the unit of instruction as measured by the posttest total score for each individual student. Results of the one-way ANOVA are reported in Table 2.

The ANOVA was statistically significant, $\underline{F}$ (2, 102) = 4.805, $\underline{p}$ = .010. The strength of the relationship between the three treatments and the posttest score, as assessed by SPSS, was medium with the three treatment levels accounting for 8.6% of the variance of the dependent variable. Levene's statistic was calculated to determine homogeneity of variances. The results of this test were not significant, $\underline{F}$ (2, 102) = 2.963, $\underline{p}$ = .056, therefore the researchers assumed that the variances of the three treatment groups were not significantly different from each other. Contrast coefficients were used to evaluate differences among the means. Two contrast groups were created. Contrast one compared treatment one (text-only) to treatments two (text + A/V) and three (images + A/V). Contrast two compared treatments two and three.

Table 2. *Changes in Total Posttest Scores for Text-Only, Text + Audio/Video, and Images + Audio/Video.*

Group	n	M[1]	SD			
Text-Only	26	11.19	2.980			
Text + A/V	49	13.80	3.840			
Images + A/V	30	13.72	3.923			
Total	105	13.13	3.805			
Source	SS	df	MS	F	p	$\acute{\eta}^2$
Between	129.675	2	64.837	4.805	.010	.086
Within	1376.339	102	13.494			
Total	1506.014	104				

[1] 20-point scale

Table 3 indicates that there was a statistically significant difference t (102), = 3.06, p = .003, between the text-only treatment and the treatments containing A/V components and that there was no statistically significant difference t (102), = -.09, p = .926, between treatments two and three. The groups that received an audio/video component in the curriculum scored significantly higher than the group that received the text-only treatment. There was no difference in the Second and Third treatments. A significantly linear trend was detected $\underline{F}$ (1, 102) = 6.578, $\underline{p}$ = .012 as can be seen in Figure 1. Participants who received audio/video components in the unit of instruction scored 8.68% higher on the posttest than students who received text without an audio/video component.

Table 3. *Comparison of Treatment Effects on Posttest Scores.*

Contrast	Treatment 1 (text-only)[1]	Treatment 2 (text + A/V)[1]	Treatment 3 (images + A/V)[1]	Value of Contrast	Std. Error	t	df	p
1	-2	1	1	5.13	1.67	3.06	102	.003
2	0	-1	1	-.08	.90	-.09	102	.926

[1] Coding for contrasts.

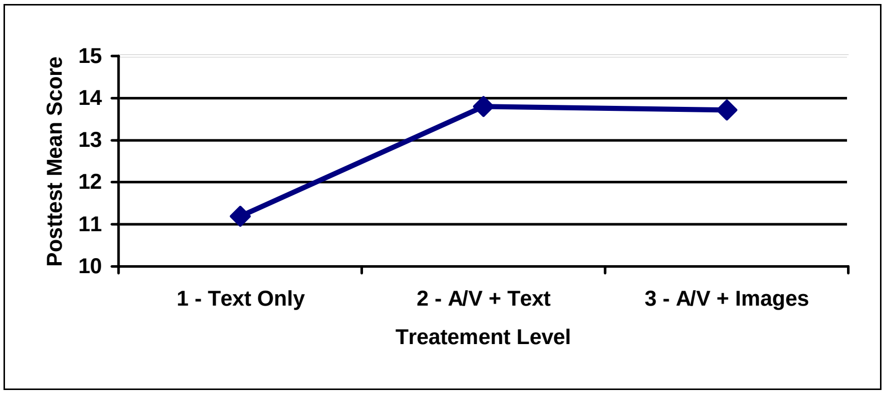

Figure 1. *Posttest Mean Score by Treatment*
(F_{Linear} (1, 102) = 6.578, p = .012).

Research Hypothesis 2. Students in treatment groups with material presented using cue summation will experience significantly greater course satisfaction than those presented with the redundant treatment and a single cue.

An analysis of variance was conducted to determine the relationship between total student satisfaction with the unit of instruction and each of the three treatment levels. The dependent variable in this ANOVA test was the sum of scores for the three satisfaction categories. Results of the one-way ANOVA for total satisfaction of curriculum material are reported in Table 4.

The ANOVA was determined to be not significant, F (2, 95) = 2.873, p = .061. A visual analysis of these data in graphic form indicated that a quadratic relationship may have existed; therefore, the ANOVA was conducted a second time incorporating the quadratic function into the model. Results for this ANOVA are shown in Table 5.

Table 4. *Differences among Treatment Groups on Total Satisfaction.*

Group	n	M[1]	SD			
Text-Only	26	53.38	7.955			
Text + A/V	42	48.88	10.787			
Images + A/V	30	54.87	13.505			
Total	98	51.91	11.282			
Source	SS	df	MS	F	p	$ή^2$
Between	704.148	2	352.074	2.873	.061	.057
Within	11642.025	95	122.548			
Total	12346.173	97				

[1] 75-point scale

Table 5. *Differences among Treatment Groups on Total Satisfaction in a Quadratic Model.*

Group	n	M[1]	SD		
Text-Only	26	53.38	7.955		
Text + A/V	42	48.88	10.787		
Images + A/V	30	54.87	13.505		
Total	98	51.91	11.282		
Source	SS	df	MS	F	p
Between	704.148	2	352.074	2.873	.061
Linear	30.594	1	30.594	.250	.618
Quadratic	658.714	1	658.714	5.375	.023
Within	11642.025	95	122.548		
Total	12346.173	97			

[1] 75-point scale

The quadratic model indicates a statistically significant difference $\underline{F}$ (1, 95) = 5.375, $\underline{p}$ = .023 between total satisfaction with the unit of instruction and the treatment level. Figure 2 indicates the quadratic nature of the trend.

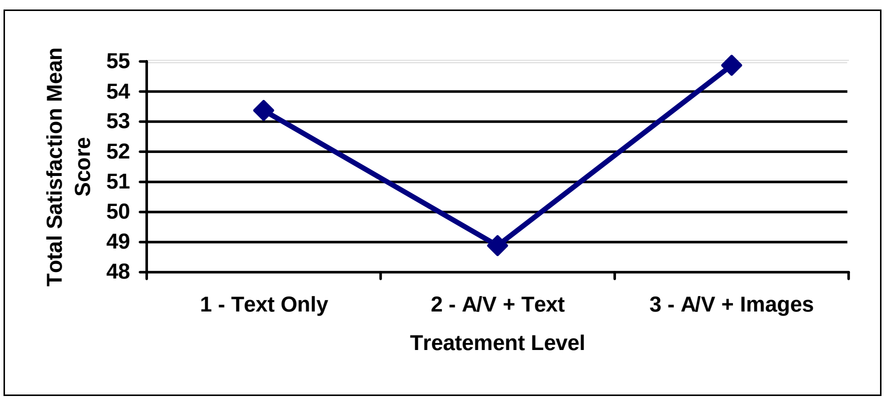

Figure 2. *Total Satisfaction of Curriculum Mean Score by Treatment*
($\underline{F}_{Quadratic}$ (1, 95) = 5.375, $\underline{p}$ = .023).

Students total satisfaction for the unit of instruction was significantly related to the treatment level used to deliver the content. The strength of the relationship between the three treatments and the total satisfaction score as assessed by SPSS, was low with the three treatment levels accounting for 5.7% of the variance of the dependent variable.

Two contrast groups were created. Contrast one compared treatment one (text-only) to treatments two (text + A/V) and three (images + A/V). Contrast two compared treatments two and three. Results from the contrast tests are shown.

Table 6. *Comparison of Treatment Effects on Total Satisfaction for Unit of Instruction.*

Contrast	Treatment 1 (text-only)	Treatment 2 (text + A/V)	Treatment 3 (images + A/V)	Value of Contrast	Std. Err.	t	df	p
1	-2	1	1	-3.02	5.09	-.594	95	.554
2	0	-1	1	5.99	2.65	2.646	95	.026

Table 6 indicates there was no statistically significant difference t (95), = -.594, p = .554, in total student satisfaction for the unit of instruction between the text-only treatment and the two treatments containing an audio/video component. There was, however, a statistically significant difference t (95), = 2.646, p = .026, between the treatments two and three for satisfaction of delivery. Students in these treatment groups were significantly more satisfied with treatment three (images + audio/video) than with treatment two (text + audio/video).

Conclusions/Discussion

The results of this study indicate that a linear relationship exists between the number of differentiated channels and student cognition gained from the electronic unit of instruction, but the hypothesis was found to be untrue as student cognition increased significantly between treatments one and two but not significantly between treatments two and three. Severin (1968) stated that true cue-summation would lead to significantly more learning than single channel or redundant cues within the same channel. This study failed to confirm that supposition. The reason for this may be found in arguments made by Cushman (1973) who stated that a second channel had to add new information to the cues of the first channel or there could be no summation. If this is the case, then redundancy is taking place rather than cue-summation. The researcher's efforts to prevent this may have proven inadequate and produced two treatments of redundancy. Severin (1967b), Cushman (1973), Nugent (1982) and Yang (1993) determined that multiple cues (either redundancy or cue-summation) were superior to single channel cues. This research confirmed those findings in that students who were administered treatments containing multiple cues performed significantly higher than students who received only a single cue. This would indicate that providing multiple cues for students would be beneficial in the learning process, however, attempting to create cue-summation may be more difficult than is practically feasible for most teachers.

The research also found that student satisfaction is not related linearly to redundancy and cue summation. Students who completed units comprised of the single cue were not significantly more satisfied that those who received multimedia components. Students who were administered units created using cue summation were, however, significantly more satisfied than those receiving redundant cues.

Recommendations

The researchers caution against generalizing these findings outside the population used for this research; however certain recommendations can be made based on the findings.

Recommendations for Improvement of Practice

The research presented here indicates that in the electronic format commonly used for distance education delivery, both redundancy and cue-summation are superior to a single cue. Researchers, teachers, and instructional designers should make concerted efforts to incorporate the use of multimedia content into future efforts. Because there was no difference in student performance between redundancy and cue summation, the researchers suggests using cue summation when possible because of the significant increase in student satisfaction scores.

Recommendations for Further Research

The United States Department of Education (2003) makes several recommendations for research practices to ensure the quality and quantity of empirical evidence meets standards acceptable for use in general education settings. This research followed those guidelines in regards to the planning, collection and analysis of data, but several improvements could be made to improve future research. The USDE states: "A general guideline is that the study should lose track of fewer than 25 percent of the individual originally randomized – the fewer lost the better. This is sometimes referred to as the requirement for 'low attrition'." (n.p.)

This study lost roughly 38% of the original participants through course transfers or administrative removal. This limitation should be addressed by future researchers and measures should be taken in order to reduce or eliminate student attrition during the course of the study.

A second area of concern based on the USDE recommendations has to do with long-term outcomes. The guideline from the USDE reads: "The study should preferably obtain data on long-term outcomes of the intervention so that you can judge whether the intervention's effects were sustained over time." (n.p.)

The final area of concern deals with sample size for finding a statistically significantly result. The USDE recommends 50-60 classrooms or 300 individuals. This is contrary to Kirk (1995) whose calculations were used to arrive at the minimum for this study of 21 individuals per treatment group. It is safe, however, to recommend that the observations be maximized to the fullest extent of the researcher's abilities and funding.

Given these guidelines, the researchers suggest the following:

1. Replication on populations outside the limited geographical scope of this project.
2. Increase population size to the point that classrooms could be the unit of observation rather than individual students.
3. Conduct testing to determine the effects of block versus traditional scheduling on student performance.
4. Additional creation and testing of multimedia curriculum in an effort to determine the internal effects and nuances of cue-summation with a variety of images in an effort to select the most effective

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Research Topic Areas in Agricultural Education

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Abstract

Research manuscripts from the Journal of Agricultural Education and the proceedings of the National Agricultural Education Research Conference published between 2000 and 2004 were categorized into 19 research topic areas. The most prominent research topic during the five year period was Technology/Distance Education. Disciplinary core research topic areas including Teaching/Learning, Teaching, and Teacher Education encompassed a relatively small proportion of all manuscripts published. Five research topic areas were distinguished as having more than half of the manuscript lead authors affiliated with a single institution which reflects a degree of disciplinary research concentration within the respective institutions. Recognizing the distribution of manuscripts across 19 research topics, the authors recommended the development of a disciplinary framework for research in agricultural education.

Introduction

Agricultural education is a relatively young discipline in the context of higher education (Williams, 1991b). The discipline first emerged in the early 1900s in land grant colleges and universities after the passage of the Smith-Hughes Act which provided federal support for teaching agricultural subjects in secondary schools (Williams, 1991a). The demand for secondary agriculture teachers, who were prepared with technical knowledge of agricultural subjects, and a command of pedagogical principles, prompted the creation of agricultural education programs in land grant colleges throughout the country (True, 1929). Thus, the emergence of agricultural education as a discipline in higher education was stimulated by an external demand for trained teachers.

The inherent disciplinary focus on teaching has been both a blessing and a curse for agricultural education. On many land grant campuses, agricultural education faculty are recognized for and provide leadership based upon their expertise in teaching and learning. However, agricultural educators are usually not held in such high regard for their research. Nevertheless, as institutions of higher education place increased emphasis on research, it is often at the expense of teaching. Agricultural education has not been immune from the changing expectations. Agricultural education faculty have experienced increased pressure to conduct research and to communicate research results through refereed journal articles and paper presentations (Warmbrod, 1986, 1987).

The *Journal of Agricultural Education* (*JAE,* formerly known as the *Journal of the American Association for Teacher Education in Agriculture*) has published 45 annual volumes of scholarly manuscripts with a focus on "current trends and issues, descriptions, analyses of innovations, research, philosophical concerns, and learner/program evaluation in agricultural education, including extension and international agricultural education" (American Association for Agricultural Education, 2005, p. 91). The *JAE* employs a blind, peer review process to ensure the quality of manuscripts published in the *Journal*.

The National Agricultural Education Research Conference (NAERC, formerly known as the National Agricultural Education Research Meeting) has been conducted annually since 1974 and involves the presentation of refereed research papers and dissemination of the manuscripts in conference proceedings. Papers accepted for presentation at NAERC are subjected to a blind, peer review process and the highest rated papers are selected for presentation at the NAERC each year.

Each of these two outlets constitutes the primary communication channel for the dissemination of research in agricultural education (Radhakrishna & Jackson, 1995). Although agricultural education research may be published elsewhere, these two sources are widely considered the premier outlets for scholarly dissemination of research in the discipline.

Over the years, much has been written about the quantity and quality of research conducted and reported in agricultural education (Dyer, Whittler, & Washburn, 2001; Kotrlik, Bartlett, Higgins, & Williams, 2001). Warmbrod (1986) noted that researchers in agricultural education were becoming more productive and praised the methodological and technical aspects of their research. However, he also noted that such improvements in quality “have not been accompanied by comparable improvement in . . . the relevance, significance, and importance of problems and issues that we investigate (p. 2).” Warmbrod emphasized the need to place a higher priority on conducting research focusing on important and significant problems and issues that are at the core of the discipline. This suggestion has been echoed numerous times in the past by various authors (Warmbrod, 1987, 1993; Silva-Guerrero & Sutphin, 1990; Radhakrishna & Xu, 1997; and Williams, 1997).

In addition to the criticism directed toward the significance and importance of the problems and issues addressed in agricultural education research, a concern existed that research in the discipline lacked focus (Buriak & Shinn, 1989). This concern has been expressed in two dimensions, from an individual researcher’s perspective (Warmbrod, 1986; Silva-Guerrero & Sutphin, 1990; Williams, 1997), and from a disciplinary perspective (Buriak & Shinn, 1989; Williams 1991a).

Faculty in higher education are experiencing increasing pressure to demonstrate and document their scholarship. Foremost among such expectations is the ability to conduct research and to communicate results to their peers. Promotion and tenure decisions in higher education continue to place heavy emphasis on scholarship. Although Boyer (1990) enumerated multiple definitions of scholarship, those definitions have not been fully embraced throughout higher education. In many institutions the primary review criteria is based upon the number of refereed publications listed in the candidate’s dossier.

Moore (1987) was unable to discern a systematic research emphasis in most agricultural education programs as a result of his review of doctoral dissertations in agricultural education between 1900 and 1986. He concluded that doctoral dissertation research lacked focus, which was also a defining characteristic of the discipline. Warmbrod (1986, p. 5) described the need for a more focused research effort when he wrote: “Research in agricultural education needs to be more programmatic. Researchers do not become scholars by studying a different topic every year.” Williams (1997) also encouraged graduate students and faculty members to embrace scholarship in a more programmatic fashion by identifying relevant problems and pursuing answers to those problems in a sustained manner.

The agricultural education research literature has repeatedly highlighted the need for focused research efforts on important and significant problems and issues. Crunkilton (1988) reported that much of the agricultural education research reported in the early 1980's addressed problems and issues associated with secondary school agricultural education. More recently, Luft (2002) acknowledged that microcomputers, sustainable agriculture, agricultural literacy, and cognition had become more prevalent in the agricultural education research literature. Luft also noted that a wide variety of topics has been researched over the years, with greater emphasis on distance education and the integration of science in agriculture in the recent past.

Since the early1980s, a consistent underlying theme has emerged from the messages of authors addressing research in agricultural education. The need for a research focus within the discipline is unquestioned. Although many authors have promoted frameworks, priority lists, and graphic illustrations to help guide the process; the discipline has yet to embrace a single model. This study was conducted to examine research topics addressed in the two primary agricultural education research publications to develop a framework for current research in the discipline and to determine the extent to which agricultural education research is concentrated within institutions of higher education.

Purpose

The need for programmatic research, on important topics, over a sustained time period, prompts the need for a discipline-wide framework for research in agricultural education. This study involved the development of a framework to categorize research in the discipline. A research framework can serve as a useful communication tool within the discipline and beyond. Agricultural education faculty and graduate students would benefit from a disciplinary paradigm to reference as they make individual decisions about their research programs. Program administrators and professional colleagues would also gain insight into the potential involvement of agricultural education researchers in multidisciplinary projects.

Agricultural education programs in higher education would benefit from a disciplinary research framework by making conscientious decisions about where to focus resources. Faculty, graduate student, and financial resources for research in agricultural education are very limited. Therefore, programs must concentrate their efforts on purposely selected research topics in order to maximize the efficient utilization of those resources. Faculty and graduate students who shift from one problem area to another on a continuous basis, will likely struggle for recognition of their scholarly contributions over time.

Higher education administrators and funding agency managers would also benefit from a disciplinary research framework in agricultural education. Funding decisions are made each year to allocate limited resources to research activities that meet certain selection criteria. Researchers who have a proven track record of accomplishment and focus their efforts on a well-defined program of research are more likely to attract resources to support their research efforts. Administrators and managers who do not have experience in, or an accurate understanding of, the agricultural education discipline will also benefit from such a framework. A research framework that has been integrated into the discipline and communicated broadly will enhance stakeholder understanding of agricultural education and how disciplinary research might contribute to the attainment of institutional and agency goals.

The research hypothesis used to guide this study is based on the belief that a disciplinary research framework should accommodate existing research that has been conducted and reported in the research literature. Although some may argue otherwise, the current research literature provides a starting point for designing a research framework that can be debated, modified, and ultimately integrated into the culture of the discipline.

The research questions to be answered in this study include:

1. How can agricultural education research be categorized by topic area?
2. What proportion of published manuscripts address each of the research topic areas identified in agricultural education?

3. To what extent are research topics in agricultural education concentrated within institutions?

Procedures

All research articles from the *Journal of Agricultural Education* (*JAE*) and the proceedings of the National Agricultural Education Research Conference (NAERC) for the five year period from 2000-2004 were included for analysis. These two sources had published 397 research manuscripts during that time. Each of the 169 JAE articles and the 228 NAERC papers were identified with a unique case number. Articles from the *Journal of Agricultural Education* were numbered by volume-issue-page number using the first page of the article. National Agricultural Education Research Conference papers were numbered according to the year and then the sequence of the article as it appeared in the table of contents of the conference proceedings. Articles were printed from the internet URL aaaeonline.org for the 2000 – 2003 NAERC. The CD-ROM version of the conference proceedings was used to access NAERC papers for 2004. Articles for the *JAE* were also obtained from the internet at aaaeonline.org for 2000 – 2002. Paper copies were obtained from personal collections or the University library.

The purpose and objectives of each manuscript were reviewed to sort and categorize the manuscript into discernable research topic areas. This process resulted in identifying 19 research topic areas in agricultural education. All manuscript titles, authors, and institutional affiliations were compiled into an electronic database. The data were entered into an SPSS data file to aid in summarization.

Findings

The first research question addressed in this study was answered by classifying each published manuscript into a research topic area. Sorting the 397 manuscripts published during the five year time frame resulted in the list of 19 research topic areas (in addition to an 'Other' category) presented in Table 1. The nineteen research topic areas accounted for 371 (93.5%) of the 397 manuscripts published. Twenty-six manuscripts addressed relatively independent research topics that could not be categorized into a discernable research topic area. Thus, 6.5% of the manuscripts published (in the Other category) during the target period were not judged to be closely associated with any other manuscript published during the period. Multiple explanations may account for the range of topics reflected in the Other category of manuscripts; however, closer examination of this issue was beyond the scope of this study.

Table 1. *Manuscripts Published in the Journal of Agricultural Education and the National Agricultural Education Research Conference Proceedings between 2000-2004 by Research Topic.*

Research Topic Area	**Number**	**Percent**
Technology/Distance Education	56	14.1
Extension/Adult Education/Volunteer Administration	37	9.6
Pre-service and Beginning Teachers	32	8.0
Research in Agricultural Education	30	7.8
Curriculum/Integration	29	7.3
Youth Organizations/Rural Youth	29	7.3
Teaching/Learning	28	7.0
Teachers	23	5.8
Teacher Education	20	5.0
Agricultural Literacy	13	3.4
Agricultural Communication	13	3.4
Assessment	12	3.1
Student Recruitment/Retention	11	2.7
Student Achievement/Academic Performance	9	2.3
Job Satisfaction	7	1.8
Careers	6	1.6
Historical	6	1.6
Graduate Student Competence	5	1.3
Women in Agricultural Education	5	1.3
Other	26	6.5
Total	397	100

The second research question addressed in this study involved examining the proportion of the total number of research manuscripts that comprised each of the research topic areas. During the five year time frame encompassed in this study, the Technology/Distance Education research topic was the most frequently reported. Fifty-six manuscripts focused on Technology/Distance Education which accounted for 14.1% of all manuscripts published during the target period. This area was the most prevalent research topic reported during this time in agricultural education.

Other popular research topics, as evidenced by the number of manuscripts published included: Extension/Adult Education/Volunteer Administration ($\underline{n}$ = 37, 9.6%); Pre-Service and Beginning Teachers ($\underline{n}$ = 32, 8.0%); Research in Agricultural Education ($\underline{n}$ = 30, 7.8%); Curriculum/Integration ($\underline{n}$ = 29, 7.3%); Youth Organizations/Rural Youth ($\underline{n}$ = 29, 7.3%); Teaching/Learning ($\underline{n}$ = 28, 7.0%); Teachers ($\underline{n}$ = 23, 5.8%); and Teacher Education ($\underline{n}$ = 20, 5.0%). Therefore, the nine most popular research topics in agricultural education accounted for nearly three-fourths (284 of 397 manuscripts or 71.5%) of all manuscripts published between 2000 and 2004.

Ten research topic areas encompassed a range of 5 to 13 manuscripts in each area, respectively. However, each individual research topic area accounted for less than five percent of all manuscripts published in the two sources during the five year period.

The third research question in this study involved an examination of research topic concentration within higher education institutions. The purpose of this analysis was to determine the extent to which agricultural education programs in higher education reflected a programmatic focus in one or more research topic areas. The measure used to identify institutional research focus involved calculating the proportion of manuscript lead authors (in each respective research topic area) who were affiliated with a single higher education institution. The resulting percentage (see Table 2) was judged to be reflective of the institutional concentration for each respective research topic area.

The researchers identified research topic areas that produced an institutional research topic concentration greater than 50%, based on the finding that at least half of all manuscripts published in the research topic area had a lead author from a single institution. Of the 19 research topics identified, five research topics revealed an institutional research topic concentration above the 50% threshold.

Research topic areas that resulted in an institutional research topic concentration of greater than 50% percent were identified as follows:

- Graduate Student Competence (Texas A&M, 5 of 5 manuscripts comprising 100%)
- Student Achievement/Academic Performance (U. of Missouri, 7 of 9 manuscripts comprising 78%)
- Assessment (Iowa State University, 8 of 12 manuscripts comprising 67%)
- Student Recruitment/Retention (University of Florida, 7 of 11 manuscripts comprising 64%)
- Women in Agricultural Education (University of Arizona, 3 of 5 manuscripts comprising 60%)

Texas A&M produced the highest institutional research topic concentration (100%) in the area of Graduate Student Competence. Although there were only five manuscripts published during the selected time frame, each of the lead authors were affiliated with Texas A&M University. The second highest level of institutional research topic concentration was the University of Missouri (78%) in the Student Achievement/Academic Performance topic area. In that area, nine manuscripts were published and seven of the lead authors were affiliated with the University of Missouri. The remaining three research topic areas that met the institutional concentration threshold of 50% or more were: Iowa State University (Assessment), University of Florida (Student Recruitment/Retention), and University of Arizona (Women in Agricultural Education).

Table 2. *Institutional Authorship of Agricultural Education Research by Topic Area in JAE and NAERC Proceedings between 2000-2004.*

Topic (N)	**Institution**	**First Author (N)**	All Authors (N)	**Institutional Concentration (percent)**
Technology/Distance Education (56)	Texas A&M University	22	51	39
	University of Arkansas	8	24	14
	Iowa State University	7	16	13
	Oklahoma State Univ.	4	6	7
	Mississippi State Univ.	3	8	5
	Texas Tech University	2	10	4
	Louisiana State Univ.	2	6	4
	University of Florida	2	10	4
	North Carolina A&T State University	2	3	4
	North Carolina State	2	4	4
	Tarleton State Univ.	1	2	2
	University of Georgia	0	4	0
	West Texas A&M Univ.	0	1	0
	Sul Ross State Univ.	1	1	0
	Fort Mill High School	0	1	0
Research (30)	University of Florida	5	9	17
	Michigan State Univ.	5	11	17
	Louisiana State Univ.	4	0	13
	Oklahoma State Univ.	4	8	13
	Texas Tech University	3	12	10
	University of Missouri	2	6	7
	Texas A&M University	2	6	7
	Iowa State University	2	4	7
	University of Nebraska	1	5	3
	The Pennsylvania State University	1	3	3
	Cornell University	1	1	3
	University of Illinois	0	2	0
	The Ohio State Univ.	0	2	0
	Idaho State University	0	2	0
	Univ. of New Orleans	0	2	0
	The State University of New York at Oswego	0	1	0
	Allen ISD	0	1	0
Agricultural Communication (13)	Texas Tech University	5	15	38
	Oklahoma State Univ.	3	5	23
	Texas A&M University	2	5	15
	National FFA	1	1	8
	The Ohio State Univ.	1	4	8
	Louisiana State Univ.	1	2	8
	University of Florida	0	2	0
	Canadian ISD	0	2	0
	University of Missouri	0	4	0
	Kansas Livestock Assoc.	0	1	0
Adult Education/ Volunteer Administrati	University of Florida	7	19	19
	New Mexico State Univ.	4	10	11
	Iowa State University	4	7	11
	Texas A&M University	3	3	10
	West Virginia State University	2	10	7

Topic (N)	Institution	First Author (N)	All Authors (N)	Institutional Concentration (percent)
	University of Idaho	2	2	7
	Oklahoma State Univ.	1	3	3
	University of Jordan	1	3	3
	Purdue University	1	4	3
	The Pennsylvania State University	1	4	3
	Louisiana State Univ.	1	2	3
	University of Kentucky	1	2	3
	Valencia County Cooperative Extension	1	1	3
	University of Nebraska	1	1	3
	The Ohio State Univ.	1	1	3
	University of Illinois	1	1	3
	Valle Grande Rural Institute	1	1	3
	Clemson University	1	1	3
	University of Minnesota	1	1	3
	Tuskegee University	1	1	3
	Utah State University	1	1	3
	Texas Tech University	0	2	0
	Michigan State Univ.	0	1	0
	National FFA	0	1	0
	Texas Cooperative Ext.	0	1	0
Careers (6)	University of Missouri	1	2	17
	Tarleton State Univ.	1	1	17
	Iowa State University	1	1	17
	Cornell University	1	1	17
	Texas A&M University	1	2	17
	University of Arkansas	1	1	17
	The Pennsylvania State University	0	1	0
Assessment (12)	Iowa State University	8	11	67*
	Purdue University	1	4	8
	University of Florida	1	3	8
	The Ohio State Univ.	1	2	8
	Oklahoma State Univ.	1	3	8
	Uni. of California-Davis	0	3	0
	Texas Tech University	0	1	0
	Michigan State Uni.	0	1	0
Pre-service and Beginning Teachers (32)	University of Minnesota	5	9	16
	University of Tennessee	4	4	13
	The Ohio State Univ.	3	6	9
	University of Illinois	3	5	9
	Texas A&M University	3	10	9
	University of Kentucky	2	2	6
	Clemson University	2	2	6
	Oklahoma State Univ.	1	4	3
	University of Arkansas	1	2	3
	Sam Houston State	1	2	3
	University of Texas Health Center at Tyler	1	2	3
	New Mexico State	1	1	3
	Purdue University	1	1	3
	West Virginia State University	1	1	3
	University of Nebraska	1	1	3

Topic (N)	Institution	First Author (N)	All Authors (N)	Institutional Concentration (percent)
	North Carolina State University	1	1	3
	Stockton High School	1	1	3
	Virginia Tech Univ.	0	2	0
	Oregon State University	0	2	0
	Barnesville High School	0	1	0
	Iowa State University	0	4	0
	University of Idaho	0	1	0
	University of Georgia	0	1	0
	University of Florida	0	1	0
	University of Missouri	0	4	0
Agricultural Literacy (13)	Oklahoma State Univ.	3	12	23
	Southern Illinois Uni.	2	2	15
	The Ohio State Uni.	2	2	15
	Arnett Clinic LLC	2	2	15
	Iowa State University	1	3	8
	University of Missouri	1	2	8
	Texas A&M University	1	2	8
	Michigan State Univ.	0	2	0
	Purdue University	0	4	0
	SW Texas State University	0	1	0
Student Achievement/ Academic Performance (9)	University of Missouri	7	18	78*
	University of Illinois	1	3	11
	University of Florida	0	3	0
	Louisiana State Univ.	0	1	0
	Breaux Bridge High School	1	1	11
Graduate Student Competence (5)	Texas A&M University	5	10	100*
	Texas Tech University	0	1	0
	Oklahoma State Univ.	0	1	0
Youth Organizations/ Rural Youth (29)	Purdue University	4	10	14
	North Carolina State	4	8	14
	Texas Tech University	2	9	7
	Texas A&M University	2	12	7
	University of Georgia	2	2	7
	Kansas State University	2	2	7
	Oklahoma State Univ.	1	4	3
	The Pennsylvania State University	1	3	3
	University of Nebraska	1	3	3
	Louisiana State Univ.	1	3	3
	The Ohio State Univ.	1	2	3
	Iowa State University	1	4	3
	Virginia Tech Univ.	1	1	3
	University of Minnesota	1	1	3
	Adrian High School	1	1	3
	Dordt College	1	1	3
	Canal Winchester HS	1	1	3
	Mississippi State Univ.	1	1	3
	Murray State University	1	1	3
	University of Florida	0	3	0

Topic (N)	Institution	First Author (N)	All Authors (N)	Institutional Concentration (percent)
	University of Idaho	0	1	0
	Utah Farm Bureau Fed.	0	2	0
	Nelson County, Virginia	0	1	0
	West Virginia State University	0	5	0
	Slaton High School	0	1	0
	New Iberia, Louisiana	0	1	0
	Montgomery County, Virginia	0	1	0
Teaching/ Learning (28)	Iowa State University	5	10	18
	University of Georgia	4	4	14
	The Pennsylvania State University	3	8	11
	University of Illinois	3	4	11
	University of Florida	3	18	11
	University of Arkansas	2	8	7
	Texas A&M University	2	3	7
	Kansas State University	1	4	4
	University of Nebraska	1	4	4
	Mena Schools	1	1	4
	The Ohio State Univ.	1	1	4
	Michigan State Univ.	1	1	4
	Murray State	1	1	4
	Iowa FFA Association	0	1	0
	University of Texas	0	1	0
	PA Governor's School	0	1	0
	University of Missouri	0	1	0
	Oklahoma State Univ.	0	1	0
Teachers (23)	Texas A&M	5	10	22
	North Carolina State University	4	7	17
	University of Florida	2	7	9
	Iowa State University	2	4	9
	Texas Tech University	1	5	4
	The Ohio State Univ.	1	2	4
	University of Nebraska	1	2	4
	The State University of New York at Oswego	1	1	4
	University of California-Davis	1	1	4
	University Tennessee	1	1	4
	University of Georgia	1	1	4
	New Mexico State	1	1	4
	Canadian ISD	1	1	4
	West Virginia State University	1	1	4
	Oklahoma State Univ.	0	1	0
	University of Missouri	0	1	0
	California State University – Fresno	0	1	0
	California Polytech University, Pomona	0	1	0
	The Pennsylvania State University	0	1	0
	University of Illinois	0	1	0
	Texas Tech University	0	3	0
ruit me nt/ Ret	University of Florida	7	11	64*
	Iowa State University	1	6	9

Topic (N)	Institution	First Author (N)	All Authors (N)	Institutional Concentration (percent)
	University of Missouri	1	6	9
	University of Minnesota	1	3	9
	New Mexico State University	1	2	9
	University of Illinois	0	1	0
	Iowa Valley Community College	0	1	0
Historical (6)	Southern Illinois Univ.	2	2	33
	Purdue University	1	4	17
	Virginia Tech Univ.	1	2	17
	University of Georgia	1	1	17
	The Ohio State Univ.	1	1	17
	Oklahoma State Univ.	0	1	0
Women in Agricultural Education (5)	University of Arizona	3	4	60*
	New Mexico State	1	2	20
	Clay City High School	1	1	20
	Southern Illinois Univ.	0	1	0
Job Satisfaction (7)	Ohio State Univ.	1	3	14
	SW Missouri State	1	1	14
	North Carolina State	1	1	14
	Univ. of Florida	1	2	14
	Iowa State Univ.	1	2	14
	Effingham High School	1	1	14
	New Mexico State	1	1	14
	Univ. of Georgia	0	3	0
	Univ. of Missouri	0	2	0
	Oklahoma State Univ.	0	1	0
Teacher Education (20)	Clemson University	2	4	10
	University of Missouri	2	8	10
	University of Illinois	2	5	10
	Texas A&M University	2	3	10
	University of Wisconsin	2	2	10
	Cornell University	1	4	5
	University of Florida	1	3	5
	Louisiana State Univ.	1	4	5
	Mississippi State Univ.	1	2	5
	Texas Tech University	1	4	5
	Virginia Tech Univ.	1	2	5
	Iowa State University	1	2	5
	Penns Grove HS	1	1	5
	Botswana College of Ag	1	1	5
	North Carolina State	1	1	5
	Purdue University	0	1	0
	Onalaska High School	0	1	0
	Kansas State University	0	1	0
Curriculum/ Integration (29)	Oregon State University	6	12	21
	Purdue University	5	9	17
	Texas Tech University	3	13	10
	North Carolina State	2	6	7
	Clemson University	2	6	7

Topic (N)	Institution	First Author (N)	All Authors (N)	Institutional Concentration (percent)
	Iowa State University	2	5	7
	Cornell University	2	4	7
	West Virginia State	1	4	3
	University of Florida	1	2	3
	Montana State Univ.	1	2	3
	University of Minnesota	1	1	3
	Mississippi State Univ.	1	1	3
	University of Illinois	1	1	3
	Riverside High School	1	1	3
	American Institute for Research	0	1	0
	SW State Missouri	0	1	0
	Ropesville ISD	0	1	0
	Canadian ISD	0	1	0
	Louisiana State Univ.	0	1	0
	St. Mary's High School	0	1	0
Other (26)	University of Florida	4	11	15
	Michigan State	3	4	12
	Oklahoma State Univ.	2	4	8
	Sam Houston State	2	2	8
	The Pennsylvania State University	1	6	4
	Clemson University	1	4	4
	North Carolina State	1	3	4
	Iowa State University	1	3	4
	Cornell University	1	3	4
	University of Nebraska	1	3	4
	University of Illinois at Urbana-Champaign	1	3	4
Other (Cont.) (26)	Texas A&M University	1	5	4
	Hamilton, Indiana	1	1	4
	University of Illinois	1	2	4
	Mississippi State Univ.	1	1	4
	San Diego Com. College	1	1	4
	Virginia Tech Univ.	1	1	4
	University of Arkansas	1	1	4
	Texas Tech University	1	2	4
	Utah State University	0	1	0
	Ohio State University	0	1	0
	Tarleton State Univ.	0	1	0
	University of Missouri	0	2	0

* Institutional concentration values comprising 50% or more of the lead author in each respective research topic area.

Conclusions and Recommendations

Reviewing the manuscripts published in the *JAE* and NAERC proceedings from 2000 to 2004 resulted in the identification of 19 research topic areas in agricultural education. Although there were similarities in the structure of the research agenda proposed by Buriak and Shinn (1993), a number of different categories emerged from this study. Therefore, based on the need for a disciplinary research framework in agricultural education, it is recommended that the AAAE Research Committee or the NCAC-24 Agricultural Education Research Committee undertake the responsibility of developing a research framework that can be adopted and integrated into the culture of the discipline. The research framework should be used by agricultural education faculty and graduate students to identify priority research interests and to aid in defining a programmatic research focus that coincides with important and significant issues at the core of the discipline. This recommendation is well-aligned with previous recommendations for the development of focused programs of research to advance the discipline and elevate the scholarly respect for agricultural education among other disciplines in higher education.

The relative emphasis placed on each of the 19 research topic areas revealed some noteworthy results. Technology/Distance Education was clearly the most prominent research topic during the five year time frame addressed in this study. Research results in this topic area may have implications for formal and non-formal educators in a number of disciplines beyond agricultural education. This observation raises a question about the balance between research that benefits a relatively narrow discipline, contrasted to research with applications beyond a single discipline. Agricultural education faculty and graduate students are encouraged to examine their research interests and to consider the degree to which their research has implications beyond the discipline. Both dimensions should continue to be addressed; however in this era of emphasis on interdisciplinary research, agricultural educators need to exhibit and demonstrate their scholarly expertise in a core area of the discipline and be prepared to apply that expertise through interdisciplinary research teams. Interdisciplinary projects involving agricultural education researchers will benefit from the insights of competent faculty who are truly scholars in their disciplinary research topic areas.

The relative emphasis (as measured by the number of published manuscripts) on core areas of the agricultural education discipline, as defined by Barrick (1988), was also interesting to note. Collectively, the research topic areas of Teaching/Learning, Teaching, and Teacher Education accounted for 71 (17.9%) of the manuscripts published during the five year period. This observation raises a question regarding the attention directed toward problems and issues at the core of the discipline as suggested by Warmbrod (1986). Although logical and rational explanations for this situation exist, there is a continuing need to focus the research agenda on the most important and significant problems and issues facing agricultural education in the future.

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Characteristics of Agricultural Education Departmental Web Sites at Land-Grant Universities

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Abstract

Web sites are critical to today's lifestyle and today's students see the Web as a valuable tool to engage in many everyday activities. This study identified important characteristics that added to the quality of agricultural education departmental Web sites. The researchers identified characteristics relevant to undergraduate students. The study looked at four high-level characteristics: usability, functionality, operational reliability, and interactivity, with 73 specific characteristics included in the evaluation matrix. Twenty-three of the 46 land-grant universities with agricultural education departments were reviewed to identify the characteristics. Twenty (87%) departments reviewed had departmental Web sites. Seven of the 12 usability features were identified on over 50 percent of the sites. Fourteen of the sites had titles in the Meta data, while few had keywords (4) or descriptions (3). Eight of the 32 functionality features were identified on over 50 percent of the sites. Overviews of the undergraduate programs on 17 (85%) sites, while 10 or less of the sites had information about enrollment, admissions, scholarships or student organizations. Nine sites had more than one bad link. The study found different stages of development in the Web sites and continued improvement is needed.

Introduction/Theoretical Framework

Today's students, the Millennial Generation, are Internet savvy. Millennials have always been in a technology-rich environment, most of them having their own TVs with cable connections (Howe & Strauss, 2000). This generation has always known computers, and the Internet has been a major part of their lives. Rainie (2004) reported that 78 percent of the adults in this generation use the Internet. "The last 20 years have seen an explosion of computer technology-related activity in schools and classrooms" (Roblyer, 2003, p. 187). The introduction of the Web in 1991 and graphically-oriented Web browsers in 1993 (McMillan, 2000) have changed the daily actions of students.

Fallows (2004) studied the Internet use of adults and found that the subgroup of 18 – 29 year olds to which the Millennials belong "stands out primarily for their attitude about the value of Internet use" (p. 19), with 96 percent responding that the Internet was a good source of information, 83 percent that it is a good way to do transactions, and 78 percent that is a good entertainment place. Looking at the whole population, Fallows (2004) found that adults search for maps, read news, play games, purchase movie tickets, do banking transactions, purchase books and CDs, and check the weather. Harris & Harbstreit (2003) reported that many students in agricultural education found the Web to be a good source of information relating to their major. Students expected access to information 24 hours a day and seven days a week, allowing them to become more responsible for their education.

Web sites have become increasingly commonplace. "Practically anyone can publish any kind of information, including graphics, sound and even video, on the Web, opening doors to each and every one of the millions of Internet users" (Castro, 1997, p. 11). Since Web sites have become commonplace, effective, and inexpensive (Ng, Parette, & Sterrett, 2003), it is critical for universities to have quality Web sites as an essential tool to provide information to current and prospective students. Just as it is important for universities to have Web sites, so should agricultural education departments provide needed information on the Web for current students and for students interested in the major.

Lilburne, Devkota, & Khan (2004) categorized Web sites as static, semi-static, or dynamic. Content on static sites does not change much after site creation. They may contain sound files, video clips, graphics, and they can be updated but they have no dynamic components. Semi-static Web pages may include features such as rollover effects on graphics and drop-down menus. Dynamic pages are created as the pages are requested by users. The content for the dynamic pages is pulled from databases from server-side programs. Amazon.com pages are an example of dynamic pages, where the pages are developed according to the user's requests, and the user's past browsing history.

Several educators and researchers have attempted to develop strategies and frameworks to evaluate Web sites. Aoki, (n.d.) developed a taxonomy of interactivity to use when evaluating Web sites. Ng, et al. (2003) studied Web sites from the graduate student perspective. Ho studied evaluating commercial Web sites (1997, June) and business school Web sites (1997, September) from the consumer perspective. Adams and Cassner (2002) studied the content of academic libraries from the distance learner perspective. Lilburne, et al. (2004) studied evaluating Web applications from the software engineer perspective. Olsina, Lafuente, and Rossi (2001) studied quality characteristics of academic Web sites from the perspective of software engineers and developed a framework with four high-level quality characteristics.

After reviewing the literature, the researchers believe four high-level quality characteristics are most appropriate for the framework in which to identify quality characteristics of agricultural education departmental Web sites. These high-level characteristics are appropriate for many of the needs and wants of undergraduate students:

- Usability
- Functionality
- Reliability
- Interactivity

Usability refers to the ease and practicality in using the Web-based system (Lilburne, et al., 2004). Visitors to Web sites must find it easy to use the site and locate information. If they find it difficult to locate the information they are seeking, they may choose to look for other sources for that information. If students look elsewhere, it may mean looking for the information at another university in which to pursue an agricultural education degree or it may mean looking for another major at the same university. Graduate students echoed this need to have easy-to-use Web sites with features such as site maps and directories (Ng, et al., 2003). Lilburne, et al. (2004) reported that, “usability is therefore considered most important factor of Web-based software and application” (p. 6).

Olsina, et al. (2001) researched six operational university Web sites from internationally respected institutions. The researchers addressed usability with features such as global site understandability, feedback and help features, and interface and aesthetic features. Global site understandability encompassed features such as site maps or site indexes and tables of contents. Feedback and help features included help, directories, FAQ features, and feedback methods. Interface and aesthetic features incorporated style uniformity and stability of main controls.

Meta data are also usability characteristics which provide information about the Web site. Meta data are stored in the HTML source code of a Web site. A title, found in the Meta data, should accurately describe the site. When users add a link to their bookmarks/favorites, the title stored in the Meta data is what appears on the list. If the title is missing or incomplete, it will fail to properly identify the link in the bookmarks/favorites. For example, if the title says “Agricultural Education Home,” it does not specify the origin of the page. It could be from a local high school agricultural education Web site, a competing university, or even a book publisher. Meta data also can provide a description and keywords for the Web site. Kienan (2000) explained that search engines such as Google use the title, keywords, and descriptions in the Meta data, along with text in the Web site itself to help locate and rank the importance of Web sites. It is desirable for a Web site to appear at or near the top of the rankings.

The characteristic of functionality addresses navigation, searching, and domain-related features (Olsina, et al., 2001). Navigation included factors such as navigability, scrolling, and navigational prediction. Searching addressed internal search engines. The domain-related student features encompassed academic information, library information, and online services. The academic information included academic unit information, enrollment information, degree information, course descriptions, and student services. Harris & Harbstreit (2003) noted that agricultural education departmental Web sites should include information about program requirements, enrollment, student involvement opportunities, and student recruitment.

The importance of operational reliability in Web-based software and applications was addressed by Lilburne, et al. (2004). The importance of operational reliability also applies to Web sites. The operational reliability refers to factors such as time that the Web site is online and operational and the number of faulty links. The information reliability reflects information accuracy and information consistency. Olsina, et al. (2001) addressed site reliability with errors in links such as dangling links, invalid links, and unimplemented links and other miscellaneous errors.

Another high-level quality characteristic to measure is the interactivity of a Web site (Aoki, n.d.). This refers to multi-sensory features and the options that the user has to direct his/her Web browsing experience. These interactivity features include search features, help features, video, audio, and links (Aoki, n.d.). McMillan (2000) found that many site developers did not take advantage of the opportunities to include multimedia interactive components, such as graphics, video, interactivity, and search functions.

Both internal and external links provide interactivity. End-users use links to determine where they will go while browsing within a Web site. Ryan (2003) discussed the extent to which external links should be made available. Extensive links allow the user to locate external resources, but the links require maintenance to keep the external sites connected. Ryan noted that smaller lists of quality links might be easier to maintain and still serve the visitors.

Purpose and Objectives

The purpose of the study was to determine characteristics of the agricultural education departmental Web sites in the land-grant universities. The study will look at the content as it relates to undergraduate students and Web site features in the context of Web site interactivity, usability, functionality, and reliability.

The following objectives were used to guide the study:

1. Identify the usability features included in the Web sites.

2. Identify presence of accurate titles, descriptions, and keywords in the Web sites Meta data.

3. Identify the functionality features included in the Web sites.

4. Determine Web site operational reliability, as identified by working internal and external links.

5. Determine the level of Web site interactivity and its interactive features.

Methods

The population was defined as the 46 land-grant universities with membership in the American Association for Agricultural Education (AAAE). The universities were selected if they had a faculty member who had paid his/her AAAE membership dues as of 9-14-2004 according to the AAAE Web site (2004). The population included 43 1862 land-grant institutions and three 1890 land-grant institutions. A sample of 23 universities, 50% of the population, was selected from the population by assigning numbers to the institutions and using a table of random digits (Hinkle, Wiersma, & Jurs, 1982). The sample included 21 1862 land-grant institutions and two 1890 land-grant institutions. The universities included in this study were not identified to protect the anonymity of the universities.

The Web sites were viewed using Internet Explorer 5.2 for Mac with resolution set at 1152 x 768 pixels. The browser window was set to be equivalent to a 13-inch monitor, measuring 10 inches across and 7 inches high. This size is mainly significant in determining the need to scroll on the home page which was considered as a factor since many students and other users may be viewing the Web site using a 13-inch monitor, thereby limiting their ability to view wide pages.

A matrix, containing 73 features, was developed using components identified by Olsina, et al. (2001), Lilburne, et al. (2004), Aoki (n.d.) and Harris & Harbstreit (2003). Some components were added as they were identified while data were being collected. All Web sites were visited at least three times to double check that all components present were identified and recorded on the matrix. The matrix included components in interactivity, usability, functionality, and operational reliability and was developed using Microsoft Excel.

McMillan (2000) analyzed 11 studies that researched content analysis of Web sites. She indicated that rapid collection was important. She reported that the collection of the 11 studies ranged from two days to five months. It was determined that the Web sites' content would be reasonably static and not as dynamic as Web sites that provide news-related content or are commercial. Therefore, it was important to review the sites in a reasonable amount to time. One researcher did all of the analysis of the Web sites. It was determined that the researcher was well qualified due to his experience in Web site development, teaching Web site development and Internet searching at the graduate level and extensive Internet use.

The data for this study were collected over a three-week period. The agricultural education Web sites were located by using one of two search techniques. The researcher searched each university Web site or searched directly for the departmental site using the Google search engine. When university Web sites of colleges/schools of agriculture and education were searched for the departmental site, they were searched through available search engines on the sites or by browsing through the sites. Efforts were made to ensure that the Web site was the departmental site. This study looked at Web sites from the user perspective, i.e. from the perspective of the undergraduate student. The study did not attempt to determine the quality of Web sites, but to record the features and some identified content that the agricultural education Web sites contained.

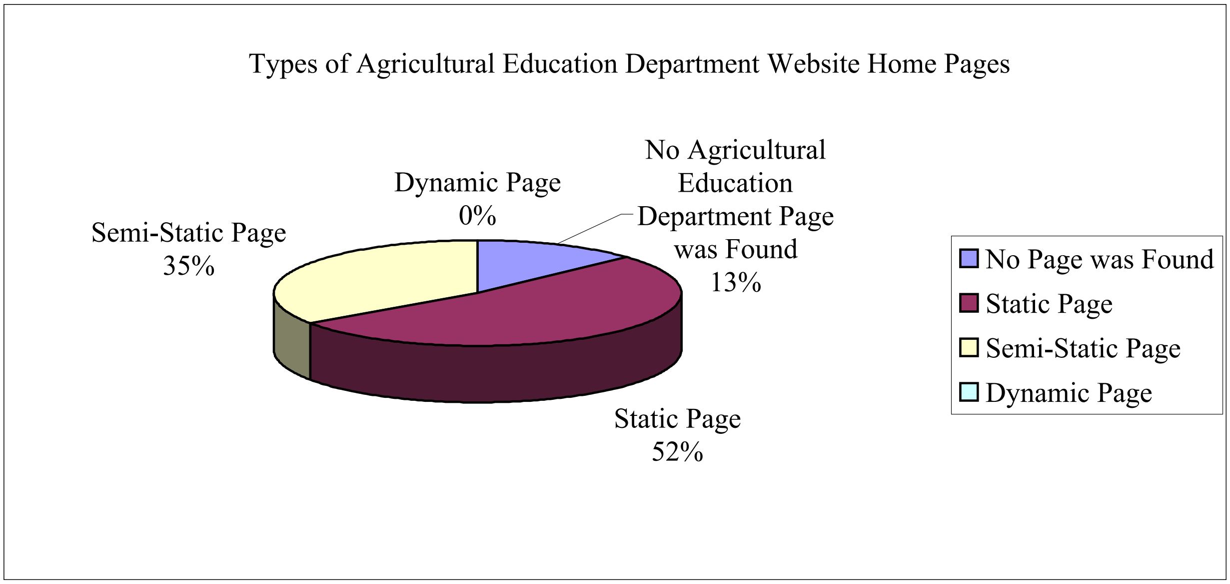
The agricultural education Web sites were then explored systematically to identify all of the matrix components present. The links to internal pages were visited and each subsequent set of links to internal and external pages was explored. As the components were identified in the Web sites, they were marked in the matrix. If links such as courses in agricultural education went to university resources, they were not included because the study was only identifying components that are located on the agricultural education Web sites. Links to some university components were specifically identified.

Results/Findings

Twenty-three land-grant universities were searched for agricultural education Web sites. Departmental Web sites were found for only 20 of the 23 land-grant universities included in the sample. The three universities without agricultural education Web sites may have had pages in university catalogs, but they did not have identifiable agricultural education Web sites. Many of the universities had stand-alone agricultural education Web sites, while some shared Web sites with departments of two or three related majors.

Twelve (52%) of the university agricultural education departmental Web sites had home pages that were identified as static, eight (35%) were acknowledged as semi-static, and none of the Web site home pages were identified as dynamic (Figure 1). The eight Web site home pages that were considered semi-static had one of the following features: photos that were randomly selected from a pool of photos to place on the home page of the Web site or photos with roll-over effects, drop down menus, or Flash features. The three institutions without agricultural education Web sites were not included in the results presented. The results reported are all based on a sample of 20 universities with agricultural education Web sites.

Figure 1.



Objective 1 - Identify the usability features included in the Web sites.

Usability features that helped the user better locate information on the Web sites and that helped the Web sites be found are located in Table 1. Three features were found on most of the sites: consistent home buttons, consistent button bars, and a feedback feature. Sixteen Web sites had either a consistent home button or a consistent button bar, with 15 (75%) having a consistent home button (or possibly an "Agricultural Education" button) and 14 (70%) having a consistent button bar. As can be seen, many had both features. Optional feedback via email was found on 15 (75%) Web sites. All 20 (100%) Web sites had email information, 18 (90%) had phone numbers for the department or individual faculty, and 17 (85%) had address information.

Other features to help students locate information on university sites were not present on many of the agricultural education departmental Web sites. Help and table of contents features were not found on any of the agricultural education Web sites. The features may have been present, but they were general features as part of the university as a whole. Site maps or site indexes were only found on two (10%) of the Web sites, while an FAQs (frequently asked questions) feature was only found on one site.

Table 1. *Usability Features Contained in Agricultural Education Departmental Web Sites in Land-Grant Universities*

	Web sites that Contain Usability Features	
Usability Features	**n**	**%**
Feedback*	15	75
Home button (or similar button) on each page	15	75
Consistent button bar	14	70
Site map/Site index*	2	10
FAQs* (frequently asked questions)	1	5
Table of contents*	0	0
Help*	0	0
Contact--Email*	20	100
Contact--Phone*	18	90
Contact--Address*	17	85
Faculty/Staff--Contact information	17	85
Faculty/Staff--Abbreviated vitas	6	30

Note. n=20, * For the agricultural education departmental Web site,

Objective 2 - Identify presence of accurate titles, descriptions, and keywords in the Web sites Meta data.

The Meta data results are presented in Table 2. The Meta data were reviewed in the HTML source code for the home pages. Complete descriptive titles were found for 14 (70%) agricultural education Web sites. The Meta data of keywords and descriptions were found in only four (20%) and three (15%) Web sites, respectively.

Table 2. *Meta Data Contained in Agricultural Education Departmental Web Sites in Land-Grant Universities*

	Web sites that Contain Meta Data Features	
Meta Data Features	**n**	**%**
Meta data - Title of page is descriptive	14	70
Meta data - Keywords	4	20
Meta data - Description	3	15

Note. n=20

Objective 3 - Identify the functionality features included in the Web sites.

A summary of the functionality features of the agricultural education departmental Web sites is presented in Table 3. The need to scroll to find information was reviewed on the Web site home pages. Only three (15%) Web sites required horizontal scrolling to view all of the information, while vertical scrolling to view important information was necessary on 13 (65%) Web sites. Four (20%) Web sites had a search feature for the agricultural education Web site. News features or newsletters were found on seven (35%) Web sites, and only two (10%) Web sites had departmental calendars with some dates for the current semester. Four (20%) agricultural education departments included their mission, vision, and/or philosophy on their Web site. General overviews of the undergraduate programs were identified on 17 (85%) Web sites. Course information was presented on most sites, with 14 (70%) listing courses in agricultural education, 9 (45%) listing course descriptions, and 6 (30%) providing course syllabi for a majority of the courses. Curriculum guides for agricultural education were found on 12 (60%) Web sites, while 4 (20%) Web sites contained curriculum guides for extension education.

Although several items might be considered to aid in recruitment, only two (10%) Web sites provided recruitment brochures to view or download. Transfer students need information about transfer credit. Only four (20%) of the Web sites had information or links to information in concerning transferability of courses. Student organizations had Web pages on ten (50%) of the pages. Current student organization calendars were found on only four (20%) Web sites.

Objective 4 - Determine Web site operational reliability, as identified by working internal and external links.

The operational reliability was assessed using only one measure: the presence of bad links. Links were considered bad if they produced a “page not found” message, if they went to incorrect links, or if the linked pages had not been completed. Some Web sites were small, containing only two or three pages while at least one Web site contained hundreds of pages. Of the 20 agricultural education Web sites, nine (45%) were identified as having more than one bad link.

Objective 5 - Determine the level of Web site interactivity and its interactive features.

The interactivity features incorporated in the matrix included features that allowed the user to direct their Web site usage experience and components such as graphics, sound, and video which gave the user a multi-sensory experience. Table 4 shows the interactivity features that were identified. Five Web sites contained a graphic space that randomly filled from a file of graphics. Two Web sites had a video clip or a QuickTime movie. Of the 20 Web sites studied, 18 (90%) included links external to the agricultural education Web site. All of those Web sites linked back to the home university. Twelve (60%) Web sites contained links to an FFA Web site, while only eight (40%) offered links to agricultural content-related Web sites. Photos were found on all 20 (100%) Web sites. Photos of the majority of the agricultural education department faculty were found on 17 (85%) Web sites, 11 (55%) had at least one general photo, and six (30%) showed students in student organization activities.

Table 3. *Functionality Features Contained in Agricultural Education Departmental Web Sites in Land-Grant Universities*

	Web sites that Contain Functionality Features	
Functionality Features	**n**	**%**
Scrolling--Vertical on home page	13	65
Search (for site)	4	20
Scrolling--Horizontal on home page	3	15
Links--University	18	90
News & information	7	35
Research Publication list	5	25
Mission, vision or philosophy statement	4	20
Calendar--Departmental (Current within 6 months)	2	10
Research Presentations	2	10
General overview--Undergraduate	17	85
Course list	14	70
Curriculum guide--Agricultural education	12	60
Jobs--Options	10	50
Links--Admissions	10	50
Student organization information	10	50
Course descriptions	9	45
Links--financial aid/scholarships	9	45
Jobs--Vacancy bulletin	8	40
Links--Graduate college/School	8	40
Scholarship--Descriptions	7	35
Scholarship--Listing	7	35
Course outlines/Syllabi--Undergraduate	6	30
Certification/Licensure information	6	30
Advising information (Identified as advising)	5	25
Scholarship--Application	5	25
Curriculum guide--Extension education	4	20
Transfer course information or links	4	20
Calendar--Student org. (Current within 6 months)	4	20
Enrollment information	3	15
Alpha Tau Alpha information	3	15
International Opportunities	2	10
Jobs--Salary information	2	10
Recruitment literature	2	10

Note. n=20

Table 4. *Interactivity Features Contained in Agricultural Education Departmental Web Sites in Land-Grant Universities*

	Web sites that Contain Interactivity Features	
Interactivity Features	**n**	**%**
Random graphics (on home page)	5	25
Drop down buttons	5	25
Search engine (for site)	4	20
Rollover graphic (on home page)	2	10
Video (or QuickTime)	2	10
Sound (separate from video)	0	0
Links--Any external	18	90
Links--University	18	90
Links--FFA	12	60
Links--Admissions	10	50
Links--Agricultural education profession (NAAE, etc.)	9	45
Links--Financial aid/Scholarships	9	45
Links--State FFA	9	45
Links--Agricultural	8	40
Links--Graduate college/School	8	40
Links--State agricultural education	7	35
Photos--Contain any photos	20	100
Photos--Faculty (majority pictured)	17	85
Photos on home page (Besides banner)	14	70
Photos--General	11	55
Photos--Student organization activities	6	30
Photos--Student teaching group photos	3	15
Photos--Historical	3	15
Photos--Teachers in the profession	2	10
Photos--Students in class	2	10

Note. n=20

Conclusions/Discussion

Web sites were located for 20 of the 23 university agricultural education departments included in the study. It was important that the 20 agricultural education departments had Web sites, especially since Fallows (2004) identified so many activities in which adults regularly engage online and Harris & Harbstreit (2003) noted that students expect access to information 24 hours a day and seven days a week. The three schools that did not have designated agricultural education Web sites should consider developing sites to provide the needed information. It is appropriate that the majority of the Web sites were static in design. Some features on the semi-static sites were distracting. The pull-down menus were sometimes difficult to maneuver.

The usability features identified included contact information on 20 (100%) sites, feedback on 15 (75%) sites, home buttons on 15 (75%) sites, and consistent button bars on 14 (70%) sites. Unfortunately, phone numbers could not be identified for two (10%) sites. This limited the methods in which users could contact the departments. Site maps or indexes that were identified as important by Ng et al. (2003) and Olsina et al. (2001) were included on two (10%) sites. Site indexes are one of the easiest strategies to help users find information on Web sites. Web developers should review the methods to improve the usability features.

At least some Meta data were available on most sites. Fourteen (70%) sites had accurate and complete titles in the Meta data. A complete title with the university name and departmental name should be in the Meta data to enable users to locate links to these pages that have been saved in bookmarks/favorites. Only four (20%) sites had keywords and three (15%) sites had descriptions in the Meta data. All site developers should reevaluate the keywords and descriptions in the Meta data. All appropriate words and possible names of sites should be listed in the keywords. Concise descriptions should also be included in the Meta data. These additions will significantly improve site positioning in search engine rankings.

Many important functionality features were not present on the majority of Web sites. Three (15%) Web sites required horizontal scrolling on the simulated 13-inch monitor. Web developers should consider avoid fixed width screens that are larger than this size since many potential users may be limited to 13-inch monitors. Only two (10%) departments had departmental calendars. Departmental calendars provide information for students about important dates. Web developers should also consider including information about financial aid, admissions, enrollment, employment opportunities, and student organizations. Fifty percent or more of the sites were missing significant information about these and other topics.

Operational reliability was a research concern. Nine (45%) Web sites had more than one bad link. Links should be checked and repaired on a monthly basis. Pages should not be linked before they are fully operational.

The interactivity features addressed in the study made the users experience more interesting. Photos were identified on all 20 (100%) sites, but few sites had many photos or a variety of photos. Only six (30%) Web sites had student organization photos, three (15%) had historical photos, and two (10%) showed photos of students in class. Photos add to the sensory experience of the visitors. Links allow the visitors to explore the sites and related information. Links were found on 18 (90%) of the Web sites. Web developers should determine which links current and prospective students need.

McMillan (2000) noted in her study that Web sites showed considerable variety in appearance and function. This was evident with the agricultural education departmental Web sites. Some sites utilized several features to enable undergraduate students and other users to easily locate needed information. Other Web sites were difficult to navigate and were not intuitive in their design. High school students might have a difficult time locating information about the department or finding information that would cause them to pursue the agricultural education major. Considering the extreme shortage of agricultural education graduates in the

United States, the profession cannot afford to miss this opportunity to recruit students into the major.

As developers reevaluate their Web sites, they should consider suggestions expressed by Ho (1997, September): be customer-focused, be clear of purpose, be credible, be critical of superficial change, and be creative. Web developers should determine what information is needed by the Millennial Generation.

Recommendations

The Web site developers should identify their most critical customers so that they can develop content that they need. Groups to consider are current and prospective undergraduates, current and prospective graduate students, agricultural educators in the field, alumni, donors, and other working agricultural education professionals. First efforts address needs of the critical customers, possibly using customer focus groups to determine needs and methods to improve the Web site.

We, as the profession, should continue to improve the agricultural education Web sites and to complete further research in the area of Web design. Research should be conducted to determine content to be included in agricultural education Web sites for advising and recruitment. Focus groups should be conducted with the current and future students to address these issues. Additional studies should continue to address the overall quality of agricultural education Web sites.

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Factors Related to the Effectiveness of Progress Toward Degree Regulations

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Abstract

Graduation and time-to-degree rates of students in higher education continue to be an issue of concern for both public and private institutions. This study sought to determine the preliminary results of the progress toward degree regulations for a College 2002 freshmen class (N = 604) who completed their sophomore year of study in the spring of 2004. The purpose of this study was to determine if progress toward degree regulations increased retentions rates of undergraduate students in a college of agriculture and to explore characteristics of the students that might be related to student's compliance in developing an approved Plan of Study. Tinto's (1993) interactionist model provides the theoretical framework for this study and postulates that each student possesses an individual set of traits such as gender, race, class rank, ACT or SAT scores that influences their initial commitment to obtaining a degree as well as a desire to obtain a degree. Class percentile was the only characteristics found to be significantly associated with whether a student completes a Plan of Study. Retention was significantly associated with developing a Plan of Study. Students who had approved plans earned more credit hours, passed more credit hours and had higher GPAs.

Introduction

Graduation and time-to-degree rates of students in higher education continue to be an issue of concern for both public and private institutions. The number of students who complete a bachelor's degree within four years is declining according to national studies (Engle, 2004). This continuing decline hinders the ability of our higher education institutions to provide the opportunity to an ever increasing number of qualified applicants to enter these institutions and weakens the financial power of the institution. Students who take longer to graduate also share this financial burden in the form of additional tuition and fewer years of earning potential.

Retention and persistence (continued enrollment) of the student determines whether a student eventually graduates. Research exists that examines the factors that predict the retention of students in a higher education setting. Most institutions utilize this research to determine formulas used to admit those students who will most likely graduate at the post secondary level. Less research and understanding exists related to factors related to the student's success in completing the degree in four years or less. Garton, Ball, and Kitchel (2004) stated that previous research, regarding colleges of agriculture, focused on admission criteria and that little has been done to track students through the degree. Recent studies at our university indicate that only 26 percent of undergraduates graduate in four years, 55 percent within five years and 62 percent within six years of enrolling in a degree program. Within the College of Agriculture and Life Sciences the percentages are higher with 38.6 percent of undergraduates completing a degree in four years, 62 percent in five years and 67.5 percent within six years of enrolling in a degree program.

A delay in credit production toward a chosen degree can often be attributed to the fact that many freshmen change their major the first semester. Kramer, Higley, and Olsen (1994) found that 57% of entering freshmen changed their degree and that many who had changed their major early were students who entered with "superficial pseudo-plans". Schein, Laff, and Allen (1987) described the phenomenon called the "Myth of the Academic Major" in their monograph on academic advising. They concluded that most freshmen students may declare a major but they probably do not understand what the major means or what careers the major will lead them toward. Students may not be capable of proceeding through a series of prescribed courses but are committed to the major.

Dyer, Lacey and Osborne (1996) found that only 40.6% of students in the College of Agriculture at University of Illinois planned to graduate in a major within that college. They concluded that if the College of Agriculture is serving as a transient warehouse then valuable resources are being wasted on these students. Russell (1993) questioned the future of agriculture since fewer youth are enrolling in Colleges of Agriculture. He suggested that institutions need to commit resources to prevent a "brain drain" of the agriculture industry. Institutions must also be accountable to taxpayers and donors who support the Colleges of Agriculture by producing graduates who will pursue a degree and career in their field (Upcraft, Gardner & Associates, 1989).

Several public higher education institutions have adopted and are enforcing "progress toward degree" regulations. The intention of these policies is to increase timely graduation rates by creating interim assessments of "progress toward degree" that track students through their degree program. Some institutions have incorporated contract-like formats which students must pledge to strive for and others have created benchmarks for students related to the numbers of hours they must complete after a certain number of semesters. Several institutions have created an on-line tool that allows students and advisors to work together to lay out an individual semester by semester plan for completion of the degree.

"Progress toward degree" regulations and Plan of Study tools were introduced to retain and speed up the rate of time toward degree completion beginning with the entering 2002 freshmen at our university. According to our university's Academic Policies and Regulations (2004), "Upon admission as a degree-seeking student, an undergraduate student is expected to make satisfactory progress in a planned and deliberate way toward graduation. This expectation of satisfactory progress translates into the following University minimum requirements: the development and registering of a Plan of Study that serves as a planning tool for completing degree requirements for the students' s selected major(s), enrollment in course work consistent with the student's Plan of Study, continuous full-time enrollment (a minimum of 12 credit hours) during consecutive semesters (i.e., Fall, Spring) until graduation, successful completion of at least 24 credit course work each academic year and matriculation into a degree program by the beginning of classes in the first semester that the student has junior status."

A Plan of Study is an on-line planning tool that requires students to follow a prescribed course of study and determine the semester in which they will complete each course requirement. Their Plan of Study must be completed and approved by their advisor at least one semester prior to the semester they are taking the courses. Each time the student amends the Plan of Study the advisor must approve the Plan of Study electronically. A student is compliant with the Progress Toward Degree Regulation if they satisfy the five requirements in the previous paragraph.

Theoretical /Conceptual Framework

The status of graduation rates continue to reflect a decline of the number of students who complete a degree within four years; however, attrition rates have remained static for the last fifty years according to Moller-Wong, Shelley & Ebbers (1999). Attrition is greatest after the second term of enrollment at the end of the freshmen year when one-third of all students drop out of college and public universities (American College of Testing Program, 1998; Ronco, S.L., 1994). ACT (2001) reported the percentage of college students who return after their first year of study is slightly increasing but the percentage of undergraduates who complete their degree in less than five years has continued to decrease and is now at 51%. The National Center for Educational Statistic (2003) reported that those completing their first bachelor's degree take 55 months on average to complete a four-year degree.

Ferguson, Wisner & Discenza (1986) concluded that it costs institutions more to recruit a new student than it does to keep a current one. The more resources an institution spends on instructional and academic support the higher the retention and graduation rates according to a study conducted by Gansemer-Topf and Schuh (2003-2004) at Iowa State University. Glennen, Farren and Vowell (1996) found that quality academic advising improves the fiscal stability of universities by increasing graduation rates. But universities often fail to recognize the value of advising in their instructional mission and often consider cutting allocations that enhance advising opportunities.

Students are most prone to drop out during their first year of college so persistence should be addressed early in the college experience (Tinto, 1990). The sophomore year of study is usually a year of academic reflection. At the end of the sophomore year, students are typically clarifying their academic goals (Gordan & Habley, 2000).

Dyer and Breja (1999) stated that retention is often predicted by university admission criteria; however, they hypothesized that other criteria may be better predicators. Garton, Ball and Kitchel (2004) found that high school core grade point average and ACT scores as the best predictors of academic performance in a college of agriculture. They did not find that learning style was a variable that could be used to predict academic obtainment.

Blecher, Micahel, and Hagedorn (2002) found that age, socioeconomic status, ability, educational aspirations, full time attendance, hours worked on a job, scholastic achievement and student involvement all help explain student persistence in a four-year degree attainment. They also found that student satisfaction levels do not have a direct impact on persistence toward degree. At the University of Iowa, Desjardins, Dong-Ok Kim & Rzonca (2002-2003) found that graduation rates of four years or less were influenced by previous academic success, current academic success at the institution, and college major.

The National Center for Education Statistics (1999) found that the percentage of students who completed 30 credits their freshmen year (43 percent) were much more likely to maintain stable credit production throughout their degree. Those who took two years to reach the 30-credit threshold were four times more likely to drop out. The number of credits produced the first year was positively related to total credit production, reaching credit thresholds, time to degree, degree attainment, and overall credit production. They also found students at public institutions versus those at private institutions were more likely to take five years for degree completion.

The National Center for Education Statistics (1999) found that first–year credit production, socioeconomic background, first-year grades, test scores, and summer term enrollment are all positively related to credit production while enrollment interruptions and initial part-time enrollment are negatively related. In 2003, The National Center for Education Statistics also found that higher grade point averages of student's at public universities were associated with shorter time toward degree completion and that the higher a parent's education the longer the child took to complete a degree. In 2004, The National Center for Education Statistics found that income, gender, and race made no measurable difference in a student's completion of a 4-year degree.

Retention of students in higher education was identified by the National Academic Advising Association (NACADA) in 1997 as a critical issue in advising. Munsell and Cornwell (1994) stated that the more support a student receives the more successful they are in meeting their goal. Even though the advising community recognizes the relationship between advising and retention most research conducted to study student retention has focused on factors that universities do not have control over such as GPA, socio-economic status, socialization, age, high school performance and gender (Payne et al, 1996 & Schurr et al,1997)

Tinto's (1993) interactionist model provides the theoretical framework for this study and postulates that each student possesses an individual set of traits such as gender, race, class rank, and ACT or SAT scores that influences their initial commitment to obtaining a degree and their desire to obtain a degree. This commitment influences their level of academic and social interaction that influences their persistence to obtain a degree. Tinto hypothesizes that an initial commitment to the institution will have an affect on the successful integration of the student into the academic and social systems (Blecher, Micahel, & Hagedorn, 2002).

Retention has consistently been found to be dependent on the student's academic and personal needs which require collaborative efforts from advisers, students, faculty, and administrators to integrate the student both socially and academically into the University (Bedford & Durkee, 1989). Gordan and Habley states: "policy and procedures are linked to commitment" (p.139) and suggest that policies and procedures be created to encourage student participation.

Provost James L. Oblinger (2004) stated in his speech titled "Progress Toward Degree Policy Designed To Help Students Reach Academic Goals" that "while the progress toward degree regulation is designed to improve graduation rates and to help students complete their degrees in a timely manner, its emphasis on faculty and student interaction in planning should have other long-term benefits". Regulations at the university articulate to students that they must work with their advisor to create and update a Plan of Study, enroll as full-time students each semester, and have their academic progress reviewed on a regular basis by colleges and academic departments.

Purpose and Objectives

The purpose of this research was to assess the preliminary results of the progress toward degree regulations for students who entered the College of Agriculture and Life Sciences as freshmen in the 2002 fall semester and had completed 2 years of study in the spring of 2004. More specifically the purpose of this study was to explore characteristics of the students that might be related to student's compliance in developing an approved Plan of Study and to determine if progress toward degree regulations increased retentions rates of undergraduate students in a college of agriculture.

1. What demographic factors are associated with students completing an approved Plan of Study?
2. Does having a Plan of Study encourage students' progress toward degree as measured by retention of students, total GPA, total hours completed and total hours completed toward their degree?

Procedures

The target population in this study were students who entered the College of Agriculture and Life Sciences as freshmen in the 2002 fall semester and had completed 2 years of study in the spring of 2004 (N=604). For the purpose of the study, the students were divided into two groups—those who had an approved Plan of Study (n=160) and those who had not developed a Plan of Study (n=444). All students in the population were included in this census study.

The dependent variable dealing with the first question of the study was the use of the Plan of Study advising tool. The independent variables were gender, race, high school class percentile rank, and SAT scores.

The dependent variables dealing with the second question of the study were retention, total grade point average, total credit hours completed, and credit hours completed toward the degree after two years of study. The independent variable was the use of the Plan of Study advising tool.

Data sets compiled by the Office of Registration and Records were utilized in the study. Descriptive statistics were used to describe the study population. Data were analyzed using appropriate inferential statistics because the population in this study was assumed to be representative of other entering freshmen students in the College of Agriculture and Life Sciences. Both statistical significance and practical importance were considered in analyzing the findings.

Findings

A majority of College of Agriculture and Life Sciences entering freshmen of fall 2002 students were female and white. In all, there were 226 males (37.4%) and 378 (62.6%) females. The racial composition of the class consisted of 498 white (82.5%), 62 African American (10.3%), 27 Asian (4.5%), 9 Native American (1.5%), and 8 Hispanic (1.3%) students. The mean high school class percentile for this group was in the top 13 % of their class and their mean SAT score as entering freshmen was 1169. This class as a whole was successful in the university setting, as they possessed a mean total grade point average of 3.04 after completing 2 years of study at the university.

Differences between gender, race, SAT scores and high school class percentile ranking of those who had an approved Plan of Study (n=160) and those who had not developed a Plan of Study (n=444) were examined using inferential statistics. A Chi-Square test was used to examine whether the gender and race of the student and the development of a plan are associated. The analysis of the association between developing a plan of study and gender yielded χ^2= 2.9905, df=1 ($p>.05$) and suggested that gender was not associated with students' developing a Plan of Study. The analysis of association between developing a plan of students and race yielded χ^2= 2.650, df=4 ($p> .05$) and suggested that race is not associated with students' developing a Plan of Study.

As seen in Table 1, SAT scores were not found to be associated with student completion of a Plan of Study $\alpha < .05$. High school class percentile was found to be significantly associated with whether a student completes a Plan of Study.

Inferential statistics were also employed to determine if having a Plan of Study encourages student's progress toward degree. Progress was identified as retention of the student at the university, total grade point average, hours toward degree and total hours passed after two years of study. A Chi-Square test was used to examine whether the retention of the student after two years and the development of a plan were associated. The analysis of retention yielded χ^2= 26.01, df=1 (p=.001) which suggested that developing a Plan of Study and the retention of the student were associated.

Table 1. *Differences Between CALS 2002 Freshmen Cohort on Selected Characteristics Grouped by The Use of A Plan of Study Advising Tool*

	M^1	*Mean Difference*	*SD*	*t-value*
SAT				
Plan of Study	1172.06		120.43	
		6.98		-.623
No Plan	1165.08		121.61	
High School Class Percentile				
Plan of Study	12.25		10.611	
		2.20		2.055*
No Plan	14.45		11.524	

*$\alpha < .05$

As seen in Table 2, a significant difference was found in the credits earned during the first two years of those students who had a Plan of Study and those that did not have a Plan of Study. Students who completed a Plan of Study completed 4.56 more hours during their first two years of study toward their degree than students who did not have a Plan of Study. Students who had a Plan of Study also passed 4.40 more total hours their first two years of study than those who did not have a Plan of Study. These differences represent more than one additional course completed and were considered of practical importance.

Total grade point average after two years at the university setting was also significantly associated with whether a student completed a plan of work. As seen in Table 2, those who completed a Plan of Study possessed a total grade point average .20 points higher than those students who did not have a plan of work.

Table 2. *Comparison of Progress Toward Degree of 2002 CALS Freshmen Cohort Who Used the Plan of Study Advising Tool vs. Those Who Did Not Develop a Plan of Study*

	M[1]	*SD*	*Mean Difference*	*t-value*
Hours Toward Degree				
Plan of Study	66.36	13.20	4.56	3.42*
No Plan	61.80	14.86		
Total Hours Passed				
Plan of Study	70.21	12.99	4.40	3.42*
No Plan	65.81	14.30		
Total Grade Point Average				
Plan of Study	3.19	.56870	.20	-3.365*
No Plan	2.99	.68640		

*$\alpha < .05$
[1]Students in this cohort should be juniors at the time of the data collection with a minimum of 60 semester hours completed. Most degree programs in CALS require more than 120 semester hours for graduation.

Conclusions/Discussion

Tinto's (1993) interactionist model provides the theoretical framework for this study and postulates that each student possesses an individual set of traits such as gender, race, class rank, and ACT or SAT scores that influences their initial commitment to obtaining a degree and their desire to obtain a degree. The results of this study suggest that the demographic characteristics of the entering freshmen from the class of 2002 do not explain a student's decision to develop a plan of study. Contrary to Tinto's findings in 1993, the demographic characteristics of gender, race and SAT scores were not associated with whether students will complete a Plan of Study. Class percentile was found to be associated with a student's development of a Plan of Study and past research confirms that students who are academically successful are often more committed to a degree program. However, the question still remains if a class percentile mean difference of 2.20 is of practical significance.

The results of this study do indicate that a Plan of Study shows promise as an advising tool to encourage students' progress toward a degree. This study supports the findings of The National Center for Education Statistics (1999) in that students who do a Plan of Study are more likely to be retained in their first two years, take more hours toward their degree, take more total hours, and have a higher GPA. The process of completing a Plan of Study requires the student to choose the exact courses they will take and when they will take them which may increase the efficiency of a student's plan to complete a degree. The findings of this study are not to be interpreted as causal; however, other possible alternatives were explored and were not found to be associated.

Retention has consistently been found to be dependent on the student's academic and personal needs which require collaborative efforts from advisers, students, faculty, and administrators to integrate the student both socially and academically into the University (Bedford & Durkee, 1989). As Gordan and Habley (2000) stated: "Policy and procedures are linked to commitment" (p.139) and suggest that policies and procedures be created to encourage student participation. The "progress toward degree" regulation of developing a Plan of Study has engaged students and faculty at our institution in a more formal and regulated advising process.

Recommendations/Implications

The future of the agriculture industry depends upon the supply of quality graduates from Colleges of Agriculture and Life Sciences. These colleges have the responsibility of assisting students in committing to a degree and completing that degree in a timely manner. Students with a Plan of Study demonstrate higher persistence and retention rates but it is not conclusive as to whether a Plan of Study increases the persistence or retention of students. Research shows that students who are organized and well planned tend to be more successful than their less focused peers. Advisors should assist students in learning how to use the Plan of Study to set academic, leadership, and personal goals as they plan their four-year program. Munsell and Cornwell (1994) stated that the more support a student receives the more successful they are in meeting their goal. Advisors and university administrators must support and encourage students in this process.

Further study should be conducted to examine the relationship between completing a Plan of Study, advising, and the success of the student to complete a degree in a timely manner. Research should be conducted to determine if the Plan of Study, as an advising tool, increases quality advising hence improving the student's performance or if a Plan of Study increases the academic interaction of the student hence strengthening the student's commitment to the University.

Quality advising is valued as a quality indicator by our institution. The university should continue to seek feedback from advisors and administrators as to how they perceive the effectiveness of "progress toward degree" regulations and planning process. Researchers should also examine the benefits and challenges experienced by faculty and administrators who implement and enforce the regulation.

This study was exploratory in nature and limited by the number of students who have been required to complete a Plan of Study during the last two years. University Planning and Analysis has formalized assessment procedures for the "progress toward degree" regulations. Longitudinal studies should be conducted in order to determine which "progress toward degree" factors most influence student retention, matriculation rates and degree completion.

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Career Decisions of Preservice Agricultural Teachers: A Synthesis of Research

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Abstract

This study synthesized research in agricultural education and other related disciplines to better understand the factors that contribute to preservice students' decisions to pursue a teaching career in agricultural education. Preservice students who chose to teach were found to perform academically as well or better than their peers who elected not to teach. This study extends the search for career decision literature to include research related to the Social Cognitive Career Theory (Lent, Brown, & Hackett, 1994). SCCT appears to be an ideal theory for explaining the development of career interests and decisions in agricultural education graduates because it focuses on specific mechanisms (self-efficacy, outcome expectations, and goals) that shape interests and choices related to entry into the profession. SCCT may provide a basis for further research and greater understanding of the decision-making process of preservice agriculture teachers. Several research recommendations are provided to guide future studies.

Introduction/Theoretical Framework

The agricultural education community envisions "a world where all people value and understand the vital role of agriculture, food, fiber, and natural resource systems" (National Council for Agricultural Education, 1999, p. 3). In order to reach this vision, the strategic plan for agricultural education calls for an abundant supply of highly motivated, well-educated teachers. However, for at least the last 37 years, agricultural education has suffered from a shortage of qualified candidates to accept teaching positions (Camp, Broyles, & Skelton, 2002). In 2001, 67 agricultural teaching positions went unfilled nationwide and 35 agricultural programs were closed due to the lack of a qualified teacher candidate. Similarly, in 1995 and 1998, respectively 41 and 55 departments did not operate after failing to hire a qualified agriculture teacher (Camp et al., 2002).

Although the shortage of qualified teacher candidates has been a continual problem (Camp et al., 2002), the agricultural education literature provides little explanation of the factors that contribute to the teacher shortage. Related research in agricultural education has primarily focused on follow-up studies of recent agricultural education graduates. A few researchers have proposed possible solutions for the shortage; however these studies have not resulted in further investigation. Results of graduate follow-up studies have shown that those who entered teaching were as academically able or more so than their peers who chose not to teach. Graduates who entered the teaching profession were found to have higher cumulative grade point averages and higher grades in student teaching and professional education coursework (McCoy & Mortensen, 1983; Baker & Hedges, 1991). Muller and Miller (1993) found agricultural education graduates entering the teaching profession to be no less academically able than their colleagues who chose to seek employment in other professions.

Cole (1984) concluded that teacher educators and teacher preparation programs can have the greatest impact on improving agriculture teacher placement and retention. According to Cole, this can be achieved by ensuring quality student teaching experiences, quality professional and technical preparation, and by reducing specific concerns pertaining to negative outcomes associated with teaching agriculture. Some of the specific concerns mentioned by graduates were spousal support, low salary, long hours, and time for hobbies and recreation (Cole, 1984).

Another career related concern that has received attention in the agricultural education literature is gender discrimination. Studies have found that the career decisions of female preservice agriculture teachers may be influenced by perceptions of barriers created by gender discrimination. Foster, Pikkert, and Husman (1991) found gender bias to be a definite deterrent to women considering a career in agricultural education. In a nationwide survey of 579 female agriculture teachers, Foster (2001) found 61.7% reported experiencing barriers or challenges due to their gender. When asked the greatest barrier faced by female agriculture teachers, the most common response was "acceptance by peers and other males in industry" (Foster, 2001, p. 392).

In 1979, Parmley, Bowen, and Warmbrod examined data from previous national supply and demand studies and concluded the teacher shortage in agricultural education was not a result of a shortfall in the number of graduates from teacher preparation programs, but rather too few of those graduates choosing to enter the teaching profession. Brown (1995) supported this conclusion finding that approximately half of agricultural education graduates were electing not to pursue teaching positions. Brown (1995) found that there were ample numbers of graduates; however the problem lied in insufficient recruitment of those qualified graduates into the profession. Camp et al. (2002) reported that the percentage of newly qualified agricultural education graduates entering the teaching profession between 1994 and 2001 ranged from 48.4% to 63.8%. The remaining proportion of graduates sought employment outside agricultural education while teaching positions went unfilled.

Although these studies provided valuable information, additional research is needed to better understand the career decision-making process of preservice agriculture teachers. Related research and theories from other disciplines need to be explored to help expedite this process, one such theory served as the basis for accomplishing the objectives of this study.

Objectives

The primary objective of this investigation was to synthesize the research related to the Social Cognitive Career Theory (SCCT) as posited by Lent, Brown, and Hackett (1994). The second objective was to identify SCCT research that may provide further insight into the career decision-making process of preservice agricultural education teachers.

Procedures

The researcher utilized numerous information sources to accomplish the objectives of this study. These sources were identified through the ERIC Documentation Reproduction Service, Journal of Agricultural Education, Journal of the American Association of Teacher Educators in Agriculture, and the library database at the University of Florida. Sources were located using keyword searches based primarily on the central elements of the SCCT. Keywords included, but were not limited to the following: career barriers, career choice, career decision, career goals, career support, preservice teachers, self-efficacy, Social Cognitive Career Theory, teacher efficacy, outcome expectations, and teacher placement.

Findings

In 1994, a theory emerged that may provide a means for further study of the processes and challenges that agricultural education graduates face when making the decision to enter the teaching profession. The SCCT (Lent et al., 1994) outlines a process whereby people form academic and occupational interests, make academic and career choices, and achieve in their educational and vocational pursuits. This theory may be important to understanding the factors that most significantly influence the career-choice decisions of agricultural education graduates because of its emphasis on the reciprocal interaction of environmental factors, personal factors, and an individual's behavior.

The SCCT represents an effort to understand the processes through which people develop interests, make choices, and achieve varying levels of success in academic and occupational pursuits (Lent et al., 1994). The SCCT stems primarily from Bandura's (1986) general Social

Cognitive Theory (SCT). Bandura views individuals as dynamic self-systems capable of exercising personal agency, not merely as simple reactive beings (Rasheed, 2001).

Figure 1 depicts the model hypothesized by Lent et al. (1994) to explain the development of career and academic interests over time, participation in career and academic activities, and the acquisition of career-related skills. In the model, Lent et al. (1994) assert that throughout childhood and adolescence, people are exposed to a wide array of activities that have potential career relevance. Additionally, they are exposed vicariously to various tasks related to potential occupations. During this period of life, individuals are differentially reinforced for pursuing certain activities and for their performance. Lent et al. (1994) believe that with continued engagement in activities, modeling, and given feedback from others, children and adolescents will begin to refine their skills, form their own performance standards and perceptions of their level of efficacy, and develop expectations about the outcomes of their performance.

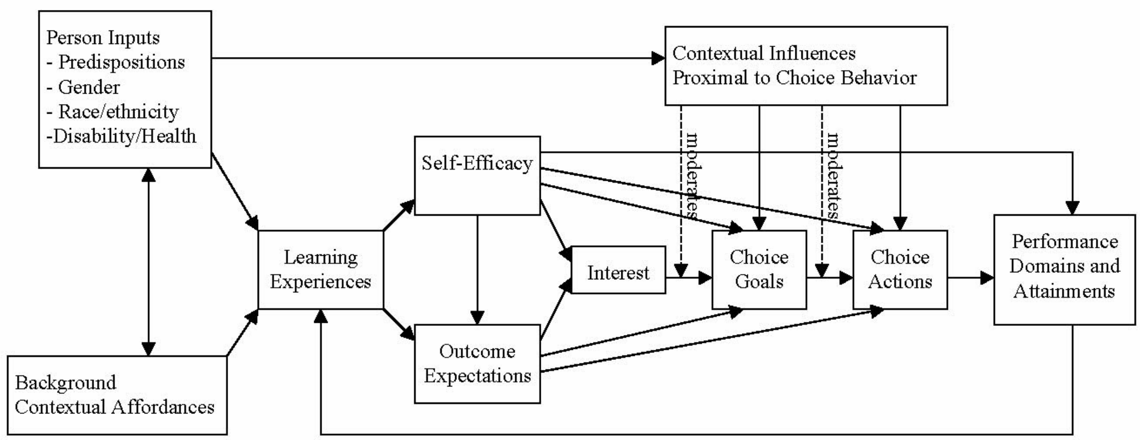

Figure 1. *Model of person, contextual, and experiential factors affecting career related choice behavior (Lent et al., 1994).*

The SCCT framework presents three social cognitive mechanisms as the most relevant to career development: (1) self-efficacy, (2) outcome expectations, and (3) goals (Lent et al., 1994). These three factors are the central core of the SCCT model through which individuals develop, pursue, and modify their career interests. The Lent et al. (1994) model hypothesizes that both self-efficacy beliefs and outcome expectancies predict career interests. This is based on Bandura's (1986) assertion that interests arising from activities are more likely to persist over time when the person feels they are effective and successful in completing those activities. Likewise, when an individual believes the outcome of an activity will not be positive, they will tend to lose interest in that activity (Sharf, 1996). These interests, together with a person's perceptions of efficacy and outcome expectancies, lead to goal formulation. The goals set by an individual affect their actions, or in this case, career decisions (Lent et al., 1994; Smith & Fouad, 1999). These decisions result in various performance accomplishments and/or failures, which affect an individual's learning experiences, thus creating a cyclical path in the model (Sharf, 1996). In 2000, Lent and colleagues further contributed to the model by providing a better understanding of the impact contextual influences such as support systems and barriers, had on career development. The following sections will provide a more detailed explanation of the theory and a review of the scholarly literature related to the constructs within SCCT model.

Self-Efficacy

Self-efficacy is a dynamic set of self-beliefs that are specific to a domain and continually interact in a complex manner with other personal, behavioral, and contextual factors (Lent et al., 1994). Numerous studies incorporating self-efficacy have significantly contributed to our understanding of the career development process. However, the recent introduction of the SCCT has caused researchers to examine the interaction between efficacy beliefs and the other contextual and individual variables that influence the career development process (Rasheed, 2001).

In 1981, Betz and Hackett extended Bandura's (1977) self-efficacy construct into career development theory. Betz and Hackett (1981) found that the level of self-efficacy of women was relative to the traditional nature and range of careers they considered viable. Hackett (1985) later made the argument that self-efficacy was more important than a student's actual ability in their decision of a math or science related major. In general, research has shown a wider range of career options and a greater interest in those options was exhibited by those persons with a higher perceived efficacy to fulfill educational requirements and job functions (e.g. Betz & Hackett, 1981; Rasheed, 2001).

In addition to the research conducted in the math and science domains, many other studies have linked self-efficacy with numerous career-related variables, such as career exploration (Rasheed, 2001), career-choice making indecision (Taylor & Betz, 1983), career salience (Matzeder & Krieshok, 1995), specific occupational tasks (Rooney & Osipow, 1992), vocational interests based on inventory instruments (Betz, Harmon, & Borgen, 1996), and academic performance (Betz & Luzzo, 1996).

In the teaching profession, teacher efficacy has continually been found to have a positive relationship with a teacher's performance, commitment to the profession, and ultimately, student achievement. Miller, Kahler, and Rheault (1989) found motivated and confident teachers were more effective. Students achieved more, exhibited greater motivation, and had a higher level of perceived self-efficacy when their teacher possessed a higher level of perceived teacher efficacy (Guskey & Passaro, 1994).

Teacher efficacy has also been examined and found to affect teachers' levels of both professional commitment and teacher attrition. Knobloch and Whittington (2002) found novice agriculture teachers with teaching and student teaching experience were more confident than teachers who lacked such experience. Links have been found between low levels of teacher efficacy and increased stress, lack of coping abilities, and burnout (Chwalisz, Altmaier, & Russell, 1992; Bandura, 1997). As a means of coping with stress, teachers may avoid engagement in certain instructional activities (Bandura, 1997). Ultimately, teachers who have a low sense of instructional efficacy show a weak commitment to the teaching profession (Evans & Tribble, 1986), they spend less time teaching the subject areas in which they feel less efficacious (Enochs & Riggs, 1990), and dedicate less total time to academic matters (Gibson & Dembo, 1984).

Outcome Expectations

Outcome expectations are personal beliefs about probable response outcomes. That is, where self-efficacy beliefs are concerned with one's perceived abilities to complete tasks or activities (i.e. "can I do this?"), outcome expectations involve the perceived consequences of actually performing the activity (i.e. "if I do this, what will happen?") (Lent et al., 1994, p. 83).

People act not only on their beliefs about what they are capable of doing but also on their beliefs about the likely effects of their actions (Bandura, 1986). Although both self-efficacy and outcome expectations are seen as influencing career-related behavior, Bandura (1986) has argued that these two factors are often differentially potent, with self-efficacy being the most influential in determining behavior (Lent et al., 1994).

Although few studies have focused on outcome expectations and career-related behavior, research has provided significant findings supporting Lent and colleagues' (1994) hypothesized relationship of outcome expectations to formation of interests, intentions, and setting of goals (Diegelman & Subich, 2001). Betz and Voyten (1997) found that career decision-making efficacy and outcome expectations were good predictors of undergraduates' academic and career indecision, and intentions to engage in career exploration. Fouad and Smith (1996) also found results supporting the SCCT model. Their analysis showed a strong association existed between self-efficacy and outcome expectations. Additionally, outcome expectations were found to be strongly associated with career exploration intentions.

Mixed support for the SCCT model was provided by Schaffner and Jepsen's (1999) study of a minority teacher recruitment program. Outcome expectations and interests were both found to have a direct effect on choice behavior; however the negative relationship found in the study contradicted the positive relationship hypothesized by the SCCT.

Goal Mechanisms

Through the process of setting goals, people organize and guide their own behavior in order to increase the likelihood that desirable outcomes can be attained (Lent et al., 1994). Goals function principally through a person's ability to symbolically represent desired future outcomes and to react to their own behavior in a self-evaluative manner based on their internal standards for performance. The self-motivating qualities of goals are achieved by linking self-satisfaction to goal fulfillment and by enacting those behaviors that are consistent with a person's internally set standards (Lent et al., 1994).

According to Bandura (1986), setting a goal does not automatically activate the self-influence mechanisms that govern an individual's behavior. Certain goal properties exist that affect an individual's performance towards achieving that goal. Bandura (1986) referenced three factors that have the greatest affect on the motivating nature of goals: specificity, challenge, and proximity.

Career goals have been given limited attention in the career development literature and are practically devoid in agricultural education research. In the extant literature, career goals are commonly operationalized as plans, aspirations, decisions, and expressed choices. Much of the research conducted in this area has been focused on identifying potential barriers to career goals. Perceptions of barriers to career goals have been shown to differ based on an individual's gender and ethnicity. Perrone, Sedlack, and Alexander (2001) examined barriers to and facilitators of career goals among college students within the context of the SCCT. In a sample of 2,743 college freshman, they found that gender and ethnicity differences existed in the perception of barriers to career goals and aspirations. McWhirter's (1997) study of 1,139 high school students demonstrated that females anticipated more barriers to career goals than did males, and that Mexican Americans anticipated more barriers than European American participants.

Additional research has provided evidence of a link between self-efficacy and career goals. Self-efficacy was found to mediate the relationship between ability and women's aspirations to advance in their chosen career field (Nauta, Epperson, & Kahn, 1998). These higher-level aspirations may be influenced by role models as well. Role models affect aspirations by increasing self-efficacy and by vicariously demonstrating how they can perform multiple life roles (Nauta et al., 1998). These researchers also conclude that self-efficacy is an important predictor of higher-level career aspirations and they suggest that interventions can be designed to increase students' self-efficacy (Nauta et al., 1998).

Person Inputs

In an effort to further elaborate on the role of the three sociocognitive mechanisms of self-efficacy, outcome expectations, and goal mechanisms, Lent et al. (1994) present a more comprehensive account of the career development process by addressing other important model components, such as person inputs. A vast array of career-relevant person inputs exist that can have an impact on the career-choice process. These inputs include, but are not limited to, gender, ethnicity, socioeconomic status (SES), genetic predispositions, and disability or health status (Lent et al., 1994). Lent et al. (1994) view person inputs as being linked to the learning experiences that shape an individual's beliefs of self-efficacy and outcome expectations. These personal characteristics have been found to have a direct effect on self-efficacy and outcome expectations (Fouad & Smith, 1996) and an indirect effect through their influence on learning experiences (Lopez, Lent, Brown, & Gore, 1997). Gender and cultural factors may further influence career development by their affect on people's view of and attempts to implement their goals (Lent, Hackett, & Brown, 1996).

Gender and ethnicity have been found to relate to self-efficacy, outcome expectations, interests, and career choice in a number of ways. According to SCCT, gender and ethnicity differences arise primarily through differential access to opportunities, supports, and socialization processes (Lent et al., 1994). Differential access influences career development and career choices by mediating a person's learning experiences. The consequences of these learning experiences give rise to one's self-efficacy and outcome expectations (Lent et al. 1994).

Although largely ignored in the career literature, SES has been found to have an influence on an individual's choice of academic endeavors and the amount of education they expect to achieve (Hanson, 1994; McWhirter, Hackett, & Bandalos, 1998; Trusty, 1998). Bandura (1997) concluded that by affecting parental and family efficacy beliefs, SES indirectly influences the support structure for children's educational development and aspirations. Parents and family's sense of efficacy and aspirations raise their children's educational aspirations and in doing so, raise the child's own academic, social, and self-regulatory self-efficacy (Bandura, 1997).

Contextual Influences

In addition to person inputs, contextual influences also influence career-choice behavior. Lent et al. (1994) posited that contextual factors have an impact on self-efficacy and outcome expectations indirectly through their affect on an individual's learning experiences. Contextual factors affect the socio-cognitive mechanisms that drive a person's interests and career choices and comprise the opportunity structure in which an individual forms and implements their career plans (Lent et al., 1994; Swanson & Woitke, 1997). Additionally, certain contextual factors may also have a direct effect on choice formation and implementation.

Contextual influences are those that influence the learning experiences through which self-efficacy and outcome expectations are developed. These include exposure to tasks or role models, the nature of support or discouragement one receives for engaging in activities, and cultural and gender socialization. Contextual influences also operate during the critical choice junctures. These include support systems, such as personal network contacts, and structural barriers, such as discriminatory hiring practices (Lent et al., 1994). According to the model, a person is less likely to translate their career-related interests into goals and goals into actions, if they perceive barriers will impede their efforts (Lent et al., 2000). Whereas, an individual's perception of ample support and few barriers is predicted to facilitate the process of transforming their interests into goals and ultimately, goals into actions. This relationship has been supported by studies that found parent, peer, and teacher support was predictive of career aspirations (Farmer, 1985), perceptions of career opportunities (Wall, Covell, & MacIntyre, 1999), and differences in self-efficacy (Lapan, Hinkelman, Adams, & Turner, 1999).

Learning Experiences

In the SCCT model, Lent and colleagues (1994) posited that experience contributes directly to an individual's sense of efficacy and outcome expectations. Bandura (1997) identified four types of learning experiences that influence the development of one's self-efficacy and outcome beliefs. These include vicarious learning, personal performance accomplishments, social persuasion, and physiological and affective states and reactions. These four types of learning experiences influence self-efficacy and outcome expectations. Performance accomplishments are considered to be the most influential learning experience (Bandura, 1997). Vicarious learning also influences self-efficacy through observations of similar others' successes and failures. Through studies using encouragement and discouragement, social persuasion has been found to impact efficacy beliefs (Luzzo & Taylor, 1993-1994). Physiological and affective states, such as levels of composure or stress, also affect the way a person perceives their capabilities (Lent et al., 1994).

Conclusions and Recommendations

A limited number of studies have been conducted related to the career decisions of preservice agriculture teachers. These studies were primarily graduate follow-ups and have shown that students who pursue careers in teaching are as academically able or more so, than their peers who chose to not teach. Additional research examining the career decisions of agricultural education graduates is greatly needed in order to address the root causes of the shortage of teachers.

The SCCT appears to be an ideal theory for explaining the development of career interests and decisions of agricultural education graduates because it focuses on specific mechanisms that shape interests and choices related to entry into the profession. Utilizing the SCCT model and its central constructs may provide agricultural education researchers with a guiding framework for studies to better understand the career decisions of preservice agriculture teachers. Research is needed to test the relevance of this model and the influence of its constructs on preservice teachers' decision to enter teaching.

Self-efficacy has been found to have an influence on career decision. Additionally, teacher efficacy had a positive relationship with teacher performance and commitment, as well as the achievement of students. Research investigating the effect of preservice teachers' efficacy on their career decisions is necessary as it may provide a basis for interventions to increase preservice teachers' sense of efficacy. Such interventions may ultimately impact their decision to enter the teaching profession.

The expected outcomes of career decisions have been found to influence an individual's choice actions. Negatively perceived outcomes of a career teaching agriculture may contribute to a student's decision to pursue employment in other fields. Future studies should attempt to identify preservice agriculture students' perceptions of career outcome expectations; so that positive perceptions can be reinforced and negative outcomes can be addressed.

Barriers to career goals are perceived differently by men and women, and by ethnicity. Through their influence on self-efficacy, role models affect an individual's beliefs in their own ability to overcome barriers and achieve their career goals. Further research is needed to identify career barriers for preservice teachers, investigate gender and ethnicity differences in perceptions of career barriers, and examine the influence of role models on career decisions.

Person inputs, such as gender, ethnicity, and socioeconomic status indirectly influence career decisions. Differences in person inputs can cause differential access, opportunity, and support, which affects learning experiences and in turn, give rise to self-efficacy and outcome expectations. Future research should investigate possible relationships between various person inputs and preservice agriculture teachers' perceptions of self-efficacy, outcome expectations, and their decision to teach.

Environmental influences shape learning experiences and moderate the process of transforming career interests into choice actions. Perceptions of barriers, such as gender discrimination, impede career aspirations while support systems facilitate the pursuit of those aspirations. Additional research is warranted to identify potential career barriers and supports for preservice agriculture teachers and to determine the influence of such barriers and supports on an individual's career decisions.

Learning experiences directly impact self-efficacy and outcome expectations. Bandura (1986) identified four types of learning experiences that have been found to influence the development of an individual's beliefs about self-efficacy and outcome expectations. Preservice teachers should be exposed to these types of learning experiences throughout their preparation program. Additionally, these learning experiences should be examined to determine their effect on preservice teachers' perceptions of self-efficacy and outcome expectations. Ultimately, teacher preparation programs may be able to provide more of the experiences that have the greatest influence on preservice teachers' self-efficacy and outcome expectancy beliefs.

This study synthesized the research related to the SCCT (Lent et al., 1994) to determine its usefulness for investigating the career decision process of preservice agriculture teachers. After analyzing the findings of this study, it became apparent that the SCCT has great potential as a guiding framework for future career-choice studies in agricultural education. Based on these findings, several research recommendations were provided. Researchers should use these recommendations as a basis for future studies to assist the profession in achieving a better understanding of the career decisions of preservice agriculture teachers.

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Perceptions of Psychosocial Assistance, Similarities and Satisfaction from Beginning and Mentor Agriculture Teachers

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Abstract

The purpose of the study was to describe the extent to which a formal mentoring relationship met psychosocial needs of beginning agriculture teachers, and to describe the extent of satisfaction with the dyad relationship. The accepting sample consisted of Missouri agriculture teachers (n = 40) in their first year of teaching during the 2003-2004 school year, and their formal mentors (n = 40) provided by school districts. Data were collected using the Mentoring Relationship Questionnaire (MRQ) developed by Greiman, Birkenholz, and Stewart (2003). This instrument consisted of both a beginning teacher version and mentor version. From the findings of the study it was concluded that formal mentors provide psychosocial assistance to beginning agriculture teachers. Psychosocial assistance was intended to enhance a sense of competence, identity, and effectiveness in beginning teachers, and consisted of support encompassing the functions of acceptance, counseling, friendship, role modeling, and social. It was found that beginning agriculture teachers and formal mentors who perceive they are similar to their dyad partner are more likely to have a satisfying mentoring experience. Dyad partners who recognize that they have similar values, attitudes, working styles, and teaching philosophies are more likely to have a positive mentoring experience, successful relationship, and satisfactory interaction.

Introduction

Gerald and Hussar (1998) predict over two million new teachers will be employed in America's schools during this decade. An increasingly complex society will challenge this group of teachers to be more prepared than ever before (National Center for Education Statistics, 1997a). Unfortunately, first-year teachers are frequently inducted through a sink or swim approach with little support from colleagues and few opportunities for professional development (Darling-Hammond & Sclan, 1996). According to the National Commission on Teaching and America's Future (1996), haphazard induction experiences contribute to high attrition rates and to lower levels of teacher effectiveness. Members of the Association of Teacher Educators (ATE) rated mentoring beginning teachers as one of the two most critical issues for improving teacher education (Buttery, Haberman, & Houston, 1991)

Nationally, more than half of all teachers leave the profession before the end of their sixth year (Marso & Pigge, 1997). According to Darling-Hammond (1997), the attrition rate (15%) for first and second year teachers is more than double that of the national average (6.6%). These characteristics led Halford (1998) to describe education as a profession that "eats its young". However, Galvez-Hjornevik (1985) found stress incurred by beginning teachers can be reduced by the mentoring relationship. Additionally, this mentoring relationship can help reduce the number of teachers leaving the profession by helping to promote professional development of new teachers (Odell & Ferraro, 1992). Several studies (Archer, 1999; Fideler & Haselkorn, 1999; Gold, 1996) have confirmed that induction programs and mentorship are effective at retaining qualified teachers.

Several states have developed mentor programs to address the issues associated with beginning teachers. One such state is Missouri. The structure and delivery in Missouri has evolved over the years. The induction program to assist beginning teachers is a result of policy decisions made by state legislators. The 1985 Excellence in Education Act passed by the state legislature required school districts to provide professional development for all teachers, and assign a formal mentor to beginning teachers by September 1988 (Missouri Department of Elementary and Secondary Education, 1988). Under the structure of this program, beginning teachers were paired with formal mentors from within their school district. Most beginning teachers were matched with mentors outside of their own discipline. In mid 2003, the Missouri Department of Elementary and Secondary Education (DESE) mandated that each division of Career and Technical Education provide structure and support for mentor programs (G. Laboube, personal communication, May 18, 2004). The Career and Technical Education program provided beginning agriculture teachers with formal mentors within their discipline.

Formal mentoring programs, like Missouri's model, have emerged as a popular response to the issues of induction teacher support and retention. The growth in popularity of these programs has been paralleled by an emerging degree of concern (Gold, 1996). Little (1990) indicated that these formal programs are often lacking in conceptual understanding characterized by unrealistic expectations and ineffective implementation strategies. Previous studies (Huling-Austin & Murphy, 1987; Ingersoll, 1999) have indicated that beginning teacher commitment did not improve just because a mentor program was in place. Peiter, Terry, and Cartmell (2003a) found, within agricultural education, many first year teachers experience problems and receive no help from a mentor. Beginning teachers often perceive induction programs as a form of evaluation as opposed to a process of mentoring (Peiter, Terry, & Cartmell, 2003b). According to the National Center for Education Statistics (1997b), further research should be conducted on what distinguishes effective from ineffective induction and assistance programs.

Previous studies have addressed issues of concern among induction year teachers in agricultural education. Most common concerns faced by beginning teachers were found to be issues of classroom management and time management (Joerger & Boettcher, 2000; Mundt, 1991; Mundt & Connors, 1999; Simon, 1989; Simon & Wardlow, 1989; Talbert, Camp, & Camp, 1994). Studies focusing on mentorship in agricultural education primarily pertained to instructional-related support and challenges associated with the first-year of teaching (Greiman, Birkenholz, and Stewart, 2003). Other studies (Barrera & Finley, 1992; Greiman, Walker, & Birkenholz, 2002; Simon, 1989; Simon & Wardlow 1989) concluded that mentor assistance helped beginning agriculture teachers overcome common first-year problems

Findings from previous investigations into Missouri's induction and mentorship program have provided an indication of the effectiveness of the program. Early in the history of the program, Wilkinson (1997) reported that one-fourth of new teachers in Missouri were struggling alone without a mentor and a professional development plan during the 1994-1995 school year. Greiman, Walker, & Birkenholz, (2002) reported that most first-year teachers had access to formal and informal mentors. It was implied that first-year teachers were utilizing several mentors to assist them during the induction process. According to Greiman, Walker, & Birkenholz, (2002), although formal mentors were assigned to provide professional development assistance for first-year teachers, it appeared that informal mentors were more helpful. In the same study, it was found that the majority of the respondents indicated that a teacher within the school district and an agriculture teacher located outside the local school district were more helpful in providing professional development assistance than the formal mentor. In contrast, Greiman, Birkenholz, and Stewart, (2003) found that mentors and beginning teachers, overall, were satisfied with the formal mentoring. In that same study, it was concluded that mentors provided psychosocial assistance to beginning agriculture teachers. These studies preceded the 2003 program shift from district to state control.

Theoretical Framework

Beginning teachers experience a variety of issues and challenges during their induction years. Those challenges require an equaled variety of support to meet their needs. This support can be categorized as either instructional-related or psychological (Gold, 1996; Stansbury & Zimmerman, 2000). Instructional-related support includes assistance with the knowledge and skill that is necessary to be successful in the classroom and school. Psychological support builds self-concept of the beginning teacher by promoting confidence, developing self-reliance and encouraging feelings of effectiveness and positive self-esteem. This is evident in findings from Simon (1989) indicating that mentors perceived their role to be one of personal assistance and psychological support.

Many research efforts have been directed at identifying characteristics of successful mentoring relationships. Gender, race, length of relationship, and perceived similarity of dyad participants may influence mentoring relationships (Dreher & Cox, 1996; Ragins & Cotton, 1999; Turban, Dougherty, & Lee, 2002). Beginning agriculture teachers and formal mentors who perceive similarities in their relationships are more likely to have a satisfying mentor experience (Greiman, et al., 2003). Simon (1989) described mentoring as an informal and naturally occurring process and recommended that mentor-induction programs not become over-formalized. Research from business and management further indicated that informal mentor relationships were more effective than formal relationships (Ragins & Cotton, 1999).

Kram (1985) described mentoring as a type of developmental relationship in which mentors provide functions that enhance both individuals' growth and advancement. According to Kram's mentor role theory; there are two types of functions of a developmental mentoring relationship, career functions and psychosocial functions. This classification provides a theoretical framework in which mentoring relationships may be evaluated. Kram described career functions as "those aspects of a mentoring relationship that enhance learning the ropes and preparing for advancement in an organization" (p. 22). These functions serve primarily to aid in the advancement in an organization, and included sponsorship, exposure and visibility, coaching, protection, and challenging assignments. Psychosocial functions "enhance an individual's sense of competence, identity, and effectiveness in a professional role" (p. 23). Psychosocial functions include acceptance, counseling, friendship, and role modeling. A fifth psychosocial function, social, was later incorporated into the theory (Ragins & McFarlin, 1990). Career functions operate primarily at the organizational level to assist in advancement of the junior colleague, while psychosocial functions affect each individual on the interpersonal level, both inside and outside the organization. Kram (1985) suggested that the greater the number of functions provided by the mentor, the more beneficial the relationship will be to the person being mentored.

Perspectives of beginning teachers regarding their induction into the profession are well documented. However, relatively few efforts have investigated the role of the mentor. It has been suggested that similarity of beginning teachers and mentors in the dyad relationship can lead to a more satisfactory experience, but little evidence exists to support that claim. Additionally, little research has been conducted to investigate the psychosocial needs of beginning teachers. Are beginning teachers and formal mentors satisfied with the mentorship component of the induction teacher program?

Purpose and Objectives

The purpose of the study was to describe the extent to which a formal mentoring relationship met the psychosocial needs of beginning agriculture teachers. An additional focus of the study was to describe the extent to which beginning agriculture teachers and their formal mentors were satisfied with the dyad relationship. The following research questions were addressed in the study:

1. What are the demographic characteristics of beginning agriculture teachers, their formal mentors, and the schools where they taught?
2. To what extent do formal mentors provide assistance to beginning agriculture teachers in meeting their psychosocial needs?

3. What is the relationship between the perceived satisfaction of formal mentoring and the perceived similarity of the dyad relationship?

Procedures

This study was descriptive-correlational in design. The target population for the study was Missouri agriculture teachers in their first year of teaching during the 2003-2004 school year ($N = 40$), and their formal mentors ($N = 40$). The names of the beginning agriculture teachers and their formal mentors were obtained from the Missouri Department of Elementary and Secondary Education and served as a frame for the study.

Data were collected using a beginning teacher version and mentor version of the Mentoring Relationship Questionnaire (MRQ) developed by Greiman, et al. (2003). The MRQ was developed after reviewing the literature and identifying highly reliable data collection instruments utilized in previous research studies involving mentoring (Kram, 1985; Mundt & Connors, 1999; Ragins & McFarlin, 1990; Turban, Daugherty, & Lee, 2002; Veenman, 1984). Section one of the beginning teacher version of the MRQ asked subjects to identify the extent their formal mentor had provided psychosocial support. This section consisted of 15 statements representing each of the five psychosocial functions (acceptance, counseling, friendship, role modeling, and social). The function of acceptance described the rate at which the beginning teacher becomes accepted into the profession by the mentor. The function of counseling referred to the extent the mentor served as a sounding board or offered an alternative perspective. Friendship represented the level the beginning teacher can trust and confide in the mentor teacher. The extent to which mentors provided a desirable example that beginning teachers could identify with was represented by the role modeling function. Finally, the social function related to the extent mentors and beginning teachers shared personal experiences as a way to escape the pressures of work.

Subjects were asked to identify the extent their mentor performed each of the 15 functions using a 7-point Likert-type scale ranging from 1 = *not at all* to 7 = *very large extent*. A second section of the MRQ required subjects to respond to 10 statements regarding the relationship with their formal mentor. Five items were designed to measure the perceived similarity of the dyad relationship, while five additional items were intended to gain a measure of the perceived satisfaction with formal mentoring. Subjects provided their perceptions using a 7-point Likert-type scale with 1 representing *strongly disagree* and 7 representing *strongly agree*. A third section of the questionnaire asked subjects to supply demographic information regarding their school (number of students, number of teachers) and themselves (age, gender, type of certification). An alternate form of the data collection instrument was developed to collect information from formal mentors of the dyad relationship, and mirrored the beginning teacher form.

Validity of the two forms of the instrument was established through prior research with a panel of experts ($n = 8$), who had an identifiable research focus on mentorship (Greiman, Birkenholz, & Stewart, 2003). Greiman, et al. established reliability of the MRQ. Reliability estimates for the beginning teacher version of the instrument were reported as follows: .97 for psychosocial mentoring functions, .98 for perceived similarity of the dyad, and .99 for perceived satisfaction with the mentoring experience. With regard to the mentor version of the MRQ, the reliability estimates were as follows: .93 for psychosocial mentoring functions, .96 for perceived similarity of the dyad, and .98 for perceived satisfaction with the mentoring experience.

The data collection process began by sending subjects a pre-notice e-mail message announcing the intent of the study and the forth coming survey packet. Five days later, the survey packet, consisting of a personalized and signed cover letter, questionnaire, and self-addressed, stamped envelope, was mailed to subjects. Ten days after the first mailing, an e-mail reminder notice was sent to nonrespondents further encouraging their participation. A week later, nonrespondents were sent a second packet containing a revised cover letter, a second questionnaire, and a self-addressed, stamped envelope as a reminder to participate in the study. The final contact with nonrespondents was approximately 25 days after the first mailing, and consisted of telephone calls that encouraged the return of the questionnaire. A total of 30 beginning agriculture teachers completed the questionnaire, resulting in a beginning teacher response rate of 75%. The response rate for the formal mentors was 75%, with 30 instruments completed and returned. An overall response rate of 75% was achieved, resulting in an accepting sample of 60 (n = 60). All instruments were usable for data analysis. Data were coded and entered into SPSS for the analyses. Measures of central tendency and variability were used to summarize the data.

Findings

The first research question sought to describe the demographic characteristics of formal mentors and the characteristics of beginning agriculture teachers and the schools where they taught. Table 1 displays the demographic characteristics of formal mentors. Twenty-five mentor teachers were male (83%) while only five were female (17%). The average age of formal mentors was 39 years old (*SD* = 8.96) with a range from 25 to 56. Additionally, mentors reported an average of 15 years of teaching experience (*SD* = 8.14). Years of experience ranged from 3 to 29 years.

Table 1. *Demographic Characteristics of Formal Mentors (n = 30)*

Characteristic	Frequency	Percent	*M*	*SD*	Range
Gender					
Male	25	83			
Female	5	17			
Age			39	8.96	25-56
Years of Experience			15	8.14	3-29

Demographic characteristics of beginning teachers and the schools where they taught are displayed in Table 2. The average age of beginning agriculture teachers was 25 years (*SD* = 4.08), with a range of 22 to 45. This resulted in an average age difference of 14 years between beginning agriculture teachers and their formal mentors. There were almost an equal number of male (*n* = 16, 53%) beginning agriculture teachers as there were female (*n* = 14, 47%). The majority of beginning agriculture teachers (*n* = 27, 90%) were certified to teach at a secondary school, while three (10%) had a temporary teaching certificate.

Table 2. *Demographic Characteristics of Beginning Teachers (n = 30)*

Characteristic	Frequency	Percent	*M*	*SD*	Range
Gender					
Male	16	53			
Female	14	47			
Certificate Type					
Permanent	27	90			
Temporary	3	10			
School Type					
Comprehensive	21	72			
Vocational	9	28			
Program Type					
Single Teacher	17	59			
Multiple Teacher	13	41			
Age			25	4.08	22-45
Enrollment			93		14-260

Regarding school information (Table 2), most (*n* = 21, 72%) of the beginning agriculture teachers taught in a comprehensive high school rather than an area vocational technical school (AVTS) or career center. The majority (*n* = 17, 59%) of beginning agriculture teachers taught in single-teacher programs, while 41% were located in multiple-teacher departments. There was an average of 93 students enrolled in the agriculture programs of beginning teachers, with a range of 14 to 260 (four-teacher program).

The second research question sought to determine the extent to which formal mentors provided assistance to beginning agriculture teachers in meeting their psychosocial needs. As revealed in Table 3, both beginning teachers and mentors perceived the psychosocial function of acceptance (beginning teacher M = 5.54, mentor M = 5.90) to be the function met to the highest extent. The psychosocial functions of counseling (beginning teacher M = 5.45, mentor M = 5.64), friendship (beginning teacher M = 5.37, mentor M = 5.54), and role modeling (beginning teacher M = 4.94, mentor M = 5.13) were identified by each group as being met to a *large extent*. Both groups perceived that the psychosocial needs of beginning agriculture teachers involving the social function (beginning teacher M = 3.83, mentor M = 3.38) were being met to *some extent*. Formal mentors had a smaller standard deviation for each of the five psychosocial functions indicating a higher level agreement on the extent to which the functions were met when compared to beginning teachers.

Table 3. *Extent to Which Mentors Met the Psychosocial Needs of Beginning Teachers as Perceived by Beginning Agriculture Teachers and Formal Mentors*

	Beginning Teachers (n = 30)		Formal Mentors (n = 29)	
Psychosocial Function	M	SD	M	SD
Acceptance	5.54	1.32	5.90	0.72
Counseling	5.45	1.69	5.64	0.92
Friendship	5.37	1.76	5.54	1.03
Role Modeling	4.94	1.85	5.13	1.02
Social	3.83	2.23	3.38	2.18

Note. 7-point scale (1 = not at all, 3 = some extent, 5 = large extent, 7 = very large extent)

The third research question sought to determine the relationship between the perceived satisfaction of formal mentoring and the perceived similarity of the dyad relationship. As revealed in Table 4, beginning agriculture teachers (M = 5.41, SD = 1.69) and formal mentors (M = 5.94, SD = 1.09) *agreed* that overall they were satisfied with formal mentoring (i.e., the relationship had been a positive experience, they were glad to have had the opportunity to interact, the relationship had been successful, they would want the same dyad partner if having to do it over again, and they were satisfied with the interaction). Respondents (beginning teacher M = 4.86, mentor M = 5.03) *agreed* that the dyad relationship had similarities (i.e., partner had similar values and attitudes, were alike in a number of areas, had similar working styles, see things much the same way, and have similar teaching philosophies). Further, it was found that formal mentors (M = 5.94, SD = 1.09) were more satisfied with mentoring interactions than were beginning agriculture teachers (M = 5.40, SD = 1.69). In addition, formal mentors (M = 5.03, SD = 1.08) perceived the dyad relationship to be more similar than did beginning agriculture teachers (M = 4.86, SD = 1.42). The perceived satisfaction of formal mentoring was found to have a *very high* positive correlation (Davis, 1971) with the perceived similarity of the dyad relationship for both the beginning agriculture teachers (r = .82) and the formal mentors (r = .85).

Table 4. *Satisfaction with Formal Mentoring and Similarity of Dyad Relationship*

	Beginning Teachers (n = 30)			Formal Mentors (n = 30)		
Construct	M	SD	$r_{x1.2}$	M	SD	$r_{x1.2}$
Satisfaction with Formal Mentoring (x_1)	5.40	1.69	.82	5.94	1.09	.85
Similarity of Dyad Relationship (x_2)	4.86	1.42		5.03	1.08	

Note. 7-point scale (1 = strongly disagree, 3 = disagree, 5 = agree, 7 = strongly agree)

Conclusions, Implications, and Recommendations

From the findings of this study, it was concluded that formal mentors provided psychosocial assistance to beginning agriculture teachers, thus supporting research conducted by Kram (1985). In particular, the psychosocial needs of beginning agriculture teachers were being met in the functions of acceptance, counseling, friendship, and role modeling. To a lesser extent, the social function was not being met to the extent the other four psychosocial functions were. This concurs with Greiman, et al., (2003), except the mentors in that study were in the same school as the beginning teacher and were not necessarily agriculture teachers. This implies that the psychosocial needs of beginning agriculture teachers were being provided for in the mentoring relationship.

Beginning agriculture teachers can anticipate formal mentors providing psychosocial support during the induction year of teaching. This support is not dependent upon whether the mentor is in the same school district or a different school district. Additionally, this support is not dependent upon whether the mentor is a teacher in the agriculture field or from a different field. Knowing this support is available may help to build the self-confidence of beginning teachers as they begin their induction into the profession, and help to reduce the feelings of insignificance and isolation that beginning teachers often experience (Odell & Ferraro, 1992). When a beginning teacher seeks a teaching position, the level of support may be a factor in whether or not beginning teachers want a single- or multi-teacher program. A beginning teacher may seek a multi-teacher program over a single-teacher program if he or she is concerned about not feeling supported or competent during the first year. However, findings of this study are consistent with Greiman, et al., (2003) in that assistance will be available in the form of a mentor, despite the number of teachers in the program.

Beginning teachers and mentor teachers are satisfied with formal mentoring. In addition, it is concluded from this study that beginning agriculture teachers and formal mentors who perceived they are similar to their dyad partner are more likely to have a satisfying mentoring experience. This conclusion is consistent with previous research suggesting that perceived similarity influenced dyad relationships (Dreher & Cox, 1996; Turban et al., 2002; Greiman, et al., 2003). However, this study fails to support Simon's (1989) claim that mentor-induction programs not become over-formalized and that that beginning teachers should be allowed to select their own mentor(s). For this study, the mentor-induction program was formalized and mentors were assigned. Mentors and induction teachers with similar values, attitudes, working styles, and teaching philosophies were more likely to have a positive mentoring experience, successful relationship, and satisfactory interaction. This finding implies the importance of similarity when selecting dyad partners, and presents administrators and mentoring program coordinators with the challenge of making a dyad assignment before the two participants have met and established a rating of similarity.

The first recommendation is to share the findings of this research and that of the Greiman et al., (2003) study with the state agency responsible for the teacher mentoring process. Because both studies produced similar findings, the state agency may now feel it has flexibility in whether or not the mentor is an agriculture teacher or not, or if the mentor is a part of the school district or not. In addition, the state agency should be encouraged to spend time and resources in pairing the mentor with the beginning teacher. Another recommendation is to investigate the discrepancies in the study indicating that the mentors were more satisfied and perceived the dyad relationship to be more similar than beginning teachers. Identifying the factors that make the mentoring relationship more satisfying to the mentor teacher may help to entice other qualified teachers to seek out professional development opportunities associated with serving as a mentor. Additionally, factors influencing the satisfaction of beginning teachers should be identified. The focus of the mentoring process is on the growth of the beginning teacher. This focus makes it logical to conclude that the beginning teacher should be as satisfied or more satisfied with the relationship than the mentor.

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Developing a Model of Cooperating Teacher Effectiveness

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Abstract

A trend in agricultural education has been a shortage of graduates from preservice agricultural education programs who choose to enter the teaching profession, thus causing a deficit in the number of qualified teachers to fill vacancies. When examining preservice agricultural education programs, student teaching is often the capstone experience, during which, the student teacher works closely with the cooperating teacher. Given that the student teaching experience is often the final semester of preservice agricultural education programs, it is reasonable to assume that satisfaction with that experience contributed to a student teacher's decision to enter the teaching profession. Because the decision to enter teaching is made by the student teacher, insight in to their perceptions of the student teaching experience, particularly the cooperating teacher, is invaluable. The purpose of this study was to develop a model of cooperating teacher effectiveness by replicating the work of Roberts and Dyer (2004). The Delphi method was utilized with an expert panel (N = 13) of all the student teachers from southern university. Thirty characteristics were identified and grouped into the categories of Teaching/Instruction, Professionalism, Student Teacher/Cooperating Teacher Relationship, and Personal Characteristics.

Introduction

In 2001, 798 new agricultural science teachers were needed to fill vacant teaching positions (Camp, Broyles, & Skelton, 2002). In that same year, there were 857 newly qualified agricultural education graduates. However, only 59% (509) chose to enter the teaching profession. This discrepancy (798 vacancies, 509 teachers) created a net deficit in the number of qualified people to fill teaching vacancies.

If 93% of the agricultural education graduates in 2001 chose to enter the teaching profession, the net deficit would be erased. So why did 348 new agricultural education graduates choose not to enter teaching? It is reasonable to presume that some went to graduate school and some had military obligations. Anecdotal evidence also suggests that even though they successfully completed an agricultural education program, a few were not well suited to be teachers. But what about the remaining graduates that could have made excellent teachers? What contributed to their decisions?

Given that the student teaching experience is often the final semester of agricultural education programs, it is reasonable to assume that satisfaction with that experience contributed to a student teacher's decision to enter the teaching profession. Unlike preservice courses on campus, during the student teaching experience, cooperating teachers exert a tremendous influence on the quality of the learning experience. Because the decision to enter teaching is made by the student teacher, insight in to their perceptions of the student teaching experience, particularly the cooperating teacher, is invaluable.

Theoretical Framework

The theoretical foundation of this study is rooted in constructivism with its central tenet that students actively construct meaning through their experiences (Doolittle & Camp, 1999) and that student experiences do not occur isolation, but rather in complex social environments (Vygotsky, 1978). Conceptually, a student teacher constructs meaning through their respective experiences characterized by complex interactions between the student teacher, the students, the cooperating teacher, and the university supervisor (see Figure 1).

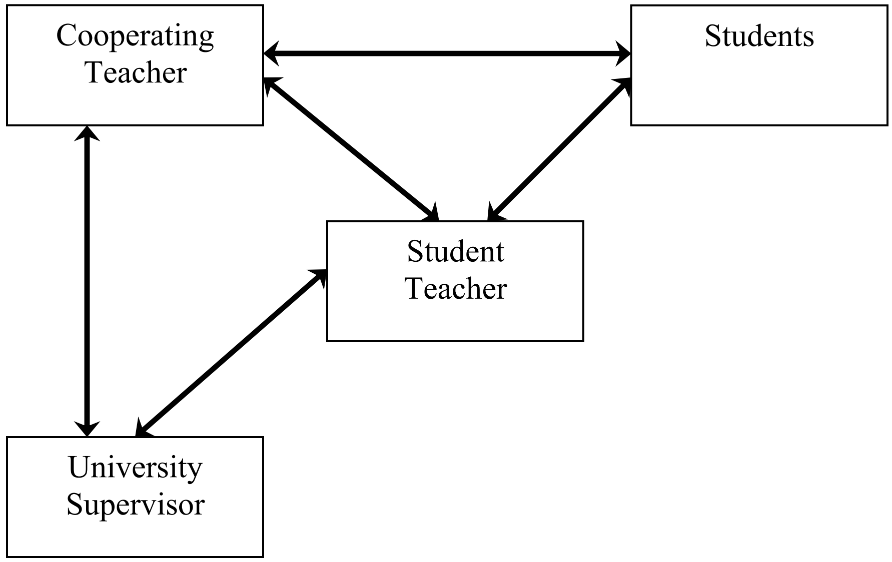

Figure 1. Model of Interactions in the Student Teaching Experience

However, Dewey (1938) warned that all experiences are not educative. Thus, in a student teaching experience, any one of the interactions can affect the educational experience and is worth investigating. This study specifically focused on the interaction between the student teacher and the cooperating teacher, which many scholars have identified as of critical importance to the overall learning and satisfaction of the student teacher (Barnes & Camp, 2002; Borne & Moss, 1990; Deeds, 1993; Deeds, Flowers, & Arrington, 1991; Edwards & Briers, 2001; Norris, Larke, & Briers, 1990).

Previously, Roberts and Dyer (2004) investigated the interaction between student teachers and cooperating teachers by ascertaining student teacher perceptions of the characteristics of effective cooperating teachers. From the results of that Delphi study, they identified 19 characteristics, separated into the five categories of: Instruction, Advising, Professionalism, Cooperating Teacher/Student Teacher Relationship, and Personal Characteristics. Using this data, they developed a model of cooperating teacher effectiveness (see Figure 2). Although useful, a major limitation of this study was the small sample size ($N = 7$).

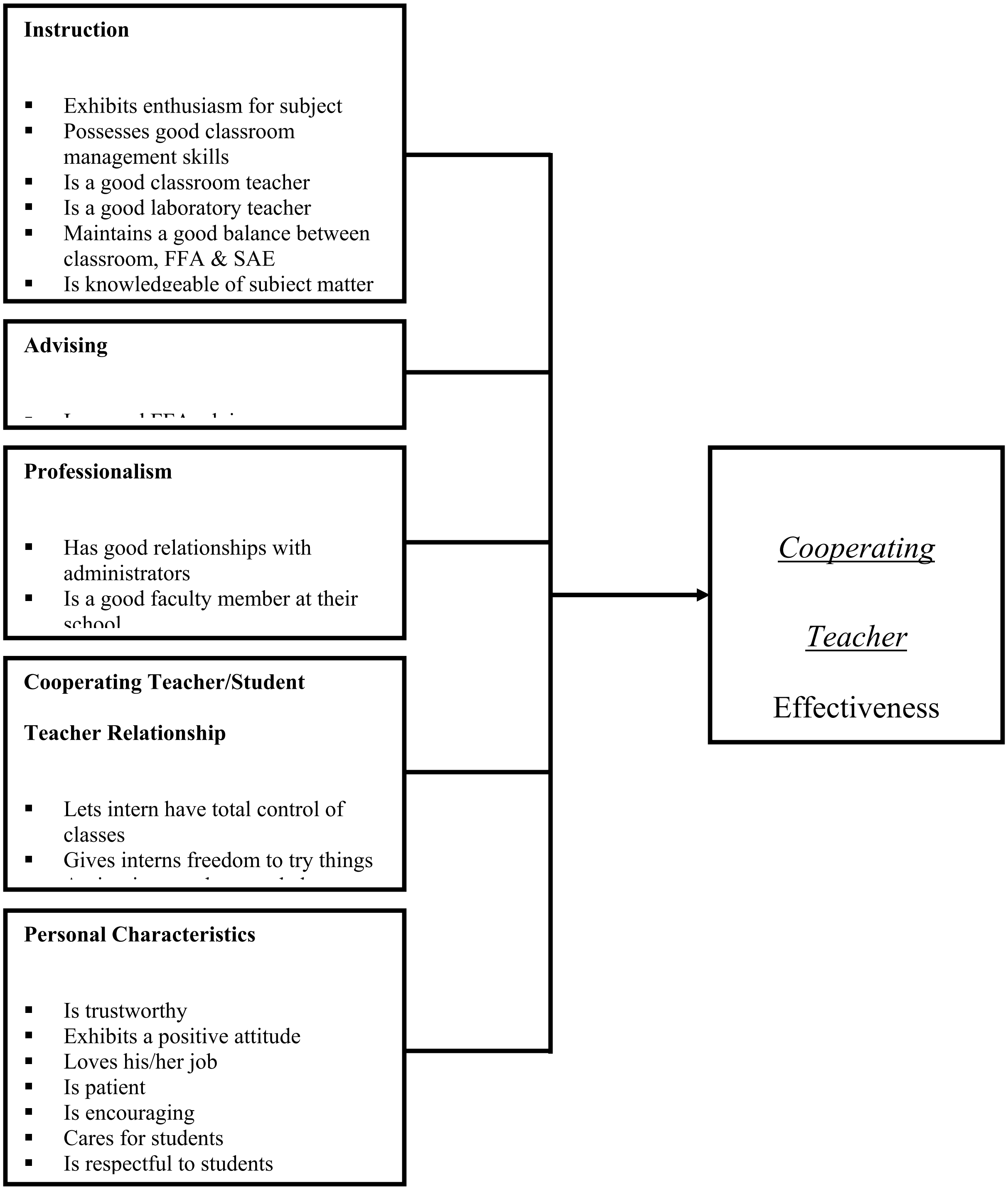

Figure 2. Model of Cooperating Teacher Effectiveness (Roberts & Dyer, 2004)

A recent study also investigated student teacher perceptions of both the cooperating teacher and the cooperating teaching center (Harlin, Edwards, & Briers, 2002). Their results also support the importance of the relationship between the student teacher and cooperating teacher. In an earlier study Larke, Norris, and Briers (1992) also examined student teacher perceptions of cooperating teachers. Results of this study revealed the importance of classroom management and professionalism by the cooperating teacher.

Earlier research that examined this problem from other perspectives (other than student teachers) also identified many of these same characteristics. For example, a cooperating teacher should conduct a total agricultural science program that balances instruction, FFA, and SAE (Deeds, 1993; Edwards & Briers, 2001), exhibit professionalism (Deeds, Flowers, & Arrington, 1991; Larke, Norris, & Briers, 1992; Norris, Larke, & Briers, 1990), exhibit good classroom management skills (Larke, Norris, & Briers, 1992), and be a good classroom teacher (Edwards & Briers, 2001). Additionally, several studies found the relationship between the student teacher and cooperating teacher to be important (Barnes & Camp, 2002; Edwards & Briers, 2001).

The results from Roberts and Dyer (2004) and other research in the area begin to paint a picture of student teacher perceptions of an effective cooperating teacher. However, with the limitations of the Roberts and Dyer study, coupled with a void in other recent research that examined this issue from the student teacher's perspective, further research is still needed.

Purpose

The purpose of this study was to develop a model of cooperating teacher effectiveness by replicating the work of Roberts and Dyer (2004). In doing so, two objectives guided this study:

1. Develop a consensus listing of student teacher perceptions of the characteristics of an effective cooperating teacher.
2. Using those characteristics, develop a model of cooperating teacher effectiveness.

With this knowledge, coupled with additional research from other perspectives (cooperating teachers and teacher educators), a clear picture of an effective cooperating teacher can be developed. This knowledge will be invaluable in assisting teacher educators in placing student teachers with effective cooperating teachers, thus maximizing their chances of a successful learning experience.

Methods

This study replicated the work of Roberts and Dyer (2004), thus employed the same Delphi methodology. The Delphi method is a widely accepted research tool to obtain consensus from an expert panel (Dalkey, 1969; Helmer, 1966; Stufflebeam, McCormick, Binkerhoff, & Nelson, 1985). The expert panel for the current study represented the same population used by Roberts and Dyer (2004), which consisted of all student teachers at a southern university in 2004 ($N = 13$).

The study used a series of three rounds of data collection in face-to-face sessions with the student teachers during the eighth week of an eleven week student teaching experience. The first round consisted of a questionnaire with the open-ended question, "What are the characteristics of an effective cooperating agriculture teacher?" Data were analyzed using the constant-comparative method to categorize the responses into characteristics (Glaser & Strauss, 1967).

Data from this round were treated as nominal data and reported as frequencies. Thirteen members of the panel responded (100%) and identified 35 characteristics.

The second round consisted of a questionnaire that asked panel members to rate each of the 35 characteristics identified in Round 1 using a five point Likert-type scale (1 = Strongly Disagree to 5 = Strongly Agree). Panel members were also asked to make revisions to current characteristics or include additional characteristics. Data from Round 2 were treated as interval data and analyzed using means and standard deviations (Clason & Dormody, 1994). Following the procedures from Roberts and Dyer (2004), it was decided a priori that characteristics with a mean of 4.0 or greater would be retained for the next round. Thirteen panel members responded (100%) and agreed with 32 characteristics. Based on recommendations from the panel, two characteristics were split, thus providing 34 characteristics for the next round.

Round 3 asked panel members to provide a dichotomous (agree/disagree) indication for each characteristic. Following the precedent from Roberts and Dyer (2004), it was decided a priori that characteristics with 80% agreement would be retained. McCampbell and Stewart (1992) indicated that most Delphi studies reach consensus in the third round. Such was the case with this study. Eleven members of the panel responded (85%) and reached consensus on 30 characteristics.

To develop a model of cooperating teacher effectiveness, the constant comparative method was used to categorize the characteristics (Glaser & Strauss, 1967). Specifically, the characteristics were examined and grouped together with similar characteristics or placed in a new category. Based on those categories, the researcher developed a visual representation of cooperating teacher effectiveness.

Results

Round 1 sought to develop a list of potential characteristics of an effective cooperating teacher using an open-ended question. Panel members identified 35 characteristics, a full list of which can be seen in Table 1. Every panel member (n = 13) indicated that effective cooperating teachers “Provides constructive feedback/evaluation.” Eleven panel members also identified that “Caring/understanding/patient” was a characteristic of an effective cooperating teacher. Other characteristics identified by the majority ($n \geq 7$) included “Good interpersonal skills” and “Gives student teacher freedom and control.” A full list of the identified characteristics is presented in Table 1.

Table 1. *Descriptive Statistics of Characteristics by Delphi Round*

	Round 1 (*N* = 13)	Round 2 (*N* = 13)		Round 3 (*N* = 11)
Characteristic	*N*	*M*	*SD*	Agree %
1. Provides constructive feedback/evaluation	13	5.00	.00	100.00
2. Caring/understanding/patient[a]	11	4.92	.28	
2a. Caring/understanding				100.00
2b. Patient				100.00
3. Conducts a program that has teaching, FFA, and SAE	5	4.92	.28	100.00
4. Dependable/responsible/reliable	3	4.92	.28	100.00
5. Trustworthy	1	4.92	.29	100.00
6. Provides a variety of experiences to student teacher	5	4.85	.38	100.00
7. Shares resources with student teacher	4	4.85	.38	100.00
8. Good relations with community	3	4.85	.38	100.00
9. Effective teaching	2	4.85	.38	100.00
10. Serves as a role model	1	4.85	.38	100.00
11. Assists student teacher when needed	5	4.77	.44	100.00
12. Experienced	2	4.77	.44	100.00
13. Provides clear expectations	2	4.77	.44	100.00
14. Good classroom management	1	4.77	.44	100.00
15. Exhibits professionalism	1	4.77	.44	100.00
16. Effective communicator	5	4.69	.48	100.00
17. Cooperative	2	4.69	.48	100.00
18. Fair	1	4.69	.48	100.00
19. Good interpersonal skills	7	4.62	.51	100.00
20. Excellent FFA advisor	5	4.54	.66	100.00
21. Open to new ideas/flexible	4	4.46	.52	100.00
22. Praises student teacher when appropriate	1	4.46	.78	100.00
23. Has good knowledge of school policies	1	4.38	.87	100.00
24. Supports decisions of student teacher	3	4.69	.48	90.90
25. Effectively supervises SAE projects	2	4.46	.66	90.90
26. Gives student teacher freedom and control[a]	7	4.42	.90	
26a. Gives student teacher control				90.90
26b. Gives student teacher freedom				54.50[c]
27. Good relations with other faculty	2	4.54	.66	81.80
28. Anticipate needs of student teacher	1	4.54	.88	81.80
29. Has good subject matter knowledge	1	4.15	.90	81.80
30. Good relations with parents	1	4.92	.28	72.70[c]
31. Teaches a diverse curriculum	1	4.31	1.03	63.60[c]
32. Sense of humor	1	4.08	.76	27.30[c]
33. Highly organized	1	3.69[b]	1.11	
34. Teaching experience in two agricultural programs	1	2.54[b]	1.33	
35. Buys student teacher lunch	1	2.15[b]	1.68	

[a] Split in to two characteristics after Round 2. [b] Dropped after Round 2. [c] Dropped after Round 3.

In Round 2, panel members were asked to rate their level of agreement with each of the 35 items identified in Round 1 using a 5 point Likert-type scale. Panel members were also given instructions that they could modify any of the items to increase their level of agreement. As noted earlier, it was decided a priori that items with means of 4.0 or greater would be retained. Using this methodology, 32 items were retained. A full list of all items can be found in Table 1. Interestingly, one item, "Provides constructive feedback/evaluation" received "Strongly Agree" responses from all 13 panel members (100%). Three items, "Highly organized", "Teaching experience in two agricultural programs", and "Buys student teacher lunch" had means less than 4.0 and were dropped. Feedback from panel members recommended that two items be split. "Caring/understanding/patient" was split into "Caring/understanding" and "Patient". While "Gives student teacher freedom and control" was divided into "Gives student teacher control" and "Gives student teacher freedom." Therefore, 34 items were considered in Round 3.

In Round 3, panel members were asked for a dichotomous (agree/disagree) response for each item. As indicated earlier, it was decided a priori that items with at least an 80% agreement rate would be retained. A full list of the items considered in this round can be seen in Table 1. Panel members agreed on 30 items, thus dismissing four items. Interestingly, of the two items split in the last round, "Caring/understanding" and "Patient" were both agreed on by 100% of the panel, while "Gives student teacher control" was agreed on by 90% of the panel and "Gives student teacher freedom" was only agreed on by 54% of the panel and dropped. Three additional items were dropped, "Good relations with parents", "Teaches a diverse curriculum", and "Sense of humor."

The second objective of this study sought to use the identified characteristics to develop a model of cooperating teacher effectiveness. As indicated earlier a causal-comparative method was used to group items into categories (Glaser & Strauss, 1967). From the data in this study, four categories were identified: Teaching/Instruction, Professionalism, Student Teacher/ Cooperating Teacher Relationship, and Personal Characteristics (see Figure 3). The greatest number of characteristics (n = 9) were placed in the Student Teacher/Cooperating Teacher Relationship category, followed by Personal Characteristics (n = 8), Teaching/Instruction (n = 7), and Professionalism (n = 6).

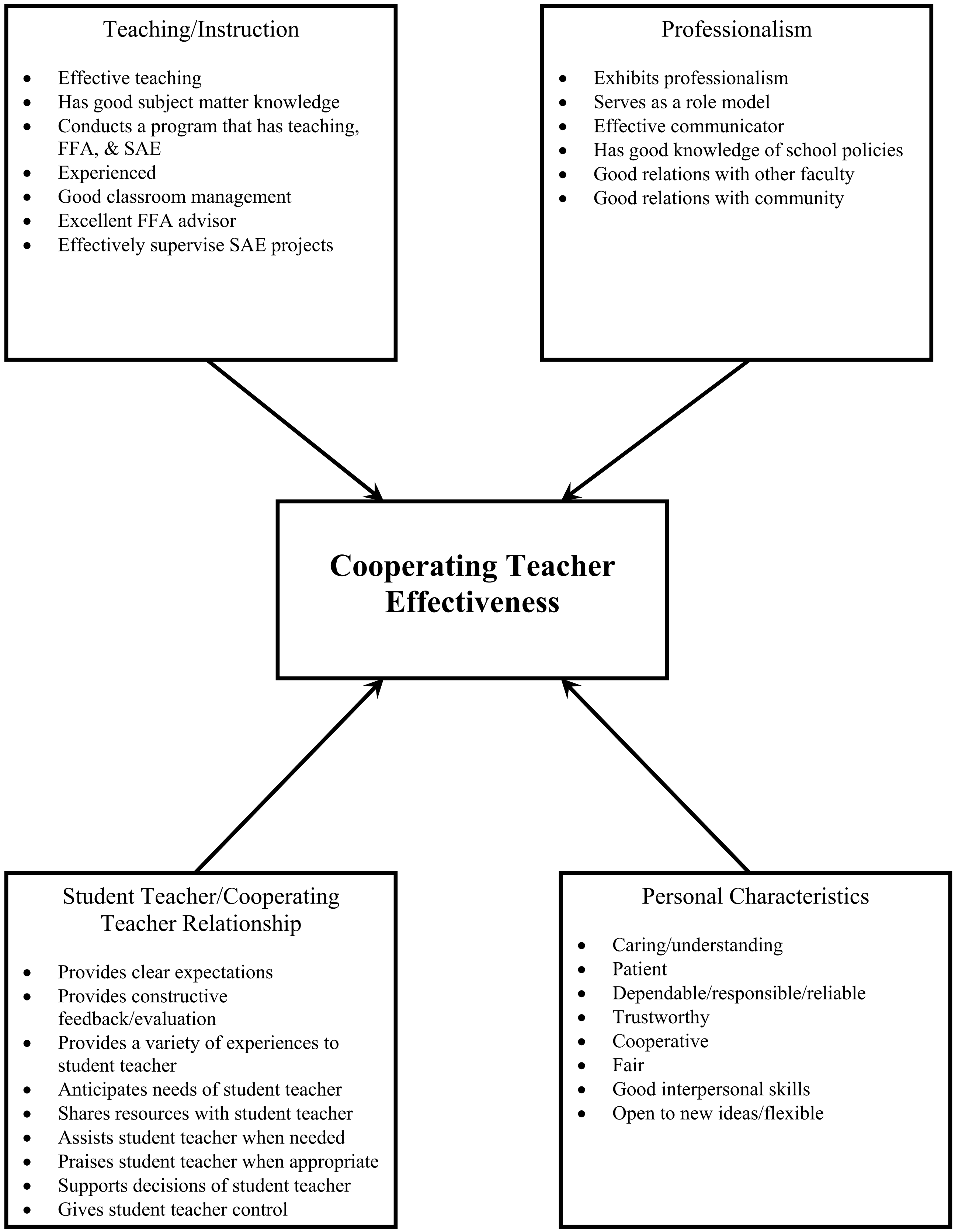

Figure 3. *Model of Cooperating Teacher Effectiveness*

Conclusions, Discussion, and Implications

From the data in this study, we can conclude that from the perspective of this population there are 30 characteristics of an effective cooperating teacher and that those characteristics can be grouped into the categories of Teaching/Instruction, Professionalism, Student Teacher/ Cooperating Teacher Relationship, and Personal Characteristics. This conclusion expands the findings of Roberts and Dyer (2004), who found only 19 characteristics.

In the Teaching/Instruction category, the characteristics of an effective cooperating teacher are: effective teaching; has good subject matter knowledge; conducts a program that has teaching, FFA, and SAE; experienced; good classroom management; excellent FFA advisor; and effectively supervise SAE projects. Upon further examination of the model proposed by Roberts and Dyer (2004), it was decided that their categories "Instruction" and "Advising" were truly related and represented "Teaching/Instruction", just in different settings (formal/non-formal). In comparison to their results great similarities were found, with the exception that two new characteristics were identified, "Experienced", and "Effectively supervise SAE projects", while one characteristic identified by Roberts and Dyer, "Exhibits enthusiasm for the subject" was not found in the current study.

The similarities between the current study and Roberts and Dyer (2004) along with other research that examined characteristics related to teaching and instruction (Deeds, 1993; Edwards & Briers, 2001; Larke, Norris, & Briers, 1992) support the importance of the teaching ability of a cooperating teacher in all aspects of an agricultural science program (classroom, FFA, and SAE). As such, these abilities should be considered when selecting cooperating teachers.

In the Professionalism category, the characteristics of an effective cooperating teacher are: exhibits professionalism; serves as a role model; effective communicator; has good knowledge of school policies; good relations with other faculty; and good relations with community. These characteristics greatly expand the findings of Roberts and Dyer (2004) who only identified two characteristics in this category "Has good relationships with administrators" and "Is a good faculty member at their school."

The differences between the two studies are worth discussing. First, the two characteristics found in this category by Roberts and Dyer (2004) are remarkably similar to "Has good knowledge of school policies" and "Good relations with other faculty" found in the current study. In examining the other characteristics, although not found by Roberts and Dyer, "Exhibits professionalism" is prevalent in many other studies (Deeds, Flowers, & Arrington, 1991; Larke, Norris, & Briers, 1992; Norris, Larke, & Briers, 1990). "Serves as a role model" and "Effective communicator" are broad characteristics that are likely implied in the identified characteristics in the earlier study. However, "Good relations with community" was not identified in the earlier study, but is consistent with the philosophy that agricultural science programs are community-based (Phipps & Osborne, 1988).

In the Student Teacher/Cooperating Teacher category, the characteristics of an effective cooperating teacher are: provides clear expectations; provides constructive feedback/evaluation; provides a variety of experiences to student teacher; anticipates needs of student teacher; shares resources with student teacher; assists student teacher when needed; praises student teacher when appropriate; supports decisions of student teacher; and gives student teacher control. These characteristics expand the findings of Roberts and Dyer (2004), with one exception. In the earlier study, “Gives interns freedom to try things” was identified and agreed on by 100% of the panel, while in the current study, “Gives student teacher freedom” was only agreed on by 54% of the panel and dropped. This discrepancy is interesting and worthy of further research.

An emerging trend in this category of the current study focused on mentoring of the student teacher. That is, providing clear expectations, anticipating student teacher needs, giving a variety of experiences, providing feedback, and providing praise when appropriate. This notion of the importance of the relationship between the student teacher and cooperating teacher is supported by other scholars (Barnes & Camp, 2002; Edwards & Briers, 2001).

In the Personal Characteristics category, the characteristics of an effective cooperating teacher are: caring/understanding; patient; dependable/responsible/reliable; trustworthy; cooperative; fair; good interpersonal skills; and open to new ideas/flexible. These findings build on the work of Roberts and Dyer (2004). However, a few differences were found. In the earlier study, “Exhibits a positive attitude” and “Loves his/her job” were reported, while neither was found in the current study. Perhaps these characteristics are implied in the identified characteristics. Regardless, this incongruity warrants further examination.

Although not a direct duplication of Roberts and Dyer (2004), the identification of several personal characteristics by the current study provide further insight into the characteristics of an effective cooperating teacher. Although seldom reported in empirical research, the importance of personal characteristics is supported in the literature. Phipps and Osborne (1988, p. 133) posited that, “unquestionable character is essential for every successful teacher” and that “a teacher with a pleasing personality can do a great deal in developing a good community attitude toward the program in agriculture.” While difficult to quantify, personal characteristics are important and should be considered in selecting cooperating teachers.

The results of the current study provide further knowledge about the characteristics of effective cooperating teacher and thus further criteria to be considered when selecting cooperating teachers. However, the findings are applicable only to the population studied. Further research is warranted to replicate this study at other universities in other states to expand the knowledge about this phenomenon.

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Benefits of Service-learning in Tennessee
4-H Youth Development: A Delphi Study

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Abstract

Service-learning is growing in popularity as a methodology for teaching youth life skills and 4-H project knowledge. Through a modified Delphi technique, a panel comprised of 4-H'ers, volunteers, and agents in Tennessee identified and prioritized benefits of utilizing service-learning to fulfill the mission of the state's 4-H Youth Development program. The study found that primary benefits of conducting service-learning projects through 4-H Youth Development are getting kids involved in community service; teaching youth dependability, responsibility, and commitment; and developing citizenship skills/civic responsibility. There were some differences among the subpanels' lists and prioritization of the benefits. The study has implications for 4-H leaders, both youth and adult, who employ service-learning as a teaching tool.

Introduction/Theoretical Framework

Since its inception in 1902, the 4-H Youth Development program has outlined community service as one of its primary objectives. In October 2000, Tennessee 4-H Youth Development expanded that service commitment to include service-learning, a form of experiential education where youth apply knowledge, skills, critical thinking, and wise judgment to address genuine community needs (Toole & Toole, 1994). Service-learning is a growing methodology for fulfilling the 4-H mission of helping youth develop skills and attitudes they need to become successful adults. After receiving a 3-year grant from the Tennessee Commission on National and Community Service and Learn and Serve America, University of Tennessee Extension began a statewide initiative to infuse service-learning throughout the 4-H Youth Development program (Mantooth & Hamilton, 2004). The program provided training and resources for youth and adults, as well as opportunities for funding and recognition for projects. From October 2000 until December 2003, more than 182,000 4-H'ers partnered with 14,800 adults to conduct 5,300 service-learning projects, benefiting more than 901,000 people through 585,000 hours of service (Mantooth & Hamilton, 2004).

Nationally, service-learning can trace its theoretical roots to John Dewey, Alexis de Tocqueville, William James, and Thomas Jefferson, as well as historical movements such as the push for civil rights in the 1960s (Waterman, 1997a). Dewey is credited with conceptualizing ideas of experiential education and reflective thinking, both vital components of service-learning. Dewey's work also provided the foundation for key elements of service-learning, such as student involvement in developing learning objectives, working cooperatively on learning tasks, linking what is learned to personal experience, placing importance on social and not just intellectual development, and valuing actions for the welfare of others (Kraft, 1996).

In 1910, American philosopher William James called for a program of national service for youth that would serve as the moral equivalent of war, something that would speak to men's souls as universally as war did and yet be compatible with their spiritual selves (Waterman, 1997a). The Twentieth Century saw many large-scale efforts to engage youth in service, including the Civilian Conservation Corps, the Peace Corps, Volunteers in Service to America, the Youth Conservation Corps, and other organizations that sought to benefit the volunteers who were serving their communities (Corporation for National and Community Service, n.d.; Kraft, 1996; Pritchard, 2002; Waterman, 1997b). Additionally, service-learning gained national attention with the passage of the National and Community Service Trust Acts of 1990 and 1993.

This legislation established the Corporation for National and Community Service (CNCS), a federal agency that provides grants for both school-based and community-based service programs. School-based service-learning is organized as part of the academic curriculum of an elementary or secondary school or an institution of higher education, whereas community-based service-learning is organized through a community agency or youth-serving organization (National and Community Service Trust Act of 1993). While much attention has been given to school-based service-learning, community-based efforts also have grown over the past 10 years. The CNCS has awarded more than $37 million to community-based organizations and state service commissions, and a substantial amount of community-based service-learning is occurring beyond what is funded through the CNCS (Bailis & Lewis, 2003).

The number of youth engaged in service is increasing. Skinner & Chapman (1999) revealed that 64% of all public schools had students involved in service activities recognized and/or arranged through the school, and 32% of all public schools organized service-learning as part of their curriculum. Shumer and Cook (1999) reported that 6.1 million high school students were involved in service-related programs in 1997, and Safrit and Auck (2003) found that 98% of Ohio 4-H'ers had voluntarily helped others within the previous year.

The increasing number of youth involved in service-learning has sparked a growing field of research on the impact of service-learning. Because the youth engaged in service-learning are often outside the classroom, interacting with community members and organizations, impacts of service learning are not limited to youth. Indeed, researchers (Billig, 2000; Blyth, Saito, & Berkas, 1997; Eyler & Giles, 1999; Scales & Leffert, 1999; Melchior, 1999) have found an impact on youth, schools and community organizations through which they work, and communities they serve.

Youth participating in service-learning programs, both school-based and community-based, show increased self-esteem and problem-solving skills, more positive attitudes toward adults, and increased concern for others' welfare (Scales & Leffert, 1999). Service-learning also has a positive impact on students' civic attitudes and participation, particularly if students remain active in organized service activities (Melchior, 1999). Student outcomes are influenced by the level of youth leadership, hours spent in service, quality of service placement, structured reflection opportunities, the intensity of the service experience, program design, and implementation (Blyth, Saito, & Berkas, 1997; Eyler & Giles, 1999).

Communities, schools, and organizations also experience benefits from service-learning programs. Community members have more positive perceptions of schools and youth. Furthermore, schools report greater mutual respect between teachers and students, improvements in the overall school climate, and increased school cohesiveness (Billig, 2000b). Melchior (1999) reported that organizations utilizing service-learning improved services to clients and the community, increased capacity to take on new projects, and formed new relationships with public schools.

Despite the number of community-based organizations that are engaging in service-learning and the increasing amount of research in the field, "community-based service-learning is the least understood and least studied of the streams of service-learning" (Bailis & Lewis, 2003, p. 17). Therefore, understanding the benefits of service-learning in community-based organizations, particularly 4-H Youth Development, is a problem due to the lack of research on community-based service-learning.

Purpose and Objectives

The purpose of this study was to identify benefits of service-learning in Tennessee 4-H Youth Development. Furthermore, the researchers sought to describe perceived differences among three subgroups: 4-H members, volunteers, and Extension agents.

Procedures

Researchers used the modified Delphi technique with a panel of experts to generate data for the study. The Delphi technique is a method of group communication that is effective in allowing a group of experts, as a whole, to deal with a complex problem (Linstone & Turoff, 1975). The technique uses sequential questionnaires developed through summarized information and feedback of opinions from earlier responses (Delbeq, Van de Ven, & Gustafson, 1975).

Panel members (n = 30) were purposefully selected from individuals who served as youth coordinators, adult volunteer coordinators, or Extension contacts for 10 service-learning projects funded by 4-H Seeds of Service mini-grants between April 2001 and October 2003. The panel consisted of 10 4-H members, 10 adult volunteer leaders, and 10 4-H agents who had demonstrated expertise in service-learning through grant proposals, reports, and reflection materials submitted to the state 4-H office. The members represented the four districts of University of Tennessee Extension, providing statewide scope to the study. Youth, volunteers, and Extension agents comprised separate subpanels due to the groups' varying developmental level, focus, needs, and experience with service-learning.

The researchers administered a series of three questionnaires to participants. The first questionnaire consisted of an open-ended question—"*The benefits of conducting service-learning projects through 4-H Youth Development are . . .*"—that generated a list of benefits of service-learning implemented through the 4-H Youth Development program. The researchers summarized responses from the first questionnaire and eliminated any duplicate responses. Three, second-round questionnaires, one for each subpanel, were developed from the responses provided in round one. The second-round questionnaires asked participants to rate responses on a Likert-type scale of 1 (most important) to 9 (least important). The third round questionnaires ranked the responses to each question from most important to least important by arithmetic mean. Panel members were provided with the subgroup's mean and their own rating for each item. In addition, they were asked to explain why they disagreed with the rankings, if they did. A panel of experts, consisting of three faculty members and two 4-H Youth Development specialists, determined face and content validity for each instrument. Dalkey (1969) stated that the reliability was greater than .80 when the Delphi group was larger than 13.

First round questionnaires were mailed to participants. Participants had the option of responding through a paper copy or Web-based questionnaire. Subsequent questionnaires were distributed to panel members either through the mail or e-mail, based on respondents' preferred method of receiving correspondence as indicated through the first Web-based questionnaire.

In round one, 18 panel members responded through the on-line questionnaire and 7 mailed or faxed their questionnaires, providing an 83% (n = 25) response rate. The 4-H youth subpanel had a 60% (n = 6) response rate; the volunteer subpanel had a 90% (n = 9) response rate; and the Extension agent subpanel had a 100% (n = 10) response rate. For this, as well as subsequent rounds, non-respondents were contacted in an effort to achieve 100% response for each subpanel. Responses from the three subgroups were maintained separately. Data generated by youth panel members were not considered until signed informed consent statements were on file with the researchers.

In the first round, the 4-H youth subpanel (n = 6) generated 59 statements, which were summarized to 26 benefits. The volunteer subpanel (n = 9) generated 73 statements, which were summarized to 34 benefits. The Extension agent subpanel (n = 10) generated 95 statements, which were summarized to 30 benefits.

In round two, 21 panel members responded on-line, and 4 mailed or faxed their surveys, providing an 83% response rate. The 4-H youth subpanel had a 70% (n = 7) response rate; the volunteer subpanel had an 80% (n = 8) response rate; and the Extension agent subpanel had a 100% (n = 10) response rate. As with the first questionnaire, responses from the subgroups were maintained separately.

The researchers calculated the arithmetic mean and standard deviation for each response. Mean scores of the round two questionnaires were used to determine importance of each statement. Responses were categorized as "important" (1 – 2.49), "slightly important" (2.5 – 4.99), "uncertain" (5 – 5.99), "slightly unimportant" (6 – 7.49) or "unimportant" ($\geq$ 7.5). Standard deviation of $\leq$ 1.5 indicated that consensus was reached within the subpanel. These data were used to develop the third and final round of questionnaires.

Twenty-two panel members responded on-line, and three mailed the surveys, providing an 83% response rate to the third questionnaire. The 4-H youth subpanel had a 70% (n = 7) response rate; the volunteer subpanel had an 80% (n = 8) response rate; and the Extension agent subpanel had a 100% (n = 10) response rate. Responses from the subgroups were maintained separately.

Findings

In this study, a purposefully selected panel of 4-H youth, volunteers, and Extension agents was utilized to generate and prioritize benefits of conducting service-learning projects in Tennessee 4-H Youth Development.

Benefits Identified by 4-H Youth Subpanel

The 4-H youth subpanel rated the importance of 26 benefits of conducting service-learning projects through 4-H Youth Development. The mean and standard deviation for each statement are described in Table 1. The statements are prioritized in order of most important to least important by average arithmetic mean scores. The 4-H youth subpanel reached consensus on 13 of the 18 benefits ranked as "important." Some of these benefits include *getting kids involved in community service* (M = 1.00, SD = 0.00); *helping others, making a difference, meeting community needs* (M = 1.28, SD = 0.49); *learning organization and responsibility* (M = 1.57, SD = 0.53); and *having fun* (M = 2.14, SD = 0.69).

Table 1. *Delphi Study Round Two: Prioritized List of Benefits Identified by 4-H Youth Subpanel (n = 7)*

	Benefit	M	SD
1.	Getting kids involved in community service.	1.00	0.00[a]
2.	Helping others, making a difference, meeting community needs.	1.28	0.49[a]
3.	Giving youth the power to change something about their community.	1.43	0.79[a]
4.	Learning organization and responsibility.	1.57	0.53[a]
5.	Teamwork; collaborating with others.	1.57	0.79[a]
6.	Helping youth develop people skills.	1.57	0.79[a]
7.	Learning leadership skills.	1.57	0.79[a]
8.	Teaching solid values.	1.85	1.57
9.	Giving youth a chance to understand management of a group.	2.00	1.15[a]
10.	Understanding and being a part of your community; building a sense of community.	2.00	1.15[a]
11.	Having fun.	2.14	0.69[a]
12.	Breaking down social barriers to unite and achieve a common goal.	2.14	1.57
13.	Learning from the people you're helping and from other volunteers.	2.14	1.86
14.	Raising awareness of the problems in your community.	2.14	2.19
15.	That it benefits the organization being helped.	2.29	1.89
16.	Personal rewards from helping others (feeling good, sense of worth).	2.43	1.13[a]
17.	Meeting others; making friends.	2.43	1.27[a]
18.	Having enough money to buy equipment needed to perform service projects.	2.43	1.40[a]
19.	Publicity for 4-H (as a service organization, not just for agriculture).	2.71	1.60
20.	Learning to work with other organizations within your community.	3.00	1.63
21.	Using skills and creating a learning environment while having fun and helping others.	3.14	2.79
22.	Working in a youth/adult partnership.	3.57	2.37
23.	Having other opportunities arise.	3.86	1.68
24.	Possible scholarship opportunities.	3.86	1.86
25.	Recognition for service.	5.57	2.76
26.	Getting out of school.	8.14	1.57

Note. Likert scale: 1 – 2.49 = Important; 2.5 – 4.99 = Slightly Important; 5 – 5.99 = Uncertain; 6 – 7.49 = Slightly Unimportant; ≥ 7.5 = Unimportant.
[a] Consensus of Group.

In round three, five 4-H youth subpanel members indicated disagreement with the ranking of eight statements. Panel members responded in favor of higher importance for six benefits, including *getting out of school, learning leadership skills,* and *meeting others and making* *friends*. Panel members thought the ranking should be less important on the benefits of *breaking down social barriers to unite and achieve a common goal* and *recognition for service*. One benefit, *publicity for 4-H (as a service organization, not just agriculture)*, received one response that it should be more important and two that it should be less important. The panel members' explanations for their responses were based on their personal experiences with service-learning in their counties.

Benefits Identified by Volunteer Subpanel

The volunteer subpanel rated the importance of 34 benefits of conducting service-learning projects through 4-H Youth Development. The mean and standard deviation for each statement are described in Table 2. The statements are prioritized in order of most important to least important by average arithmetic mean scores. The volunteer subpanel reached consensus on 20 of the 21 benefits ranked as "important." Some of these statements include *teaching youth dependability, responsibility, and commitment* (M = 1.00, SD = 0.00); *developing leadership skills* (M = 1.14, SD = 0.38); *helping youth see themselves as valuable and responsible community members* (M = 1.14, SD = 0.38); and *children/teens learning self-esteem by making a difference in the community* (M = 1.28, SD = 0.49).

Table 2. *Delphi Study Round Two: Prioritized List of Benefits Identified by Volunteer Subpanel (n = 8)*

	Benefit	**M**	**SD**
1.	Teaching youth dependability, responsibility, and commitment.	1.00	0.00[a]
2.	Developing leadership skills.	1.14	0.38[a]
3.	Helping youth see themselves as valuable and responsible community members.	1.14	0.38[a]
4.	Children/teens learning self-esteem by making a difference in the community.	1.28	0.49[a]
5.	Developing teamwork skills.	1.29	0.49[a]
6.	Teaching life skills and useful knowledge/experience.	1.29	0.49[a]
7.	Helping others; improving the community; meeting community needs.	1.29	0.76[a]
8.	Developing a lifetime habit of service; teaching youth compassion and to give back to the community.	1.43	0.79[a]
9.	Learning to see a specific need and plan a project to help (conceive, plan, and accomplish a mission).	1.43	0.79[a]
10.	Helping youth see what their talents are.	1.50	0.76[a]
11.	Youth becoming more interested in the community and more aware of community needs.	1.57	0.79[a]
12.	Teaching youth that you have to work for what you want.	1.57	1.13[a]
13.	Having fun while learning and meeting a community need.	1.71	0.95[a]
14.	Working in youth/adult partnerships.	1.71	1.11[a]
15.	Keeping children/teens involved with adults, which creates a bond for a lifetime.	1.86	0.90[a]

16.	Developing listening skills (how to follow instructions).	2.00	1.41[a]
17.	Developing record keeping and documentation skills.	2.14	0.90[a]
18.	4-H promotion; community seeing 4-H as a service-oriented organization.	2.29	1.50[a]
19.	Motivating the people in the community.	2.43	0.98[a]
20.	Meeting others; forming bonds with youth and adults.	2.43	1.27[a]
21.	Building relationships/networks in the community.	2.43	1.51
22.	Acquiring a better knowledge of the . . .	2.5	1.31[a]
23.	Learning to use new equipment, such as a sewing machine.	2.5	2.07
24.	Personal/emotional rewards.	2.71	1.50[a]
25.	Having access to expertise of 4-H/University staff where my knowledge is limited/lacking.	2.86	1.07[a]
26.	Having funding for a needed project.	2.86	1.86
27.	Keeping children/teens involved.	2.86	2.41
28.	That it's a hands-on learning time.	2.88	2.10
29.	Giving youth community service involvement that they can put on college scholarship applications.	3.00	2.20
30.	Keeping youth busy and out of trouble.	3.25	2.31
31.	Seeing how supportive everyone was of the project.	3.86	1.07[a]
32.	Recognition.	4.43	2.51
33.	Youth getting to travel abroad.	5.38	2.67
34.	That prizes are offered.	6.25	2.05

Note. Likert scale: 1 – 2.49 = Important; 2.5 – 4.99 = Slightly Important; 5 – 5.99 = Uncertain; 6 – 7.49 = Slightly Unimportant; ≥ 7.5 = Unimportant.
[a] Consensus of Group.

In round three, four volunteer subpanel members indicated disagreement with the ranking of 12 statements. Panel members responded in favor of higher importance on the following statements: *children/teens learning self-esteem by making a difference in the community, teaching life skills and useful knowledge/experience, teaching youth that you have to work for what you want, developing record keeping and documentation skills, that it's a hands-on learning time,* and *recognition*. Respondents thought these statements should be less important: *keeping children/teens involved, keeping youth busy and out of trouble, seeing how supportive everyone was of the project,* and *youth getting to travel abroad*. Two statements received mixed comments. For the benefit of *learning to use new equipment, such as a sewing machine*, one respondent commented that it should be more important, while another respondent had the opposite view. Similarly, the benefit of *giving youth community service involvement that they can put on college scholarship applications* received opposing comments from two panel members. The reasons given for disagreeing with each of these statements were based on panel members' personal experiences with service-learning.

Benefits Identified by Extension Agent Subpanel

The Extension agent subpanel rated the importance of 30 benefits of conducting service-learning projects through 4-H Youth Development. The mean and standard deviation for each statement are described in Table 3. The statements are prioritized in order of most important to least important by average arithmetic mean scores. The Extension agent subpanel reached consensus on 18 of the 21 benefits ranked as "important." Some of these statements include *developing citizenship skills/civic responsibility* (M = 1.11, SD = 0.33); *teaching youth about helping others and the importance of service* (M = 1.22, SD = 0.44); *developing leadership skills* (M = 1.33, SD = 0.50); and *promoting youth in a positive way* (M = 1.33, SD = 0.50).

Table 3. *Delphi Study Round Two: Prioritized List of Benefits Identified by Extension Agent Subpanel (n = 9)*

Benefit		M	SD
1.	Developing citizenship skills/civic responsibility.	1.11	0.33[a]
2.	Teaching youth about helping others and the importance of service.	1.22	0.44[a]
3.	Developing leadership skills.	1.33	0.50[a]
4.	Promoting youth in a positive way.	1.33	0.50[a]
5.	Helping others.	1.33	0.71[a]
6.	Teaching youth life skills.	1.33	0.71[a]
7.	Developing youth/adult partnerships.	1.44	0.53[a]
8.	Youth learning the value of their service.	1.44	0.53[a]
9.	Developing decision making skills.	1.44	0.73[a]
10.	Teaching responsibility.	1.44	0.88[a]
11.	Developing communication skills.	1.78	0.83[a]
12.	Giving youth a feeling of competency.	1.78	0.83[a]
13.	Developing organizational/planning skills.	1.89	0.99[a]
14.	Allowing youth to work with other agencies; networking.	1.89	1.05[a]
15.	Youth building self-esteem.	1.89	1.83
16.	Learning about and feeling connected to the community.	2.00	0.87[a]
17.	Incorporating many volunteers in community and networking capacity.	2.11	0.60[a]
18.	Youth using school and 4-H knowledge to help others.	2.11	0.60[a]
19.	Good publicity for 4-H.	2.44	1.33[a]
20.	Creating new friendships among youth.	2.67	1.32[a]
21.	Recognition/community awareness of service activities.	2.78	1.86
22.	Having fun.	2.78	1.86
23.	Personal/emotional rewards.	3.11	1.69
24.	Teaching youth about evaluation and how it benefitted the community.	3.22	2.33

Table 3 (Continued)			
25.	Learning how to help the environment and why it is important.	3.25	1.49[a]
26.	Youth learning trade skills: painting, building, etc. (depending on project).	3.78	1.48[a]
27.	Allowing senior 4-H'ers volunteer hours they need for scholarships and job applications.	4.00	2.24
28.	That 4-H has a lot of good resources.	4.13	1.81
29.	Securing new funding sources to acquire new educational materials and resources in the county.	4.56	2.83
30.	That a little money given here can make a big difference in other countries.	4.56	2.92

Note. Likert scale: 1 – 2.49 = Important; 2.5 – 4.99 = Slightly Important; 5 – 5.99 = Uncertain; 6 – 7.49 = Slightly Unimportant; ≥ 7.5 = Unimportant.
[a] Consensus of Group.

In round three, three Extension agent subpanel members indicated disagreement with the ranking of seven statements. Panel members responded in favor of higher importance for the following benefits: *promoting youth in a positive way, teaching youth life skills, developing decision making skills, recognition/community awareness of service activities, good publicity for 4-H, that 4-H has a lot of good resources,* and *securing new funding sources to acquire new educational materials and resources in the county*. The panel did not recommend that any statements be ranked less important.

Conclusions/Recommendations/Implications

The three subpanels generated many statements with similar content. These benefits included *getting kids involved in community service and developing a habit of service*, *helping others and meeting community needs*, *learning/teaching responsibility, developing leadership skills,* and *teamwork and networking in the community*. The three subpanels generated several statements related to youth becoming more aware of community problems, developing civic responsibility, and feeling connected to the community. The three subpanels also generated several statements related to teaching skills such as record keeping, communication, and people skills.

Although the subpanels generated many of the same benefits of service-learning in 4-H, there were differences among the subpanels' lists and prioritization of benefits. For instance, the 4-H youth and volunteer subpanels agreed on the benefit of *having fun.* And the volunteer and Extension agent subpanels had similar views on the benefits of *developing and working in youth-adult partnerships* and *publicity for 4-H as a service organization*.

The 4-H youth subpanel generated one benefit—*getting out of school*—that the other subpanels did not. The volunteer subpanel had six statements that were unique from the benefits generated by the other subpanels. These included *keeping youth busy and out of trouble, youth getting to travel abroad,* and *keeping children/teens involved.* The Extension agent subpanel had two statements that were not also generated by the other subpanels. These benefits were *that 4-H* *has a lot of good resources* and *that a little money given here can make a big difference in other countries*.

Many of the benefits identified in this study, particularly those related to civic attitudes and skills, correspond to those revealed by Melchoir (1999) and Scales and Leffert (1999). However, this study also discovered several new benefits of community-based service-learning as it relates to 4-H Youth Development. These benefits included *learning leadership skills*, *teaching solid values*, *developing organizational/planning skills*, and *working in youth/adult partnerships*. One may conclude that many of these benefits were identified because of the organization through which the service-learning occurred. As a community-based organization, 4-H engages youth in a variety of activities. Service-learning projects in 4-H can focus on developing life skills instead of enhancing academic material. In addition, the statewide 4-H program in Tennessee places strong emphasis on youth leadership and youth/adult partnerships that may not be part of a school atmosphere. Although the benefits of service-learning may be similar in both school-based and community-based efforts, participants in a community-based organization such as 4-H may place more importance on certain benefits than do school-based participants.

Based on the results of this study, recommendations can be made for the statewide 4-H Youth Development program in Tennessee. 4-H Youth Development should sustain and expand the existing service-learning initiative in order to help youth and adults develop a habit of service, meet community needs, learn skills, take an active role in their communities, and garner other benefits of service-learning. State 4-H Youth Development staff should provide training, resources, and technical assistance to regional and county Extension staff, volunteers, and 4-H youth to assist them in planning and implementing effective service-learning projects. Resources should include printed and Web-based manuals on the basics of service-learning, tools for service-learning reflection, evaluation instruments to aid in program improvement, and a compilation of “best practices” from effective 4-H service-learning projects.

Several questions have surfaced as a result of this study. Researchers should study the outcomes of service-learning in 4-H Youth Development. In addition, researchers should examine the effect that the certain factors may have on the benefits of service-learning for the youth, the community, and the 4-H Youth Development program.

1. What impact does location (i.e., rural, urban, limited resource community) have on the benefits of service-learning?
2. How does the length of a project affect the benefits of service-learning?
3. How do reflection activities included as integral part of projects impact the benefits of service-learning?
4. To what extent does the degree of youth leadership in a project affect the benefits of service-learning?

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Challenges of Service-learning in Tennessee 4-H Youth Development: A Delphi Study

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Abstract

Service-learning is growing in popularity as a methodology for teaching youth life skills and 4-H project knowledge. Through a modified Delphi technique, a panel comprised of 4-H'ers, volunteers, and agents in Tennessee identified challenges of utilizing service-learning to fulfill the mission of the state's 4-H Youth Development program. The subpanels of 4-H youth, volunteers, and Extension agents found that primary challenges of conducting service-learning projects through 4-H Youth Development include coordination; working around everyone's schedule; and funding. There were some differences among the subpanels' lists and prioritization of the challenges. The study has implications for 4-H leaders, both youth and adult, who employ service-learning as a teaching tool.

Introduction/Theoretical Framework

Since its inception in 1902, the 4-H Youth Development program has outlined community service as one of its primary objectives. In October 2000, Tennessee 4-H Youth Development expanded that service commitment to include service-learning, a form of experiential education where youth apply knowledge, skills, critical thinking, and wise judgment to address genuine community needs (Toole & Toole, 1994). Service-learning is a growing methodology for fulfilling the 4-H mission of helping youth develop skills and attitudes they need to become successful adults. After receiving a 3-year grant from the Tennessee Commission on National and Community Service and Learn and Serve America, the Extension Service began a statewide initiative to infuse service-learning throughout the 4-H Youth Development program (Mantooth & Hamilton, 2004). The program provided training and resources for youth and adults, as well as opportunities for funding and recognition for projects. From October 2000 until December 2003, more than 182,000 4-H'ers partnered with 14,800 adults to conduct 5,300 service-learning projects, benefiting more than 901,000 people through 585,000 hours of service (Mantooth & Hamilton, 2004).

Nationally, service-learning can trace its theoretical roots to John Dewey, Alexis de Tocqueville, William James, and Thomas Jefferson, as well as historical movements such as the push for civil rights in the 1960s (Waterman, 1997a). Dewey is credited with conceptualizing ideas of experiential education and reflective thinking, both vital components of service-learning. Dewey's work also provided the foundation for key elements of service-learning, such as student involvement in developing learning objectives, working cooperatively on learning tasks, linking what is learned to personal experience, placing importance on social and not just intellectual development, and valuing actions for the welfare of others (Kraft, 1996).

In 1910, American philosopher William James called for a program of national service for youth that would serve as the moral equivalent of war, something that would speak to men's souls as universally as war did and yet be compatible with their spiritual selves (Waterman, 1997a). The Twentieth Century saw many large-scale efforts to engage youth in service, including the Civilian Conservation Corps, the Peace Corps, Volunteers in Service to America , the Youth Conservation Corps, and other organizations that sought to benefit the volunteers who were serving their communities (Corporation for National and Community Service, n.d.; Kraft, 1996; Pritchard, 2002; Waterman, 1997b). Additionally, service-learning gained national attention with the passage of the National and Community Service Trust Acts of 1990 and 1993.

This legislation established the Corporation for National and Community Service (CNCS), a federal agency that provides grants for both school-based and community-based service programs. School-based service-learning is organized as part of the academic curriculum of an elementary or secondary school or an institution of higher education, whereas community-based service-learning is organized through a community agency or youth-serving organization (National and Community Service Trust Act of 1993). While much attention has been given to school-based service-learning, community-based efforts have also grown over the past 10 years. The CNCS has awarded more than $37 million to community-based organizations and state service commissions, and a substantial amount of community-based service-learning is occurring beyond what is funded through the CNCS (Bailis & Lewis, 2003).

The number of youth engaged in service is increasing. Skinner & Chapman (1999) revealed that 64% of all public schools had students involved in service activities recognized and/or arranged through the school, and 32% of all public schools organized service-learning as part of their curriculum. Shumer and Cook (1999) reported that 6.1 million high school students were involved in service-related programs in 1997, and Safrit and Auck (2003) found that 98% of Ohio 4-H'ers had voluntarily helped others within the previous year.

The increasing number of youth involved in service-learning has sparked a growing field of research on the impact of service-learning. Because the youth engaged in service-learning are often outside the classroom, interacting with community members and organizations, impacts of service learning are not limited to youth. Indeed, researchers (Billig, 2000; Scales & Leffert, 1999; Melchior, 1999) have found an impact on youth, schools and community organizations through which they work, and communities they serve.

Youth participating in service-learning programs, both school-based and community-based, show increased self-esteem and problem-solving skills, more positive attitudes toward adults, and increased concern for others' welfare (Scales & Leffert, 1999). Service-learning also has a positive impact on students' civic attitudes and participation, particularly if students remain active in organized service activities (Melchior, 1999). Other benefits of service-learning include more positive perceptions of youth by community members, increased school cohesiveness, and improved services to clients of community agencies (Billig, 2000b; Melchior, 1999).

Despite the benefits researchers have found, challenges can often hinder the effectiveness of service-learning. Shumer (1997), Wade (1997), and Ogden (2002) observed challenges with implementing service-learning in both school-based and community-based programs. Service learning required more planning time, more coordination with community organizations and partners, and more administrative support (Shumer, 1997; Wade, 1997). Other challenges included lack of leverage on the part of youth, lack of time, and lack of sustainable funds (Ogden, 2002).

Despite the number of community-based organizations that are engaging in service-learning and the increasing amount of research in the field, "community-based service-learning is the least understood and least studied of the streams of service-learning" (Bailis & Lewis, 2003, p. 17). Therefore, understanding the challenges of service-learning in community-based organizations, particularly 4-H Youth Development, is a problem due to the lack of research on community-based service-learning.

Purpose and Objectives

The purpose of this study was to identify challenges of service-learning in Tennessee 4-H Youth Development. Furthermore, the researchers sought to describe perceived differences among three subgroups: 4-H members, volunteers, and Extension agents.

Procedures

Researchers used the modified Delphi technique with a panel of experts to generate data for the study. The Delphi technique is a method of group communication that is effective in allowing a group of experts, as a whole, to deal with a complex problem (Linstone & Turoff, 1975). The technique uses sequential questionnaires developed through summarized information and feedback of opinions from earlier responses (Delbeq, Van de Ven, & Gustafson, 1975).

Panel members (n = 30) were purposefully selected from individuals who served as youth coordinators, adult volunteer coordinators, or Extension contacts for 10 service-learning projects funded by 4-H Seeds of Service mini-grants between April 2001 and October 2003. The panel consisted of 10 4-H members, 10 adult volunteer leaders, and 10 4-H agents who had demonstrated expertise in service-learning through grant proposals, reports, and reflection materials submitted to the state 4-H office. The members represented the four districts of University of Tennessee Extension, providing statewide scope to the study. Youth, volunteers, and Extension agents comprised separate subpanels due to the groups' varying developmental level, focus, needs, and experience with service-learning.

The researchers administered a series of three questionnaires to participants. The first questionnaire consisted of an open-ended question—"*The challenges of conducting service-learning projects through 4-H Youth Development are* . . ."—that generated a list of challenges of service-learning implemented through the 4-H Youth Development program. The researchers summarized responses from the first questionnaire and eliminated any duplicate responses. Three, second-round questionnaires, one for each subpanel, were developed from the responses provided in round one. The second-round questionnaires asked participants to rate responses on a Likert-type scale of 1 (most important) to 9 (least important). The third round questionnaires ranked the responses to each question from most important to least important by arithmetic mean. Panel members were provided with the subgroup's mean and their own rating for each item. In addition, they were asked to explain why they disagreed with the rankings, if they did. A panel of experts, consisting of three faculty members and two 4-H Youth Development specialists, determined face and content validity for each instrument. Dalkey (1969) stated that the reliability was greater than .80 when the Delphi group was larger than 13.

First round questionnaires were mailed to study participants. Participants had the option of responding through a paper copy or Web-based questionnaire. Subsequent questionnaires were distributed to panel members either through the mail or e-mail, based on respondents' preferred method of receiving correspondence as indicated through the first Web-based questionnaire.

In round one, 18 panel members responded through the on-line questionnaire and 7 mailed or faxed their questionnaires, providing an 83% (n = 25) response rate. The 4-H youth subpanel had a 60% (n = 6) response rate; the volunteer subpanel had a 90% (n = 9) response rate; and the Extension agent subpanel had a 100% (n = 10) response rate. For this, as well as subsequent rounds, non-respondents were contacted in an effort to achieve 100% response for each subpanel. Responses from the three subgroups were maintained separately. Data generated by youth panel members were not considered until signed informed consent statements were on file with the researchers.

The 4-H youth subpanel (n = 6) generated 51 statements, which were summarized to 21 challenges. The volunteer subpanel (n = 9) generated 64 statements, which were summarized to 25 challenges. The Extension agent subpanel (n = 10) generated 75 statements, which were summarized to 21 challenges.

In round two, 20 panel members responded on-line, and 4 mailed or faxed their surveys, providing an 80% response rate. The 4-H youth subpanel had a 70% (n = 7) response rate; the volunteer subpanel had an 80% (n = 8) response rate; and the Extension agent subpanel had a 90% (n = 9) response rate. As with the first questionnaire, responses from the subgroups were maintained separately.

The researchers calculated the arithmetic mean and standard deviation for each response. Mean scores of the round two questionnaires were used to determine importance of each statement. Responses were categorized as "important" (1 – 2.49), "slightly important" (2.5 – 4.99), "uncertain" (5 – 5.99), "slightly unimportant" (6 – 7.49) or "unimportant" (≥ 7.5). Standard deviation of ≤ 1.5 indicated that consensus was reached within the subpanel. These data were used to develop the third and final round of questionnaires.

Twenty-two panel members responded on-line, and three mailed their surveys, providing an 83% response rate to the third questionnaire. The 4-H youth subpanel had a 70% (n = 7) response rate; the volunteer subpanel had an 80% (n = 8) response rate; and the Extension agent subpanel had a 100% (n = 10) response rate. Responses from the subgroups were maintained separately.

Findings

In this study, a purposefully selected panel of 4-H youth, volunteers, and Extension agents was utilized to generate and prioritize challenges of conducting service-learning projects in Tennessee 4-H Youth Development.

Challenges Identified by 4-H Youth Subpanel

The 4-H youth subpanel rated the importance of 21 challenges of conducting service-learning projects through 4-H Youth Development. The mean and standard deviation for each statement are recorded in Table 1. The statements are prioritized in order of most important to least important by average arithmetic mean scores. The 4-H youth subpanel reached consensus on four of the six challenges ranked as "important." Some of these statements include *working around everyone's schedule* (M = 1.85, SD = 0.89); *not having enough time* (M = 2.14, SD = 0.90); and *maintaining good communication among all parties* (M = 1.86, SD = 1.07).

Table 1. *Delphi Study Round Two: Prioritized List of Challenges Identified by 4-H Youth Subpanel (n = 7)*

	Challenge	**M**	**SD**
1.	Working around everyone's schedule.	1.85	0.89[a]
2.	Maintaining good communication among all parties.	1.86	1.07[a]
3.	Not having enough time.	2.14	0.90[a]
4.	Getting others involved and keeping them motivated and dedicated.	2.29	1.50[a]
5.	Lack of funding.	2.43	1.62
6.	Planning and budgeting.	2.43	1.72
7.	Logistics – planning and making sure everything is going as planned.	2.57	0.98[a]
8.	Organizing the group and keeping everyone on schedule.	2.57	1.27[a]
9.	Finding enough volunteer leaders.	2.57	1.72
10.	Disagreements within the group; getting everyone heard without feelings getting involved.	3.00	1.60
11.	Selecting a quality (truly meaningful) project that everyone wants to do.	3.00	1.73
12.	Equipment – getting, storing, setting up for project.	3.29	1.11[a]
13.	People not reporting to work.	3.29	2.43
14.	Organizational difficulties.	3.43	1.27[a]
15.	Being able to find other organizations to help.	3.43	1.71
16.	Having one person responsible for keeping records and scheduling projects.	3.57	0.98[a]
17.	Paperwork; keeping records.	4.00	1.63
18.	Having people who do not appreciate what you're doing.	4.43	2.57
19.	Publicity.	4.57	2.30
20.	Having someone talk bad about you and the project.	4,89	2.73
21.	Missing other activities and time with family and friends.	5.14	2.27

Note. Likert scale: 1 – 2.49 = Important; 2.5 – 4.99 = Slightly Important; 5 – 5.99 = Uncertain; 6 – 7.49 = Slightly Unimportant; ≥ 7.5 = Unimportant.
[a] Consensus of Group.

In round three, five 4-H youth subpanel members indicated disagreement with the ranking of six statements. Panel members responded in favor of higher importance for the challenge of *getting others involved and keeping them motivated and dedicated*. Panel members thought three statements should be ranked less important: *people not reporting to work, being able to find other organizations,* and *publicity*. Two statements, *having people who do not appreciate what you're doing* and *having someone talk bad about you and the project*, received opposing comments. All respondents' comments were based on their personal experiences with service-learning.

Challenges Identified by Volunteer Subpanel

The volunteer subpanel rated the importance of 25 challenges of conducting service-learning projects through 4-H Youth Development. The mean and standard deviation for each statement are described in Table 2. The statements are prioritized in order of most important to least important by average arithmetic mean scores. The volunteer subpanel reached consensus on five of the six challenges ranked as "important." Some of these statements include *coordination, working around everyone's schedule* (M = 1.57, SD = 0.53); *keeping up motivation, interest, participation, and commitment* (M = 1.71, SD = 0.95); and *filling out paperwork for the project* (M = 2.00, SD = 1.15).

Table 2. *Delphi Study Round Two: Prioritized List of Challenges Identified by Volunteer Subpanel (n = 8)*

	Challenge	**M**	**SD**
1.	Coordination; working around everyone's schedule.	1.57	0.53[a]
2.	Keeping up motivation, interest, participation, and commitment.	1.71	0.95[a]
3.	Filling out paperwork for the project.	2.00	1.15[a]
4.	Funding; having difficulty getting supplies/equipment.	2.29	1.25[a]
5.	People not showing up to work.	2.29	1.60
6.	Learning how much is too much to undertake within a project.	2.38	1.19[a]
7.	Getting enough adults involved.	2.38	2.00
8.	Knowing the difference in a need and what would just be a fun time.	2.50	1.69
9.	Knowing how to measure the success of the project/program.	2.71	1.38[a]
10.	Missing other activities; spending time away from family and friends; falling behind in other tasks.	3.00	2.16
11.	Getting enough teens involved.	3.00	2.31
12.	Time limits; having time to complete the project; meeting deadlines.	3.14	2.41
13.	Picking a project with an impact on a large number of people.	3.57	1.13[a]
14.	Transportation.	3.57	1.27[a]
15.	Getting group to "buy in" and understand project goals and objectives.	3.57	1.98
16.	4-H'ers not getting along.	4.42	2.14
17.	Volunteers not having a good connection with the instructor.	4.50	2.39
18.	Volunteers thinking they do not get enough help on their project.	5.38	2.45
19.	Having a place to meet.	5.71	1.97
20.	Volunteers thinking the project is different than they expected.	5.75	1.91
21.	Volunteers finding out they are not "cut out" for this.	6.38	2.00
22.	The weather.	6.43	1.90

Table 2 (Continued)			
23.	Volunteers becoming bored because the project takes too long.	6.43	2.30
24.	Volunteers thinking they have "been there, done that!"	7.25	1.75
25.	That the project doesn't challenge volunteers enough.	7.50	1.85

Note. Likert scale: 1 – 2.49 = Important; 2.5 – 4.99 = Slightly Important; 5 – 5.99 = Uncertain; 6 – 7.49 = Slightly Unimportant; ≥ 7.5 = Unimportant.
[a] Consensus of Group.

In round three, four volunteer subpanel members indicated disagreement with the ranking of 13 statements. Panel members responded in favor of higher importance for the challenges of *getting enough adults involved* and *getting enough teens involved.* Panel members responded that 11 statements should be ranked less important: *getting group to "buy in" and understand project goals and objectives, 4-H'ers not getting along, volunteers not having a good connection with the instructor, volunteers thinking they do not get enough help on their project, having a place to meet, volunteers thinking the project is different than they expected, volunteers finding out they are not "cut out" for this, volunteers becoming bored because the project takes too long, volunteers thinking they have "been there, done that!,"* and *that the project doesn't challenge volunteers enough*. All respondents' comments were based on their personal experiences with service-learning.

Challenges Identified by Extension Agent Subpanel

The Extension agent subpanel rated the importance of 21 challenges of conducting service-learning projects through 4-H Youth Development. The mean and standard deviation for each statement are described in Table 3. The statements are prioritized in order of most important to least important by average arithmetic mean scores. The Extension agent subpanel reached consensus on the three challenges ranked as "important." These statements were *working around everyone's schedule* (M = 1.89, SD = 0.78); *funding* (M = 1.80, SD = 1.03); and *time* (M = 1.80, SD = 1.03).

Table 3. *Delphi Study Round Two: Prioritized List of Challenges Identified by Extension Agent Subpanel (n = 10)*

	Challenge	M	SD
1.	Funding.	1.80	1.03[a]
2.	Time.	1.80	1.03[a]
3.	Working around everyone's schedule.	1.89	0.78[a]
4.	Time away from family and other responsibilities.	2.70	1.64
5.	Getting participants and keeping youth involved/motivated until the end of the project.	2.70	1.94
6.	Organizing project logistics (location, bad weather alternative, liability, etc.)	3.00	2.26
7.	Youth not following through with their responsibilities.	3.30	1.42[a]
8.	Getting support/commitment from adults and the community.	3.50	2.68
9.	Working in a youth/adult partnership; letting youth take leadership for the project.	3.70	2.30
10.	Doing reflection and getting youth to understand the importance of reflection.	3.80	2.26
11.	Getting them to report their accomplishments.	3.80	2.94
12.	Working in a team with different people.	4.00	2.78
13.	Doing follow-up projects.	4.70	2.63
14.	Thinking our small part would not make a difference.	4.80	2.78
15.	Selecting the best project.	5.00	2.62
16.	Lack of recognition, media coverage.	5.50	2.51
17.	Helping others without embarrassing them or hurting their feelings.	5.67	2.92
18.	Not knowing what to do.	5.70	2.67
19.	Getting too emotionally involved with the agency or individual being helped.	5.80	3.01
20.	That service-learning takes too long and/or is too difficult.	6.10	2.88
21.	Peer pressure.	6.11	2.57

Note. Likert scale: 1 – 2.49 = Important; 2.5 – 4.99 = Slightly Important; 5 – 5.99 = Uncertain; 6 – 7.49 = Slightly Unimportant; ≥ 7.5 = Unimportant.
[a] Consensus of Group.

In round three, three Extension agent subpanel members indicated disagreement with the ranking of two statements. Panel members responded in favor of higher importance for the challenges of *funding* and *doing follow-up projects*. All respondents' comments were based on their personal experiences with service-learning.

Conclusions/Recommendations/Implications

The three subpanels generated several statements with similar content. These challenges included *working around everyone's schedule, lack of funding, not having enough time*, and *missing other activities and time away from family and friends*. Also, the subpanels generated several statements related to the challenge of planning or logistics and selecting the best project.

Although the subpanels generated many of the same challenges, there were differences among the subpanels' lists and prioritization of challenges. For instance, the 4-H youth and Extension agent subpanels had similar views on the challenge of *not having enough time*; however, the volunteer subpanel did not reach consensus on this challenge. In addition, the youth and volunteer subpanels expressed similar views on the challenge of *getting participants and keeping them motivated and dedicate*d, whereas the Extension agent subpanel did not reach consensus on this challenge. Furthermore, the volunteer and Extension agent subpanels, but not the 4-H youth subpanel, reached consensus on the challenge of *funding*.

The 4-H youth subpanel generated one challenge that the other subpanels did not. This statement was *equipment—getting, storing, setting up for project*. The volunteer subpanel had nine statements that were unique from the challenges generated by the other subpanels. These statements included *knowing how to measure the success of the project/program, getting the group to "buy in" and understand the project goals and objectives,* and *volunteers thinking they do not get enough help on their project*. The Extension agent subpanel had eight statements that were not generated by the other subpanels. Some of these statements were *doing follow-up projects, helping others without embarrassing them or hurting their feelings, that service-learning takes too long and/or is too difficult,* and *peer pressure*.

The field of service-learning lacks research on challenges of service-learning, particularly as it relates to community-based efforts. This study added to the body of research knowledge by discovering different challenges. Many of the challenges identified in this study–particularly those related to planning time, coordination with the community, lack of leverage on the part of the youth, time, and funding–are congruent with those revealed in studies by Shumer (1997), Wade (1997), and Ogden (2002). However, this study discovered several diverse challenges of community-based service-learning as it relates to 4-H Youth Development. These challenges included *finding enough volunteer leaders*, *being able to find other organizations to help*, *working around everyone's schedule*, and *transportation.* One may conclude that these challenges were identified because of the organization through which the service-learning occurred. As a statewide organization, 4-H engages youth in rural, urban, and suburban areas. Many of the study participants lived in rural parts of the state and, thus, had different challenges than would 4-H members and leaders living in more urban areas. In addition, 4-H is a community-based organization that relies heavily on volunteer leaders to facilitate programming with youth during the after-school hours. Although some challenges of service-learning may be similar in both school-based and community-based efforts, participants in a community-based organization such as 4-H may place more importance on certain challenges than do school-based participants.

Based on the results of this study, recommendations can be made for the statewide 4-H Youth Development program in Tennessee. As 4-H Youth Development sustains and expands the existing service-learning initiative, efforts should be made to plan for challenges that could hinder the effectiveness of service-learning projects. State 4-H Youth Development staff should provide training, resources, and technical assistance for regional and county Extension staff, volunteers, and 4-H youth who are facing challenges such as coordinating schedules, recruiting volunteers, keeping up participants' motivation and dedication, funding projects, and filling out paperwork for the projects. Resources should include printed and Web-based manuals for planning effective service-learning projects. Resources should also include a compilation of "best practices" from 4-H groups that have overcome service-learning challenges. In addition, the state 4-H staff should provide 4-H groups with information on available service-learning grants from external sources and also seek funding to continue the 4-H Seeds of Service mini-grants. These grants should enhance the service-learning efforts at the local and regional level and require the minimal amount of paperwork.

Several questions have surfaced as a result of this study. Researchers should examine the effect that certain factors may have on the challenges of service-learning:

1. What impact does location (i.e., rural, urban, limited resource) have on the challenges of service-learning?
2. How does the availability of grant funding, including grant requirements, affect the challenges of service-learning?
3. To what extent does the degree of youth leadership in a project affect the challenges of service-learning?

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Teaching Advanced Life Sciences in an Animal Context: Agricultural Science and Business Teacher Voices

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Abstract

Research findings support the claim that integration of science into agriculture curricula is a more effective way to teach science. In 2004, one Midwestern state adopted three new courses in advanced sciences that were embedded within the context of life science, specifically animals, plants and soil, and foods. This paper looks at Agricultural Science and Business teacher comfort levels with teaching the Advanced Life Science: Animals course and their perceptions of its impact upon their students. Using qualitative research methodology, data were obtained during on-site interviews of six teachers involved in teaching the new course. Data were analyzed using an open coding system. Findings of the study showed teachers felt confident of their science background and comfortable with their personal background in animal agriculture in preparation for teaching the course. It was also found that teachers were in unison concerning the application of scientific principles to a real world context.

Introduction

Since the inception of federal funding for vocational education, ongoing debate has focused on the amount of time appropriated towards academic subject matter and what amount of time in a student's day should be committed to workforce preparation. Recently, in remarks made to students of Parkersburg South High School in Parkersburg, West Virginia President Bush called for change in the Perkins Act – the program currently administering federal funds to Career and Technical Education programs (formerly Vocational Education). In his address Bush stated:

> We're going to talk about ways to make sure the Perkins Act works better. This act was passed in 1917; we spend a billion dollars a year. The attitude has got to change from 1917. [A]s a part of the vocational training courses, there needs to be a rigorous focus on English and math and science. We've got to make sure the children have the skills that may be taught at the Perkins Programs, but they need the basics, too (Bush, 2004).

Indeed, within the past two decades intense debate concerning this issue has infiltrated Career and Technical Education (CTE) from the highest levels of program administration all the way down to the grass roots levels. Academically minded parents and students on track for college entrance are asking program providers of Agricultural Education: what have you done for me lately? And some would argue that many CTE providers have been slow to recognize the need for total integration of academics with workforce training unless their immediate futures were at stake. This research provides evidence of one instance where state level action has culminated in the total integration of academics and career and technical education resulting in a dynamic approach to offering students what they need the most – rigorous and engaging subject matter. This subject matter, in this case advanced life science is taught within the relevant context of animal agriculture that can enhance students' immediate marketability in the work place or provide students with a sufficient launching pad for their post secondary educational pursuits.

Research findings support the claim that integration of science into agriculture curricula is a more effective way to teach science. Studies reveal that students who participated in an agriscience course achieved significantly higher scores on the science portion of a state's standardized test of high school graduates than did non-agriscience students (Chiasson & Burnett, 2001). Furthermore, it has been demonstrated that teaching biology using animal agriculture as the context was effective for helping students appreciate and understand science better than traditional methods of teaching biology (Balschweid, 2002). Jelinek concluded that closing the gap between school science instruction and real life scientific activity such as that conducted in a life sciences context and presenting science in a relevant form, helped to eliminate obstacles that minimize student attitudes and interest towards the study of science (Jelinek, 1997). Balschweid also concluded that subject matter taught in the context of animal agriculture, from a teacher experienced in modern animal agricultural practices, can have a positive effect upon student attitudes towards agriculture and those who work in the agriculture industry, even when taught within a school corporation located in a larger metropolitan city (Balschweid, 2003).

In 2004, one Midwestern state adopted three new courses in advanced sciences that were embedded within the context of life science, specifically animals, plants and soil, and foods. These courses underwent a rigorous writing and review process from professors in biology and chemistry programs from statewide institutions of higher education, secondary agricultural science teachers, and representatives from business and industry. Once the courses were drafted they were reviewed by the Council for Agricultural Science and Technology (CAST) and upon receiving preliminary modifications they were reviewed again by the original stakeholders.

Following the inclusion of all recommendations the course standards were placed on the state's Department of Education website for feedback by members of the general public. After all recommendations were adopted and each stakeholder group approved the three advanced life science courses they were adopted statewide as advanced science courses eligible for inclusion as college preparatory science courses as well as honors diploma science credits. In addition, the state's commission for higher education approved the courses to 'count' as university entrance requirements for advanced science at all institutions of higher education within the state (Balschweid, 2004). All three courses are available to be taught by agriculture teachers but they are not required. To date, limited evidence is available documenting teachers' level of comfort with teaching the first of the courses, *Advanced Life Science: Animals*, and no evidence exists supporting teacher perceptions of the benefits of these courses for enrolling students.

Research into teacher thinking as it relates to curriculum adoption has established that teacher thinking influences teacher action and ultimately impacts the learning which takes place in schools (Clark & Peterson, 1986). The theoretical model for this study consisted primarily of the perceptions of agricultural science and business teachers towards adding an advanced life science course to their current course offerings. The theoretical basis for this study is grounded in the Theory of Predicted Behavior (Fishbein, 1967) and the Theory of Planned Behavior (Fishbein & Ajzen, 1975). The theory of Predicted Behavior (Fishbein, 1967) suggests that beliefs and behavioral intentions can best be viewed as consequences of attitude. The theory of Planned Behavior (Fishbein & Ajzen, 1975) suggests that demographic variables, observations, and knowledge influence values and beliefs, which in turn affect attitudes, intentions and finally, behaviors.

As adapted to this study, these theories suggest that agricultural educators' past experiences, personal training, values, and observations about science, influence their opinions, confidence level, and ultimately, their decisions to teach an advanced life science course. Understanding agricultural educators' perceptions concerning the adoption of the advanced life science courses into their curricula will help determine how likely they are to actually teach an integrated agricultural science curriculum.

Finally, qualitative research methodology was utilized in this study. Qualitative research methodology can be a useful tool as we witness change after change imposed upon the old paradigm of "vocational agriculture" and adapt to new expectations and market forces propelling agricultural education into the 21st century. Furthermore, qualitative research methodology can uncover intricate pieces of evidence that are difficult to obtain using quantitative methods. Denzin and Lincoln (1994) define qualitative research as "multi-method in its focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of, or interpret, phenomena in terms of the meaning people bring them" (p. 2). It was with this approach in mind that the researchers set out to determine the beliefs and perceptions of certain agricultural science and business teachers engaged in teaching a career and technical education course that also satisfied college bound and honors diploma students by meeting their specific requirements for an advanced science curriculum.

Purpose/Objectives

The purposes of this research were to determine Agricultural Science and Business teacher comfort level with teaching the *Advanced Life Science: Animals* course and to determine their perceptions of its impact upon their students. In order to determine these purposes the following research questions were addressed:

1. What is the level of comfort of Agricultural Science and Business teachers adopting an advanced life science course based upon state science standards and taught within an animal context?
2. What are teacher perceived benefits to students enrolled in a course specializing in advanced life science concepts taught within an animal context?

Methods and Procedures

In July 2003 discussions between the Department of Education and the Agricultural Education Teacher Preparation Program in a Midwestern state focused around the creation and adoption of agricultural science courses that would capitalize on the rigorous science prevalent in the discipline of agriculture, food, and natural resource systems. By August of that same year a panel of experts in science education from around the state had been assembled and commissioned to develop a course, or courses, that would meet the requirements for advanced science curriculum, namely that it be taught at a level beyond first year biology and first year chemistry. These courses were to engage students in rigorous science education but be grounded in the context of real life science, in this case, agriculture. By September 2003 the panel had initiated the standards for three separate courses all within the context of agriculture, one in animals, another in plants and soil, and a third in food. After extensive review the draft version of these courses were uploaded onto the Department of Education website for public review and comment. In December 2003 the state's Agricultural Science and Business teachers were notified that the first of these courses were to be offered in the 2004-05 academic year and that any interested teachers should attend a preliminary informational meeting concerning the course. The initial course to be offered was the *Advanced Life Science: Animals* course. Teachers were encouraged to request administrative approval for teaching this course. In addition to the draft copy of the course standards, teachers and administrators were told that, although not approved yet, the courses were on track to be approved by the State Board of Education and the Commission for Higher Education as advanced science courses. This approval guaranteed that the courses could be included in any student's college preparatory high school program and they would be recognized by every institution of higher learning in the state as truly being advanced science coursework.

Forty teachers arrived for the initial informational meeting in December 2003. They were instructed on the protocol for initiating the approval process in their local school corporations for adoption of this *Advanced Life Science: Animals* course into their curricular offerings for the 2004-05 academic year. Of the original group, 15 teachers were successful in receiving approval to offer the course. The remaining teachers indicated that the process was started too late to include the courses in the upcoming academic course offering catalogs and that since the course had not yet received approval at the highest levels of the state their administration was reluctant to offer the course for their college bound students. Subsequently, the courses received approval by the State Board of Education in August 2004 and the Commission for Higher Education approved the courses in October 2004.

By May 2004 the 15 participating teachers received a copy of the *Advanced Life Science: Animals* standards and a sample copy of four lessons that were to be included in the course. They were instructed to familiarize themselves with the standards and to participate in two summer workshops to be held in June and July 2004. The state's Agricultural Education Teacher Preparation Program faculty were responsible for facilitating the training.

The first workshop spanned three days and covered instruction in brain based theory and contextual teaching and learning. A nationally renowned expert in contextual teaching and learning was hired to instruct the teachers in effectively reaching their students with rigorous, high level academic subject matter. In addition, elements concerning teaching standards, student retention of important subject matter, and establishing benchmarks for success in end of course assessments were also covered during the three day in-service training. A second workshop held during two days in July 2004 focused on the technical subject matter of animal science necessary to teach an advanced life science curriculum within the context of animal science. Since the prerequisite coursework for high school students enrolling in the *Advanced Life Science: Animals* course consisted of one year of general biology and one year of general chemistry, many of the concepts and standards included in the advanced life science course consisted of information that the participating agricultural science and business teachers either needed refreshing in or they simply did not know. This two day refresher course was taught by an animal science professor from the state's Land Grant University's College of Agriculture. The animal science professor illustrated concepts in general anatomy and physiology, advanced nutrition, reproductive physiology, and cellular and macro principles of animals. During the last day of the training the teachers received instruction on the use of laboratory kits that had been specially produced for teaching the *Advanced Life Science: Animals* course. The kits were created by an outside company and mapped to the laboratory experiments contained within the course. The teachers were in-serviced on how to use the supplies and equipment contained within the kits and when and where to use the kits within the course curriculum.

In August 2004 the 15 teachers began teaching the *Advanced Life Science: Animals* course. Since this course represents the first Career and Technical Education course within the state to satisfy college preparatory and honors diploma students it is essential that research be conducted to evaluate the course. Prior to that evaluation however, the researchers felt obligated to determine if the methods used to prepare the teachers were effective and determine what the teachers perceived concerning student benefits of the course.

To obtain the data a series of interviews were conducted at the schools where agricultural science and business programs were teaching the *Advanced Life Science: Animals* course. The purpose of the interviews was to obtain rich, thick descriptions of the comfort level of teachers teaching the course and determine their perceptions of student benefits to the advanced life science curriculum using qualitative methods for data collection. Researchers used a phenomenological framework to understand the meaning, structure, and essence of the lived experience of this phenomenon for this group of Agricultural Science and Business teachers. During a 45 minute on-site interview process, the researchers sought to gain insights from the teachers in the actual setting where the course was being delivered. All teachers involved in teaching the course agreed to be included in the research study. Using purposeful sampling methods, these participants were chosen based on willingness and availability to be interviewed. Therefore, a sample based upon a teacher's proximity to the researcher's home institution was selected. As a result, a total of six teachers from the group of 15 were included in this study and no attempt should be made to generalize the results to any particular population.

An interview guide was developed and used by the researchers for all interviews. The interview guide, which utilized a set of open-ended questions, was developed by the researchers and input was received from Agricultural Education Teacher Preparation faculty. The interview guide contained questions used to explore teacher comfort level with teaching an advanced life science course and teacher perceptions of student benefits to the course. Each interview was audio recorded for accuracy. Interviews were conducted during the month of November 2004. Data were analyzed using an open coding system. Strauss and Corbin (1990) state "open coding…is the analytical process by which concepts are identified and developed in terms of their properties and dimensions" (p. 74). Conceptual labels were placed on the answers the participating teachers provided. The answers were then analyzed to determine similarities and differences. Conceptual labels were then grouped into categories comprised of similar properties.

Results

Research question one sought to determine the level of comfort of Agricultural Science and Business teachers adopting an advanced life science course based upon state science standards and taught within an animal context. Specifically, teachers were asked "when you take into account your personal science background, how does that play into your anxiety or comfort level in teaching this course?" Teachers provided the following responses:

> *I guess I'm thankful. We were one science education class away from having our science teacher minor. Many teachers in our area actually went ahead and got it. I chose not to. But I actually remembered more then what I thought I would once we went back and started reviewing all the materials for this class. So, I probably cussed em then but I am glad now. (M-1)*

> *I'm more comfortable because I have the science background. And, in fact I've relied a lot on that trying to meet the standards. (F-1)*

I feel very comfortable with it, but I have taught biology on and off the last 20 years, so.. over the last 7 or 8 I've taught agriculture full time, but had biology, enough biology in there where I was teaching that, and with the new animal science curriculum that we have, if you follow the curriculum, its pretty science intensive: anatomy and physiology, so…. I feel very comfortable with it. (M-2)

It's a high level of anxiety. And I'm probably different than most teachers from the standpoint, that I was out of the classroom, and I had just gotten what I thought was comfortable with what I was teaching and I feel like I am back to my first year of teaching all over again. Which, I knew that going into it. And since it has been a while since I've been removed from my preparation at the college and university level, a lot of those things I thought I knew, I wish I remembered a little more about this or that. So I need refreshing on some of those things. (M-3)

I feel anxiety every day, but sometimes it's not because of the course. But, my science background is adequate, probably. And I think I'm trying to maximize my strengths. To meet the variety of the outcomes that I need to be maximizing and stuff like that. This is a first year course. You know if I was going to teach it the next 10 years in a row I'd do it different every year. And you know, hopefully be smarter every year. And do it different every year. And every time you do something the first time its… well you have good days and bad days. But I have a good book, a real good book with some good curriculum and we're probably doing it a little different than other schools are. (M-4)

For me, it's a comfort level because I actually was, I would say, first an animal science major. Agricultural education was my second. I double-majored, so… For me it played right in and was a great interest. And I'd been teaching animal science… see, I had been one of them that had been complaining all along that we ought to be doing more and make a higher level step. Because we'd been doing it in actuality, now its been nice to take it one more step further, but we'd actually been doing a lot of the things that the standards are for this class already. So that helped the comfort level quite a bit. (M-5)

In addition, the teachers were also asked "given your personal experience with animals (domestic and farm), how does that play into your anxiety or comfort level in teaching this course?" Selected teacher responses included:

It helps me be comfortable with the basic animal science, and then I can concentrate on refreshing my brain and making sure that I understand the more difficult parts. I guess, to me, its like taking my normal animal science class to the next level. Like, normally if I covered nutrition, we would talk about the six main parts of the water, the carbohydrates, the proteins, etc. But now we are taking it from that and we are talking about how those proteins attach, how those proteins work in the body, from the feed and the grass. How that converts to muscle and how that whole chemical process… we are just taking to a much higher level than I ever would have in my basic animal science class. So I am comfortable with the animal science end of it so that gives me time just to prepare for the science end of it. (M-1)

Well, I live on a small farm. We raise beef cattle and swine. And my daughter's been into goats and poultry the last couple of years. So, I'm very comfortable around the animals. I'll take you out into the lab here in a little bit, and you'll see that we have a little menagerie made up of exotics as well as common companion species. So, I'm comfortable with that. That hasn't been a big problem. (M-2)

Yes, it helped. It helped. Not to brag, but I have a pretty extensive animal science background. And the animal science is my passion. So, because of that I think its helped in this class. Because I've been able to lend things to the course that weren't in the materials, or weren't in the curriculum. (M-3)

Every story I tell relates to animals. Without that, then I would be lost. So you have to have some kind of correlation. It's been my savior, probably. Without that, I don't know what I would do. We all have our different styles, and pace. What works for one doesn't work for someone else. And, so far so good. (M-4)

We have 42 students in this class, in two sessions. It's about 50/50 (male/female). The two sessions, one is a little bit bigger than the other one. One session has a very strong agriculture background. And, there was no rhyme or reason to this, it was just the way it was scheduled, and one is not. And it's interesting. Those two classes take on two totally different personalities. As they would, regardless. But the non agriculture students, its interesting because I started all the classes this year with some agricultural industry type things. And I guess some of those non agriculture students got concerned. In fact I used some information out of one of the power points we got from the in-service. And I think they were concerned, in fact I had one student say, 'you know I was really worried this was going to be a farming class'. And then later on she said she really likes the way we learn things in here because it's very hands on simply by the way I'm approaching it. (M-5)

The teachers were asked to elaborate on their comfort level or level of anxiety associated with the lab equipment. The following selected responses indicate their response to this question:

At this point I have been very comfortable with it. My biggest problem is we get so wrapped up in the lab that I sometimes don't think we spend enough time in the classroom, so I have to be careful about that. We get to doing some things out there in the lab and we are having so much fun that…I want to make sure that I cover enough material, but I guess as long as you are doing it, whether its in the lab or in the classroom, as long as you are covering the standards. You want to make sure you are covering the standards. And so I do, you know, I guess that made me a little more comfortable in the fact that I worry about the standards, not about the book itself. I think as a teacher a lot of times we get into that, okay we've got x amount of time we should be able to cover this many chapters, so…. [upon seeing the lab kit for the first time]… Well, it's a lot of stuff I have never used before, but its kind of fun just learning it yourself. (M-1)

Well, the lab equipment was horrible, so I sent mine back. I sat down with the catalog and ordered the things that I needed. I just took that list and ordered the things that I needed and then I also have some of my own equipment that I'm going to be using. And some of my own labs that I'm going to be using that I've used before that I know will work. (F-1)

No anxiety at all. In fact, after I got the kit the flyer came out for the $1900 kit, the only anxiety that I had was coming up with the $1900. And when it was the state contributing $500, I was really anxious when I heard it ballooned from $1000 to $1900. I was real anxious about that. Then, when I found out that they were able to come up with another $500 so we had a thousand and then the school came up with $900 we had to rob Peter to pay Paul this year because we didn't have that in our budget. But we got it and no anxiety at all with it. (M-2)

I'm not 100 percent comfortable, but we're learning. And one of the greatest things is I got a group of students that are learning right along with me. As a matter of fact, when the lab kit arrived, it was them that unpacked it, checked it off, and made sure everything was there, and they didn't know everything that was in there. So, its kind of an exploratory learning process for them. And, at this point we haven't used everything yet. We've used some of it, and some of it we'll use later on. (M-3)

Have the students, its scientific, have them do the work. And I can show you the lab, each student has 2 labs that they are performing. And I have a rubric set up on their presentation, PowerPoint, or whatever they are doing, and they are in charge of that lab and that one week lesson. That starts December 1st, okay? And so I don't have any results from that, but I am empowering students. And I'll tell you what, they are excited about it. And it takes some planning to get all the labs and stuff like that, hatching eggs and all that stuff. But they are excited about that. (M-4)

My comfort level on that was probably less than a lot of them because we're starting a new program. We went ahead and got the kits because I thought there would be things in there that we needed to go with and that kind of thing. Probably in retrospect given our situation coming into a new program I was allotted whatever we needed, open checkbook, so to speak. If we're going to teach this as a first rate class here's how it would be in real life. I don't think we ought to be make-shifting things. Because, if I'm going to send a student to DowAgro Sciences or whatever, and they have been using things that well, this really isn't what this if for but we're going to use it for that…. I don't think that's a good situation to be in. (M-5)

Research question two sought to determine what teachers perceived students were benefiting from enrolling in a course specializing in advanced life science concepts taught within an animal context. Selected teacher responses included:

I think it just makes science…. fun. Anytime, I found out with any shop class, or any particular class, anytime that you can let them do what you have been talking about, it reinforces it, and they have fun while they are doing it. So to me that has always been the *fun part of a lab or a shop, is that you are doing what you are talking about, therefore it not only reinforces that skill level, but it also makes it fun for them and they remember that too. I think I am an exciting person, but if I stand there long enough and talk, I'm going to put myself to sleep. You know, nobody just wants to lecture all the time. At least I don't. (M-1)*

We've got a few of them in there that are taking the class because they didn't want to go to the career center to take a health class. Our pre-nursing program over at the career center would require that they have to leave the high school and drive over to the career center, which is about nine miles away. They'd be gone for half a day, but I got a few of them in there that are looking directly at going to nursing. So they are kind of looking at this as a class that will help them out for their college biology. They're also the kind of kids that are also in anatomy and physiology here at the high school. And as I started working on the curriculum there' the biology and nutrition and stuff that we cover in there. (M-2)

I think they are getting to expand their animal science knowledge, and general biology knowledge. I hope so anyway. It's about 50/50 [girls versus guys in the class]. There may be two or three that want to do it for college credit. (M-3)

You know what, we won't know until 5 years from now. It will be interesting to look back and say, you know, that was a smart move. Or it wasn't a smart move. Whatever. Who knows? We won't know until 5 years from now. (M-4)

This is important. Because this to me, it takes us to the next level that we were just talking about that the state wants [agricultural education teacher preparation] to do and I think it takes the agriculture program to that next level of what we need to be doing. Now we don't ever want to forget, you know, I turned 43 kids away that wanted to take agricultural mechanics. We still have those kinds of students that need that kind of training as well, so I don't want that to ever go away. But we needed to go this direction as well with students. This took the place of Biology 2. We come in with this, our numbers become high but we're going to be held accountable, which is good! I like that. Once again, that takes agriculture programs to a whole other level. So, we're being watched, so to speak. (M-5)

Teachers were asked specifically, 'in your opinion, what skills are your students learning in this class that can be applied towards a vocational trade?' Teacher responses were as follows:

Well, I guess you're talking about writing up lab and experimental applications, problem solving, team work, because they are working together in groups on different activities. Of course, you are reinforcing just measuring skills because you are using the scales to keep track of the weight of the eggs before they hatch, the birds after they hatch. They are learning how to sex birds. I guess writing reports, keeping track of data, those kinds of things. (M-1)

Well, the kids that I have are all going to go to college. They are all higher level kids. Every one of them. They were bored with the curriculum. And to be very honest, trying to teach from that curriculum, I haven't found my groove. And I've been real disappointed with my performance. So, I thought a lot, reflected a lot and I think I'm just going to teach it strictly from a science perspective, and then throw in the animal science in as a secondary. Or relate it back to the animals. (F-1)

They're picking up a lot of things, in terms of what I think will lead them to going to a [land grant university] or one of the other colleges here in the state that will lead them into biotechnology, bioengineering, or animal science. A lot of kids that are in here are very interested in veterinary technology and veterinary medicine. The school is kind of looking at this is a way to put those types of students in here out of our standard animal science class, put them into advanced life science: animals. And, it seems to look really good because, in the past, I would have students that are college prep, valedictorian, salutatorian types, they might be in a class, an animal science class, that I have 17 kids with [learning disabilities], and some of them have various levels of assistance being required of them and usually more than what you would end up having with a special student, or a standard student. And, pulling them out and putting them in their own class, they seem to be really excited about it, and they kind of build off of each other's enthusiasm. And they're, I hate to use the word, but they're a little cut above the, you know, the standard student here in school. Because they've already been successful in biology, and been successful in chemistry, so, they are pretty good kids. (M-2)

They're learning to explore and learn on their own, to a certain degree. As an example, we are doing the unit on the chicks right now. We've got the eggs out there incubating. I took four of those lessons and I broke my class of 16 up into four groups. And they taught the lessons to their other classmates. Now, some groups did a better job than others, but I looked at that and thought, wait. Why do I have to do all this? And I think they learned something. That to me, that activity with the chicks was one of the strongest things I've seen. It's probably created more interest than any of the other topics we've covered up to this point. Some I was pleased with, some I was not so pleased with. I also spent some time at the end of each lesson reviewing some of the points I thought maybe they should have covered more in depth. (M-3)

We're just one more step on that ladder where we are preparing young people. And, you know, I have found out a lot of this stuff that we are going over, they have had in chemistry. And guess what? They're going to get two more shots at it at [the land grant university]. It's just reinforcement. So far this school is very supportive of this. When I first came here, it's a top, top priority. They want this thing to work. (M-4)

That's one thing we are really looking at. Because we're really doing some research here particularly in this area as to what we want to do, where we need to have these kids. One of my goals is, and we're working towards this because we are going to build facilities here, we're not sure what we are going do in terms of a decent agriculture facility yet. We're looking at just building an agriculture technology center for the school. One of my goals is, and we've already had discussions with them, is having a Dow Agro Science

Scientist be with us one day a week. Because we want this to be a real life setting. And, what better way to show what we're doing. And we've been doing a lot of that. We're taking one day a week, we're sending four students out of those classes. We're alternating back and forth from the classes and everybody has to do it before we go back and start over out with a vet. This past week 4 students went with a veterinarian to do dehorning, vaccinations, and castration at a dairy farm. We just finished mammary system, he walked them through the milk cows. They did the California mastitis test on them, on a couple of cows and then those kids came back and gave a presentation… and what's interesting is that I told them they had to do a 5 minute presentation. They did a 30 minute one when they got back. And those were totally non farm kids on farm calls. What we have tried to do is send non farm kids on the farm calls and farm kids on the in house surgeries and that kind of thing. (M-5)

Conclusions/Implications/Recommendations

Research question one sought to determine the comfort level of agricultural science and business teachers involved in teaching an advanced science course taught within the context of animals for the first time. The teachers involved in this study volunteered to teach this course and convinced their administrators of its value even though the course was in its first year of existence. Based upon the findings of the study it can be concluded that the teachers felt confident of their science background in preparation for teaching a high school advanced science course that built upon concepts and principles that students gained in taking a year of general biology and a year of general chemistry in preparation for the course. Most of the teachers emphasized their intensive science background in preparing to become agricultural science and business teachers with one teacher indicating they were within one class of double majoring in science education as an undergraduate. Teachers commented that a difficult task in teaching an advanced science course, even though they had significant background in advanced science concepts, was that they hadn't used much of the knowledge they learned in college and it required effort for them to review and brush up on the advanced science concepts related to the *Advanced Life Science: Animals* course. This implies that the agricultural science and business teachers initially involved in teaching the advanced science course did not feel the need for additional advanced science coursework to be proficient in teaching advanced science concepts and principles to their students. The teachers felt confident in their background in science education and confident in their ability to access the resources necessary to refresh them in any concepts they felt they were lacking.

In addition, it can be concluded that the agricultural science and business teachers involved in teaching the advanced science course felt comfortable with their personal background in animal agriculture and their ability to apply it to the advanced science course. Teachers indicated little anxiety related to teaching advanced science concepts and principles within an animal context. Teachers also indicated that regardless of the agricultural and/or animal background of their students, they felt confident they were able to relate the context of animals back to the students in their advanced science course. This is in line with the findings of Fishbein & Ajzen (1975). Teachers even stated that several of the students in the *Advanced Life Science: Animals* course were interested in future careers in veterinary technology and/or veterinary medicine. This implies that teachers were not only confident in their own ability regarding animal agriculture but that they were cognizant of their students' comfort level with the context of animals as well.

Teachers were also asked their comfort level with the laboratory equipment necessary to teach an advanced science course. Each teacher involved in the study indicated that even if they weren't completely comfortable with some of the supplies and equipment necessary for offering the various laboratories, they were able to utilize local resources to assist them with the laboratory kit supplies. Some of the teachers even mentioned that students were very helpful as a resource in this area. It can be concluded that even if the teachers weren't exposed to the type of laboratory supplies and equipment necessary for teaching an advanced science course, they were competent in utilizing the supplies and equipment after receiving instructions from either printed or personal resources.

Presently, this course is available to be taught by all agricultural science and business teachers. It is recommended that this course be made available to agricultural science and business teachers who possess a high level of comfort with both advanced science concepts and a personal background with animals. It is further recommended that if an agricultural science and business teacher feels a degree of anxiety with either of these topics additional coursework should be made available to the teacher prior to offering the course.

Research question two sought to determine teacher perceptions of the benefits for students enrolled in an advanced science course taught within an animal context. Teachers were in unison concerning the application of scientific principles to a real world context. They admitted that students enjoyed hands on activities in the laboratory and that regardless of student backgrounds, students enjoyed learning in an animal context. This parallels the findings in the study conducted by Jelinek (1997). Even students who were interested in careers in nursing requiring four-year college degrees, found the *Advanced Life Science: Animals* course fulfilling their needs. In addition, when asked what skills could be applied to a vocational trade, teachers responded that the ability to conduct lab write-ups, being able to function in experimental settings, working in teams, and problem solving were the obvious student benefits. It can be concluded that students initially enrolled in an advanced science course taught using animals as a context can learn transferable skills that could relate to moving directly into the workforce and/or students headed directly for institutions of higher learning. In addition, when advanced science concepts are taught in the context of animals, students, at least initially, appear to have a great deal of interest. It is recommended that additional research begin to target the effectiveness of the *Advanced Life Science: Animals* course upon student achievement in science and the influence that this course has upon student attitudes towards science in general.

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An Examination of the Texas Print Media's Ability to Report Objectively on Cotton Following the Dissemination of an Agricultural Media Resource

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Abstract

This study reexamined the coverage of cotton from 534 Texas newspapers following the dissemination of an agricultural media resource tool. Using the Hayakawa-Lowry method, the levels of bias in the media's coverage of cotton were evaluated following the August, 2004 distribution of the CottonLink© media resource tool. The objectives for this study were to: (a) identify all articles written about cotton in Texas newspapers for six selected months according to circulation size and geographic region; (b) classify cotton articles into categories; (c) categorize the sentences in hard news and feature articles using the Hayakawa-Lowry News Bias categories and determine the level of bias in the judgment statements, and compare these results to the Beesley (2003) study completed prior to CottonLink©. A total of 1,356 articles were collected from 275 newspapers by the Texas Press Clipping Service for the six-month period of the study. An overall increase was found in the number of articles, newspapers and circulation size after the dissemination of the CottonLink© media resource tool while a decrease was found in the number of judgment sentences during this study. While additional research is recommended, the results create a potential solution in the battle to increase agricultural literacy.

Introduction

The W. K. Kellogg Foundation (1984) stated that knowledge of the agricultural industry and its influences are issues of great importance. Unfortunately, Americans do not seem to possess an understanding of today's agriculture industry. A study conducted in Arizona (Behavioral Research Center of Phoenix, 1989, cited in Terry, 1994) found that most heads of households had little knowledge about agriculture and held negative perceptions about the impact of agriculture upon their lives. As the population moves from rural to urban areas, the public's knowledge of agriculture will continue to decline (Frick & Elliot, 1995).

Within Texas, agriculture is the second largest industry producing more than $80 billion annually for the economy. Cotton is the principal cash crop in the state of Texas, generating $1.6 billion for farmers. In 2000, 3,940,000 bales of cotton were produced, helping to make Texas the nation's leading producer of cotton (Texas Farm Bureau, 2003). Frick and Spotanski (1990) suggested that in order to have an agriculturally literate society an individual must (a) have minimal understanding of basic agricultural processes or methods, (b) comprehend basic terms related to agriculture, and (c) realize the important impact that the agricultural industry has on society. This begs the question; do Texans understand the state's cotton industry?

While it is important to understand the public's understanding and beliefs about the agriculture industry, it is essential to understand the way the public gains information and formulates decisions (Frick & Elliot, 1995). Rogers (1995) stated that one of the primary means by which the public receives information is through the mass media and that the mass media is very influential on public opinions towards issues.

Altschull (1995) said the media is all around us and is very well respected. Therefore, it is important that all forms of the media present facts in order to create an accurate story when reporting. In addition to reporting the facts, Tuchman (1972) says there are four procedures that will help a reporter gain credibility and remain objective: (a) present both sides of an issue when reporting on a controversial topic, (b) present evidence backing up what is being written, (c) use quotation marks whenever directly quoting a source, and (d) organize stories so the most relevant information is read first. Journalists should write about all news issues, including agriculture, in an objective and factual manner. By doing this, the public can be informed and then form their own opinions (Sitton, Terry, & Key, 2001).

Despite the increased competition from the Internet and television, newspapers remain an important and reliable source for news (Bonk, Griggs, & Tynes, 1999). Texas has a newspaper circulation of more than 4.2 million which supports the need to research media coverage on agriculturally related topics and determine the levels of bias used in print media (Texas Press Association, 2003). Assuming that an individual newspaper can be read by more than one person in each household, this print news source has the potential of reaching the majority of the Texas population.

In 2002, funding was provided by the International Cotton Research Center to study cotton coverage in the print media. An advisory committee was selected and consisted of area cotton producers, ginners, and other experts in the cotton industry as well as print media professionals. As part of this project, baseline data from newspapers was gathered between September 2002 and February 2003 to establish the extent of cotton-related news publication in Texas newspapers (Beesley, 2003).

Core to this project was the development and dissemination of a media resource tool. The goal of this tool, *CottonLink*©, was to provide print journalists with a more detailed understanding of the cotton industry as well as access to credible cotton-related sources. Formatted as a CD Rom, the guide contains information about the history of cotton, a photo gallery, and the names and contact information of expert sources in a variety of areas of the cotton industry. Photos for *CottonLink*© were provided by various sources including Cotton Inc., John Deere, and departmental photos. In August 2003, the *CottonLink*© CD was delivered to every newspaper in Texas. Delivery of *CottonLink*© included mailing 511 CD's to newspapers with small circulations, and agricultural communications faculty hand-delivered 23 CD's to those newspapers with a large circulation.

Conceptual Framework

Frick and Elliot (1995) conducted a study examining agricultural awareness in faculty members at Land Grant Universities. From this study, the researchers developed a conceptual framework to describe the factors contributing to knowledge and perceptions of agriculture (Figure 1). This framework describes three primary factors that individuals use in order to form a knowledge base and an opinion on an issue: (a) personal characteristics, (b) education, and (c) participation in agricultural activities.

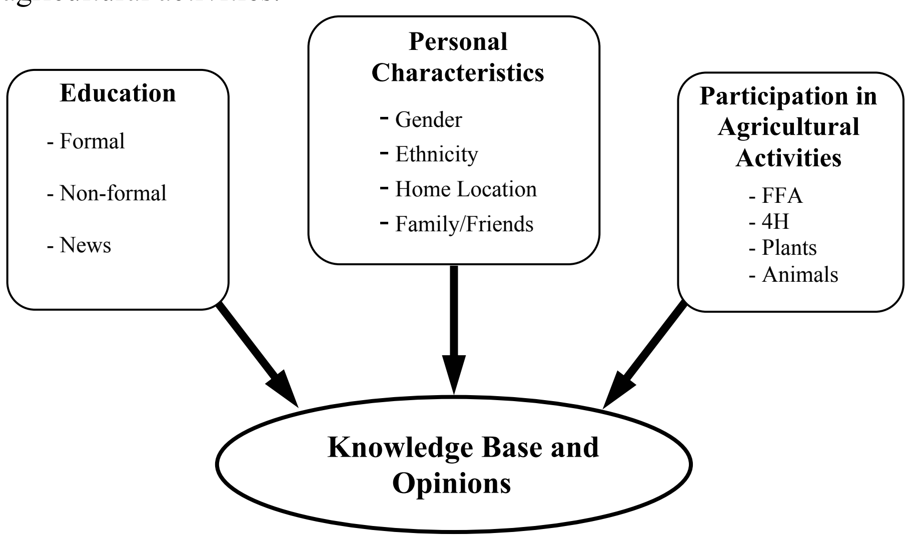

Figure 1. *Conceptual Framework for Agricultural Literacy (Frick & Elliot, 1995)*

For the purposes of this study, the conceptual framework used by Frick and Elliot (1995) was applied, concentrating only on the *News* aspect of the education factor displayed in Figure 1.

Purpose and Objectives

This study evaluated the Texas print media and its coverage of cotton after the distribution of *CottonLink*©, a media resource guide and compare the results to those obtained by Beesley (2003). Objectives developed to guide this study.

1. Identify all articles written about cotton in Texas newspapers for six selected months according to circulation size and geographic region and compare the results to the Beesley (2003) study completed prior to *CottonLink*©
2. Classify cotton articles into categories and compare the results to the Beesley (2003) study completed prior to *CottonLink*©
3. Categorize the sentences in hard news and feature articles using the Hayakawa-Lowry News Bias categories determining bias of judgment statements and compare the results to the Beesley (2003) study completed prior to *CottonLink*©

Methods

For this study, an ex post facto descriptive research design was used. As described by Ary, Jacobs, and Razavieh (1996), descriptive research asks questions concerning the nature, incidence or distribution of educational variables and relationships among these variables. In Ex post facto research, causes are studied after they presumably have exerted there effect on the variable of interest (Gall, Gall, & Borg, 2003). This study examined Texas newspapers coverage of cotton and the level of bias after the *CottonLink*© CD was distributed in August 2003; therefore an ex post facto descriptive design was deemed most appropriate.

Data Collection

The *CottonLink*© project advisory committee helped to identify key words (cotton, cotton textile, boll weevil, and cotton production) that were used by the Texas Press Clipping Service. Articles were collected seven days a week during the selected sixth month period from September 1, 2003 to February 28, 2004. It should not be assumed that these results would be the same during other months of the year.

The Texas Press Clipping Service collected news articles from all 534 Texas newspapers for this study. L. Brooks (personal communication, February 26, 2004) describes the reliability of The Texas Press Clipping Service by stating that all newspapers are physically read by a well-trained staff member. Although Brooks acknowledges that human error is possible, training is an on-going process of the clipping service to ensure accurate data collection. The training is conducted by Brooks to make sure each individual receives the same background training in order for the stories to be evaluated using the same criteria, thus increasing inter-rater reliability. The Texas Press Clipping Service reviews 95% of the newspapers published in the state of Texas. As such, it should be understood that the 5% not covered could be reporting cotton-related articles that would not be included in this study. The six-month data collection period of this study mirrors the time frame used by the Beesley (2003) study during the previous cotton production season.

Data Analysis

For Objectives 1 & 2, the 1,356 cotton-related articles were coded into six different categories by the primary researchers: (a) hard news, (b) features, (c) columns, (d) editorials, (e) industry-provided, and (f) filler. The articles were also coded according to Texas cotton-producing region (Plains, Coastal, and the remainder of Texas; see Figure 2). The articles were further coded according to the month in which it was published.

For Objective 3, only those articles coded as hard news and feature articles were utilized (N=292). A random sample (n=169) was selected to complete the content analysis utilizing the Hayakawa-Lowry News Bias analysis categories. The Hayakawa-Lowry News Bias analysis was originally created by S.I. Hayakawa (1940) to analyze sentences in print media. In this original coding system, sentences were sorted into one of three categories (a) report sentences, (b) inference sentences, and (c) judgment sentences. Hayakawa's method was built upon by Lowry (1971) when he thought it was important to consider reporter bias and attribution of the information. Lowry's developed six categories to add to Hayakawa's method for a total of nine categories, which include: (a) report attributed sentences, (b) report unattributed sentences, (c) inference labeled sentences, (d) inference unlabeled sentences, (e) judgment attributed, favorable sentences, (f) judgment attributed, unfavorable sentences, (g) judgment unattributed, favorable sentences, (h) judgment unattributed, unfavorable sentences, and (i) other sentences (Figure 3).

A panel of three experts from agricultural education and communications, trained in the Hayakawa-Lowry method of content analysis, coded the articles. To insure inter-coder reliability, the articles were coded independently by each expert. When discrepancies in coding decisions were found, the panel members and the researchers met to review the sentences in question and work as a group to achieve consensus.

Results were entered into the same Microsoft® Excel spreadsheet that was used in the Beesley (2003) study thus facilitating comparison on the results. Descriptive statistics were generated and are reported in this paper.

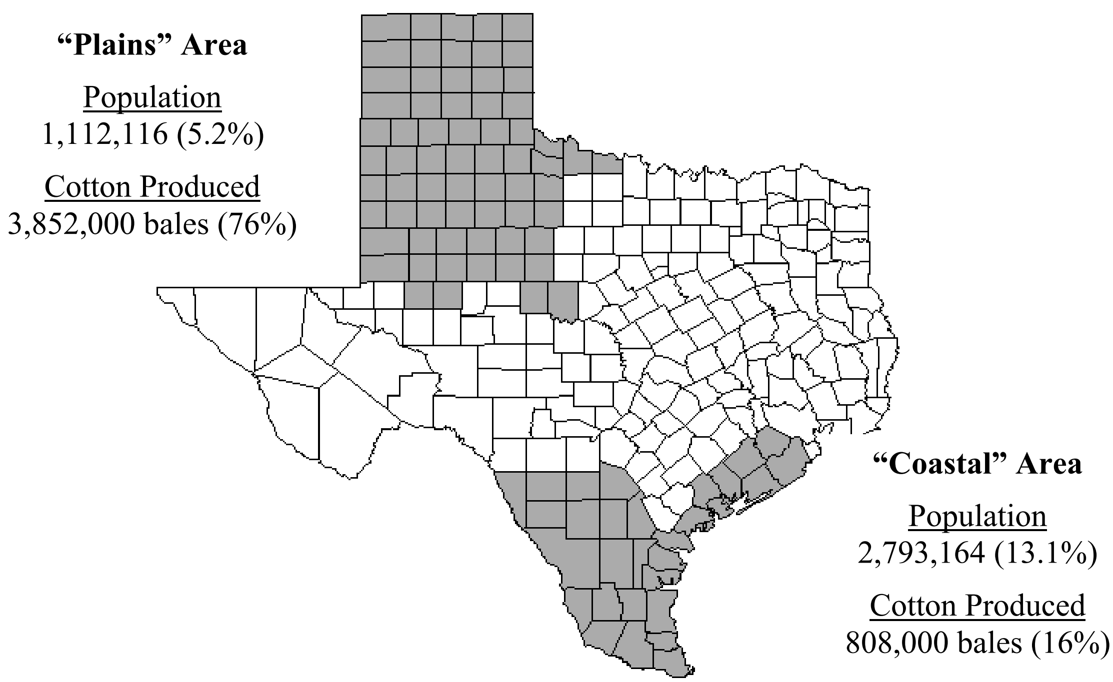

Figure 2. *Primary cotton producing regions of Texas (Doerfert, Beesley, Haygood, Akers, Bullock, & Davis, 2004).*

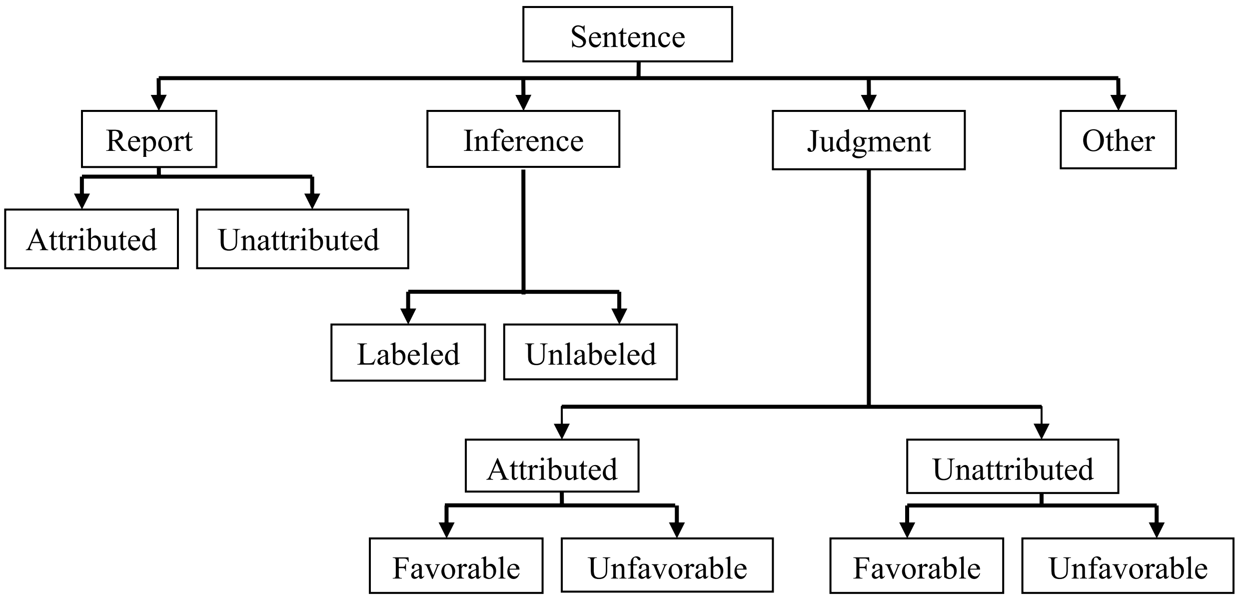

Figure 3. *Hayakawa-Lowry Method (as cited in Haygood, Hagins, Akers & Kieth, 2002).*

Findings

Objective One

Objective one sought to identify all articles written about cotton in 534 Texas newspapers for six selected months according to circulation size and geographic region and compare these finding to the Beesley (2003) study. When compared to Beesley's study (2003), there was an overall increase in the number of news articles written during the 2003-2004 study. A 17.5% (202 clippings) increase was found from the 2002-2003 study which recorded 1,154 cotton-related articles compared to 1,356 articles for this study. When comparing these studies by month, there was a 19.9% decrease in December, the only month to not show an increase. The other months ranged from a 3.6% increase in September to 52.6% increase in January (Figure 3).

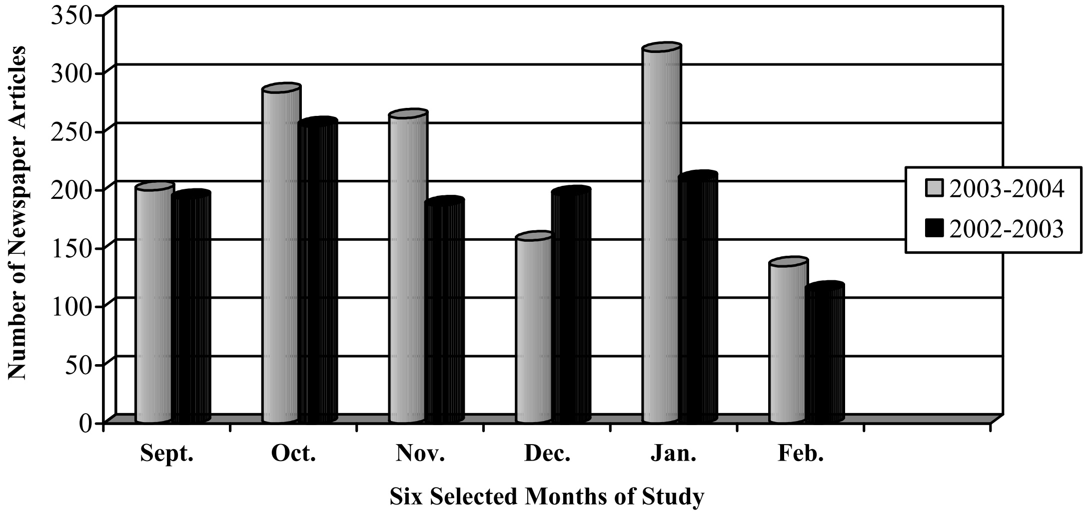

Figure 4 Comparison of Texas Newspaper Coverage of Cotton by Month Between

In the Plains cotton-growing region, 77 of the 81 newspapers reported on cotton during the 6-month study period. The data revealed an overall increase in the number of newspapers reporting on cotton in the three regions for this study: Plains, Coastal, and remainder of Texas. The total number of Texas newspapers publishing cotton-related articles over the period of six selected months was 275 — an increased of 31% from the 206 newspapers publishing cotton stories in the previous year. These 275 newspapers have a circulation of 3,223,280 customers compared to last year's 206 newspapers with a circulation of 1,828,147, showing a 76% increase in circulation to customers.

Objective 2

Objective two sought to classify cotton-related articles into categories. The articles were sorted into six categories by the primary researcher: (a) hard news, (b) features, (c) columns, (d) editorials, (e) industry-provided, and (f) filler. The hard news category included all hard news articles and Associated Press articles. The feature category was made up of special interest stories. Articles that appeared in newspapers daily or weekly were placed in the columns category. The editorial category consisted of editorials and letters to the editor. Industry-provided articles consisted of articles from the Texas Cooperative Extension Service, Texas Department of Agriculture, Texas Boll Weevil Eradication Foundation, and various cotton commodity groups in Texas. Photographs, graphs, and short stories used to fill empty space were placed in the filler category.

Coverage of hard news decreased during the current study, which collected 265 articles compared to the 345 hard news articles collected the previous year (Figure 5). A slight decrease was also found with feature stories. Twenty-seven features were collected in 2003-2004, while 31 were collected in the previous year's study. An increase was found in the number of columns for the current study, which were 106 columns compared to 51 the previous year. There was also a slight decrease in the number of editorials published in the current study. During this study, three editorials were written, compared to six published during the time period of the previous study. Industry-provided articles saw the largest increase from 641 in 2002-2003 to 869 during 2003-2004. A slight increase was also found in the number of filler stories used. Eighty-six filler stories were published during in 2003-2004, while only 82 were published in 2002-2003. The following figure represents the comparison of newspapers by article type.

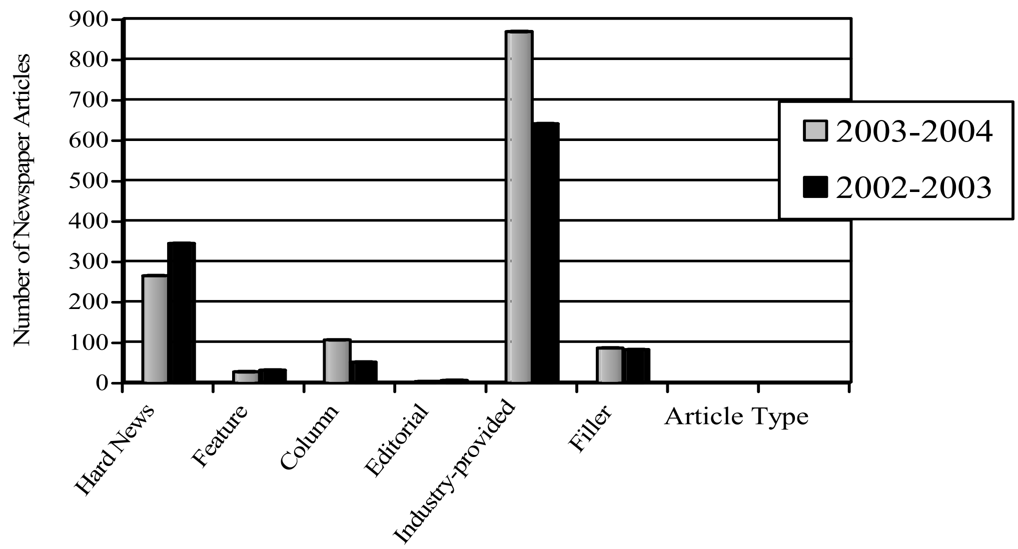

Figure 5 Comparison of Texas Newspapers by Article Type

Objective Three

Objective 3 sough to categorize the sentences in hard news and feature articles using the Hayakawa-Lowry News Bias categories and to determine the level of bias in the judgment statements. The researchers found a decrease in judgment attributed, favorable; judgment attributed, unfavorable; judgment unattributed, favorable; and judgment unattributed, unfavorable when compared to Beesley's (2003) study. Judgment sentences involve reporters inserting their personal bias into a story. Table 1 below depicts a comparison between the numbers of sentences for each category based on the Hayakawa News Bias analysis.

Table 1. *Total Number of Sentences in Each Category of the Hayakawa-Lowry News Bias Analysis*

	Beesley (2003)		Current Study		
Sentence Category	Number of Sentences	Percent of Total	Number of Sentences	Percent of Total	Change
Report, attributed	1,170	25.6	1,359	31.3	↑
Report, unattributed	1,681	36.8	1,430	32.9	↓
Inference, labeled	282	6.2	432	10.0	↑
Inference, unlabeled	281	6.2	326	7.5	↑

Judgment attributed, favorable	460	10.1	421	9.7	↓
Judgment attributed, unfavorable	278	6.1	170	3.9	↓
Judgment unattributed, favorable	145	3.2	75	1.7	↓
Judgment unattributed, unfavorable	132	2.8	45	1.0	↓
Other sentences	137	3.0	85	2.0	↓
Total	4,566	100.0	4,343	100.0	

Conclusions

In a previous study by Beesley (2003), cotton in the Texas print media was measured for objectivity and accuracy. Following Beesley's study, *CottonLink*©, a media resource tool, was disseminated in August 2003 to 534 Texas newspapers. This study sought to determine if the *CottonLink*© media resource tool had an effect on the overall coverage of cotton in the Texas print media. Replicating the methods followed by Beesley's (2003) study, news articles on cotton published from September 2003 to February 2004 were collected, identifying 1,356 articles that corresponded to cotton.

Objective One

Objective one sought to determine the total number of cotton-related articles written in Texas newspapers for six months after disseminating the CottonLink© CD. From September 2003 to February 2004, there were a total number of 1,356 cotton-related articles. Based on the findings of this study, the following conclusions were made:

1. There was an average 226 cotton-related articles per month during the six month period of this study.
2. There was an average of 57 cotton-related articles per week during the six month period of this study.
3. There was an average of 8 cotton-related articles per day during the six month period of this study.
4. There was an increase in the overall number of articles collected during this study. A 17.5% (202 clippings) increase was found when compared to Beesley's (2003) study. An increase in the number of clippings per month was seen in five of the six months of this study.
5. The total number of Texas newspapers increased 31% from 206 during Beesley's study (2003) to 275 during the present study. This study also saw a 76% increase in circulation size from 1,828,147 during the previous study to 3,223,280. The increase in the total number of newspapers exposes more people to cotton-related stories.

Objective Two

Objective two sought to classify cotton articles into categories. A total of 1,356 articles collected during the six month period were coded into six categories by the primary researcher. When examined by categories, the researchers found 265 hard news articles, 27 feature articles, 106 columns, three editorials, 869 industry-provided articles, and 86 filler articles. Based on the findings of this study, the following conclusions were made:

1. The most frequently published articles were industry-provided. The industry-provided category is comprised of news articles provided by agricultural industries. The industry-provided category includes all articles from the Texas Department of Agriculture, Texas agricultural cooperatives and commodity groups, and other various agricultural industries. This category represented 64.10% of the articles during the six month time period.
2. The least frequently published articles were editorials. This category represented 0.22% of the articles during the six month period.

Objective Three

Objective three sought to categorize the sentences in hard news and feature articles by using the Hayakawa-Lowry News Bias categories. Based on the findings of this study, the following conclusions were made:

1. Report sentences made up 64.23% (2,789) of all sentences in this study. These sentences are the most desired because they are factual, verifiable and considered to be unbiased.
2. Unattributed report sentences were the most common occurring category in the sample representing 32.93% (1,430), while 31.29% (1,359) of sentences were attributed to a source.
3. Inference sentences made up 17.45% (758) of the sentences in the sample. These sentences can be subjective and are not immediately verifiable.
4. The majority of the inference sentences were labeled, representing 9.95% (432) of the total number of sentences in the sample. Unlabeled inference sentences made up a mere 7.51% (326) of the total.
5. Reporters used their own expressions or opinions of others creating judgment sentences, which made up 16.37% (711) of the sentences in the sample.
6. When judgment sentences were used by reporters, they were most often attributed to a source with a favorable tone, accounting for 9.69% of the total. Overall, there were more favorable judgment sentences (496) than unfavorable (215) and more attributed judgment sentences (591) than unattributed (120).
7. Sentences that were used as introductory statements in an article were placed in the other sentences category. These sentences made up 1.96% (85) of all sentences.
8. Reporters are including their own opinions when writing articles about cotton.

9. When reporting on cotton, journalists are using more of a favorable bias than unfavorable bias. When evaluating all the judgment sentences in this study, 69.76% were favorable and 30.24% were unfavorable toward cotton.
10. Of the judgment sentences in this study, more are attributed to a source than not. Attributed judgment sentences make up 83.12%, while unattributed judgment sentences make up 16.88%.
11. Fewer judgment sentences were found during this study. A total of 711 judgment sentences were collected in the sample compared with 1,015 during Beesley's (2003) study.

Recommendations

Based on the results of this study, it is evident that there is bias among journalists when reporting on cotton. However, it appears that the *CottonLink*© media resource tool may have had an influence on reducing the amount of bias while increasing the amount of cotton-related news coverage. Therefore the following recommendations should be considered:

1) Research must be conducted to determine if in fact a cause and effect relationship exists with the changes in news coverage (quantity and quality) and the creation and dissemination of agricultural media resource tools such as *CottonLink*©. Lindenman (2003) says there are three main stages to this type of evaluation. This study is the first stage of evaluation known as outputs. These are immediate results that are seen from an activity which were accomplished by this study. The next study should be the outtake stage and should seek to find whether or not the target audience received the message. The final study should examine at outcomes level and will find out whether or not individual's opinion and attitudes changed because of the targeted message.
2) This study should be replicated and not limited to the same six calendar months to see if different results would be achieved for a different time of year.
3) This study should be expanded geographically to include other states in the Cotton Belt.
4) This study should be replicated into other mediums in addition to print media.
5) This study should be expanded to include other agricultural commodities in the state of Texas.

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Evaluating the Effectiveness of the Texas Parks and Wildlife Hueco Tanks State Historic Site Orientation/Conservation Video: A Media System Dependency Theory Perspective

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Abstract

The major purpose of this study was to provide an evaluation of the effectiveness of Texas Parks and Wildlife Hueco Tanks State Historic Site orientation/conservation video and how the video impacted the way people perceived Hueco Tanks State Historic Site through their media dependencies.

A principal components factor analysis of the 16-item dependency scale of the respondents' post awareness levels, using a varimax rotation factor analysis, yielded three underlying concepts or dimensions. The first dimension, passive interest, includes individual orientation, action orientation, solitary play and social play (Cronbach alpha = .87); the second dimension, active interest, includes self-understanding, action orientation and solitary play (Cronbach alpha = .86); and the third dimension, activism, includes social understanding and solitary play (Cronbach alpha = .81). The significant association is important due to the fact that previous media system dependency studies have proposed the existence of six underlying constructs and have not explored personal video dependency relationships.

This study provided a preliminary investigation of the three newly-discovered dimensions of media system dependency and, in the process, extended the knowledge of the relationships state park attendees have with the orientation/conservation video. A significant difference was found between the three pre-program and post-program attitudinal dimensions based upon the newly proposed three dimensions of passive interest, active interest, and activism.

Introduction/Theoretical Framework

Recent trends of wildlife-based recreation in state parks and environmental issues across Texas have contributed significantly to an explosion of knowledge in media communications. Consequently, a demand for program evaluations has been placed upon wildlife programming (K. Loke, personal communication, August 24, 2002).

Texas Parks and Wildlife compiled a Public-Use Restriction Plan in 1998 after evaluating Hueco Tanks State Historic Site's vandalism issues. The park was closed for a period of reconstruction efforts and an orientation/conservation video was developed by the Texas Parks & Wildlife Media Production Department and sent to Hueco Tanks in spring of 2000 for state park attendees to watch before entering the grounds. The mission of Hueco Tanks orientation/conservation video is: (a) to restore and preserve the prehistoric, historic, geologic and natural features of the area; (b) to provide interpretation to the public; and (c) to provide recreational opportunities which are compatible with the preservation goals of the site.

According to Erickson (1969), the response to wildlife and conservation varies, but the basic appeal in anthropomorphic features still exists. As we become older, we have a heightened interest in wildlife preservation and conservation of the vanishing nature. Morris (1969) explains the reason for this is that the older person is about to become extinct and views vanishing wildlife and nature as symbols of an impending death. Their concern for wanting to preserve wildlife and conserve nature reflects a person's desire to extend his own survival. Morris' (1969) observations suggest that the effectiveness of a message about wildlife conservation may be dependent upon the kind of wildlife/nature issues used in the communicator's message.

As a problem with the interaction between man and animal, many wildlife species have been reduced by hunting, trapping or other means of a loss of habitat. Concern for the conservation of wildlife species and the environment has resulted in the establishment of many governmental agencies. These agencies have started realizing that the key element in the survival of wildlife and conservation of nature lay with an informed and educated public.

Powers (1994) stated that if the audience is to meet the needs of wildlife/nature conservation, educational videos must answer the question of whether wildlife programming ever inspires anyone to take active, positive action toward conservation. Ball-Rokeach (1989) defines the media system as "…an information system in control of three types of 'dependency-engendering' information resources…that others have to have access to in order to attain their goals" (p. 9). These three types of 'dependency-engendering' information resources are identified by Ball-Rokeach (1989) as information gathering or information creating, information processing, and information dissemination.

Rogers (1996) explained, "the mass media is the primary sources used by people to gather initial awareness…mass media sources have a great influence upon public perception" (p.215). DeFleur and Ball-Rokeach (1989) stated, "The ultimate basis of media influence lies in the nature of the interdependencies between the media and other social systems and how these interdependencies shape audience relationships with the media. The greater the media dependency in connection with a particular message, the greater the likelihood that the message will alter audience cognitions, feelings and behaviors" (p. 3). Ball-Rokeach and DeFleur (1989) explained that the media system dependency theory predicts a cognitive psychological process that increases the probability of someone being affected by a particular medium. This process begins with either an individual who scans the media to actively decide what he or she wishes to listen to, watch or read, or one who comes into contact with media content.

In step one, active selectors expose themselves to media content that they have reason to expect will help them to achieve one or more of their understanding, orientation or play goals. Their expectations are based upon their prior experience, conversation with family or friends, or cues obtained from media sources. Casual observers encounter media content incidentally with no preformed expectations (e.g., walking into a room where the TV is on). The observers my find that one or more dependency is activated that motivates them to continue exposure. Other observers might not experience dependency activation and exposure will terminate. In step two, variations in intensity of individuals' media dependencies will be a function of differences in their personal goals, their personal and social environments, expectations with regard to the potential utility of the specific media content under consideration, and ease of access to that content. The source of the variation in the intensity of the dependency does not matter; however, the greater the intensity of relevant media dependencies, the greater the degree of cognitive and affective arousal. In step three, involvement refers to active participation in information processing. People who have been cognitively and affectively aroused will engage in the kind of careful processing of information that will allow them to recall or remember the information after exposure. The fourth step, individuals become intensely involved in information processing and are more likely to be affected by their exposure to media content. (Grant, 1989 p. 311)

The step-by-step process of the effects of specific media content on individuals is illustrated in *Figure 1*.

Ball-Rokeach (1984) investigated three primary dimensions of human motivation, including understanding, orientation and play, that individuals have a dependency relationship with the media system. Grant (1989) stated that "the three dimensions are essential to individual welfare, but they are also not mutually exclusive since any media message may serve more than one type of dependency" (p. 33).

Ball-Rokeach (1984) also explored two sub dimensions for each of the three dimensions yielding six types of goal dimensions of media systems dependency relations shown in *Figure 2*. The six sub dimensions include: action orientation, interaction orientation, self-understanding, social understanding, solitary play and social play. The first row refers to individual application and the second row is a more social approach.

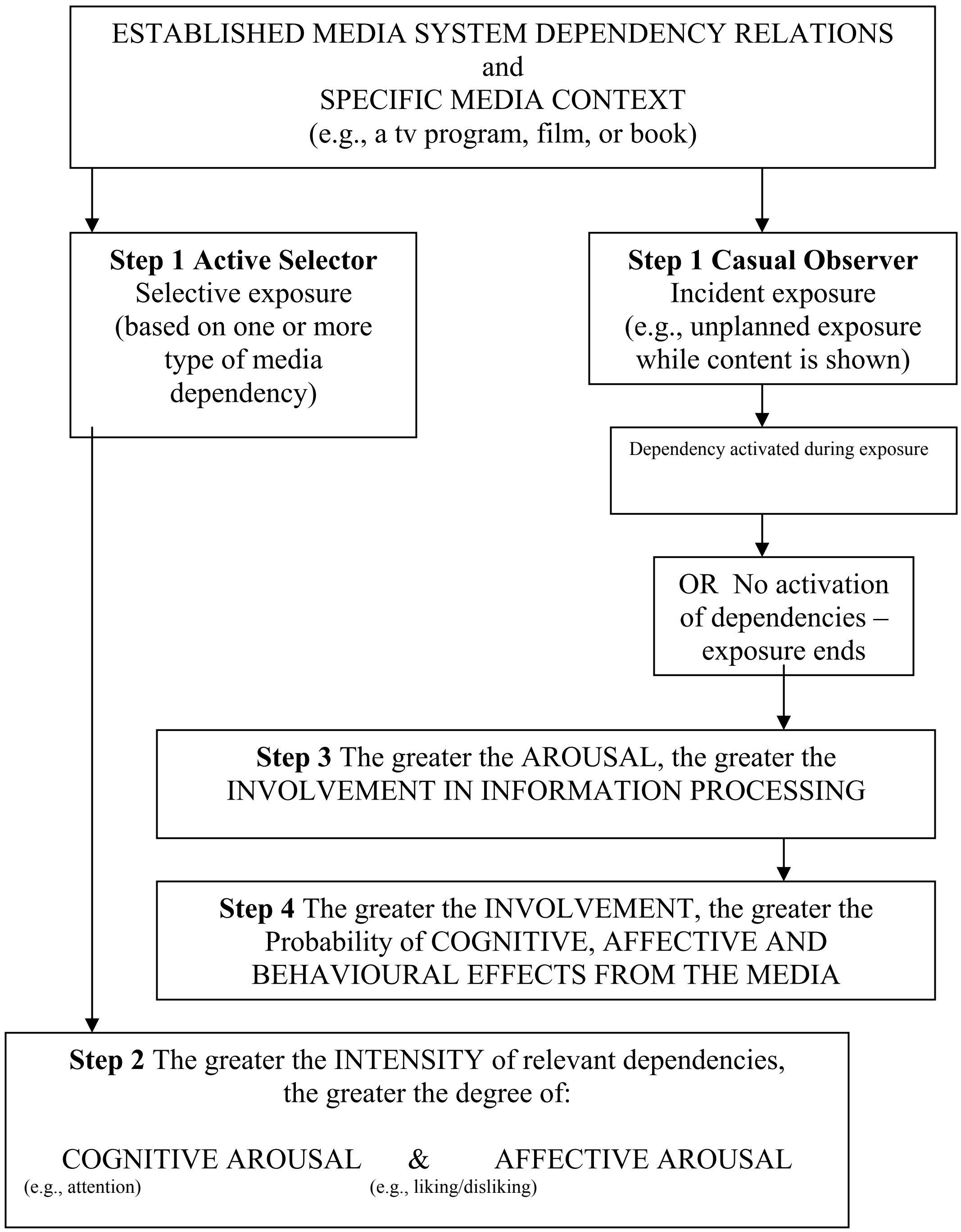

Figure 1. *The Process of Effects of Specific Media Content on Individuals (Grant, 1989)*

Understanding	Orientation	Play
Self understanding Refers to increasing the understanding of who we are. (e.g. learning about your understanding of conservation)	Action orientation Refers to pursuing goals regarding personal behavioral decisions. (e.g. deciding on how to conserve the park)	**Solitary play** Refers to attaining individual goals of enjoyment, escape, etc. (e.g. enjoying conserving the park as an individual)
Social understanding Increasing the understanding of the larger social environment. (e.g. interpreting the conservation message of the park)	Interaction orientation Attaining goals relating to how to interact with other individuals. (e.g. conserving the park while interacting with others)	Social play A shared experience where the presence of others is necessary for attaining goals. (e.g. gain pleasure in conserving park with family/friends)

Figure 2. *Goal Dimensions of Media System Dependency Relation (DeFleur & Ball-Rokeach 1989)*

Purpose and Research Objectives

The purpose of this study was to provide an evaluation of the effectiveness of Texas Parks and Wildlife Hueco Tanks State Historical Site orientation/conservation video. As a means of achieving this purpose, the following objectives were selected:

1. Determine the underlying factors related to the goal dimensions of the media dependency theory.
2. Determine if differences exist between pre and post awareness based on the identified underlying factors.

Methodology

The research design for this study was a one-group pretest-posttest design (Campbell & Stanley, 1963). Although this design leaves much desired in terms of control of extraneous variables, when data are analyzed as repeated measures, subjects serve as their own control, and within-group consistent differences can be detected using an appropriate analysis.

The target population of this study included the Hueco Tanks State Historic Site attendees during the summer season (May 1 – September 30, 2003). All attendees were required to view the orientation/conservation video befor entering the park. In recent history, the average number of attendees oriented for the summer season was 4,113. The researchers used a purposive sample of 270 attendees who voluntarily completed the instrument. Sample data were collected by one of the investigators between July 4 – September 30, 2003. The sample excluded children 15 years of age and younger for competency reasons. All park attendees were informed about the study as directed by the university's human subject's oversight board, as they entered the Hueco Tanks' Interpretation Center prior to viewing the orientation/conservation video. Those agreeing to participate in the study were asked to complete the questionnaire after viewing the video and return their completed questionnaire to the on-site investigator.

The research instrument used for this study was designed after Grant's (1989) media system dependency theory on individuals, and the questions were formatted using a post then pre design allowing respondents to assess their perceived awareness level through a pretest and post test of the same referencing frame. This method minimizes response-shift bias, which can be a source of contamination in self-report assessments (Rockwell & Kohn, 1989). Response-shift bias is a change in an individual's frame of reference because of program participation (Howard & Dailey, 1979; Kistler, 2002).

Part one of the questionnaire was used for the educational assessment of the awareness levels before and after they watched the orientation/conservation video. Sixteen statements about the areas covered by the orientation/conservation video were included in the instrument. Those 16 areas were: conservation is a group effort, protecting plant/animal life, privilege of public access, outdoor recreation activities, participating in tours, conserving Hueco Tanks, park conservation, history of Hueco Tanks, Native American culture, conserving wildlife/nature, conservation responsibilities as an individual, respecting Native American art/history, preserving rock art/pictographs, park rules, preventing vandalism, and human impact on the park. A four-point Likert-type scale was used where 1=low awareness level through 4=high awareness level. The instrument was pilot tested with 30 participants outside the sample. Reliability of the test instrument was measured using Cronbach's alpha. Pre awareness and post awareness level scales were .94 and .93 respectively. Part two consisted of five statements dealing with the satisfaction levels of the orientation video. Respondents were asked to rate their satisfaction levels of the video using a four-point Likert-type scale where 1=Very Dissatisfied, 2=Slightly Dissatisfied, 3=Mostly Satisfied, and 4=Completely Satisfied. Part three included demographic questions.

Principal components analysis was used to establish unidimensionality of the constructs used in the instrument. The researchers utilized a normalization process recommended by Loftus and Masson (1994) to control for unsystematic variance. This process involved computing an average attitudinal score for each subject based upon his/her pre-program and post-program attitudes, then subtracting the grand mean from each individual's average score, and then adding these adjusted scores to the individuals raw pre- and post-attitudinal scores (Field, 2000). Confidence intervals were then calculated at the 95% confidence level on pre- and post-attitudinal scores and error bar charts plotted to contrast the scores. This allowed the researchers to visualize the amount of spread between the two sets of scores. If the visual inspection revealed a considerable overlap between the bars, these samples were unlikely to be different from the population, consequently the treatment video would be deemed as unsuccessful. Conversely, if the error bars were not overlapped, the treatment video would likely be successful in influencing a change in awareness. To verify the plotted results, dependent t-tests were conducted on the raw data as recommended by Field (2000). These series of analyses allowed for the detection of small and consistent differences of the data.

Findings

A principal components factor analysis of the 16-item dependency scale of the respondents' post awareness levels, using a varimax rotation factor analysis, yielded three dimensions. The first dimension, passive interest, includes individual orientation, action orientation, solitary play and social play (Cronbach alpha = .87); the second dimension, active interest, includes self-understanding, action orientation and solitary play (Cronbach alpha = .86); and the third dimension, activism, includes social understanding and solitary play (Cronbach alpha = .81). Factor loadings, eigenvalves and alphas for each factor are reported in Table 1.

Table 1 explains 64.49% of the variance in the original correlation matrix among the 16 items representing the six sub dimensions of personal media system dependency relations. Two considerations are relevant to an interpretation of this three-factor outcome. First, all 16 questions were loaded on all three factors. The first group of questions loaded into the first factor including four of the six sub dimensions of personal media system dependency relations.

Those sub dimensions include individual orientation, action orientation, solitary play and social play. Respondents had a 50% variance dealing with this first group of questions and how they related to the four sub dimensions. The respondents learned about their understanding of conservation, decided on how they were going to conserve the park, realized they could enjoy conserving the park as an individual, and they could gain pleasure in conserving the park with family/friends. The second group of questions loaded into the second factor including three of the six sub dimensions of personal media system dependency relations. Those sub dimensions included social understanding, action orientation and solitary play. Respondents had a 7.23% variance towards the second group of questions and how they related to the three sub dimensions. The respondents once again learned about their understanding of conservation, interpreted the conservation message of Hueco Tanks, and decided on how they were going to conserve the park. The third group of questions loaded into the third factor including two of the six sub dimensions of personal media system dependency relation. Those sub dimensions included social understanding and solitary play. Respondents had a 6.98% variance dealing with the third group of questions and how they relate to the two sub dimensions. The respondents once again decided how they were going to conserve the park, learned they could attain their conservation goals if they interacted with other individuals, and they could gain enjoyment in conserving the park as an individual.

Table 1. *Factor Analysis*[1] *of Television Dependency Scale*

Scale Item (abbreviated)	Factors Passive Interest	Active Interest	Activism
Conserving group (Action Orientation)	.63	.44	.11
Protecting plant/animal life (Solitary Play)	.53	.31	.52
Privileged public access (Interaction Orientation)	.73	.23	.31
Outdoor rec activities (Interaction Orientation)	.84	.21	.19
Participating in tours (Social Play)	.75	.25	.23
Conserving Hueco Tanks (Social Play)	.57	.27	.47
Info on park conservation (Self Understanding)	.30	.71	.14
History of Hueco Tanks (Self Understanding)	.17	.80	.15
Learning NA culture (Self Understanding)	.21	.68	.23
Conserving wildlife/nature (Action Orientation)	.37	.60	.39
Conserving individual (Action Orientation)	.27	.67	.37
Respecting NA art/history (Solitary Play)	.21	.51	.46
Preserving rock art/picot (Solitary Play)	.20	.40	.60
Following park rules (Social Understanding)	8.380E-02	.26	.79
Preventing vandalism (Social Understanding)	.36	.14	.72
Human impact on park (Social Understanding)	.29	.15	.74
Eigenvalue	8.04	1.15	1.12
Percent of variance explained	50.28%	7.23%	6.98%
Reliabilities (alpha) of high-loading items	.87	.86	.81

[1]Principle Components; Varimax Rotation

The second objective was to determine if differences exist between pre and post awareness based on the three underlying factors (passive interest, active interest and activism) of state park attendees whom watched the orientation/conservation video. As indicated in *Figure 3,* a likely difference existed between pre-and post-attitudes based upon a visual inspection of the confidence intervals. The dependent t-test analysis verified that this difference was statistically significant different. The results indicate the passive interest dimension post awareness (M=3.02, SD=.46) was significantly greater than the passive interest dimension pre awareness (M=2.06, SD=.69), t (269) = -24.05, p=.000. The mean difference was -.96 points between the two four-point Likert ratings for passive interest pre and post awareness. Individual's passive interest was enhanced after viewing the orientation video.

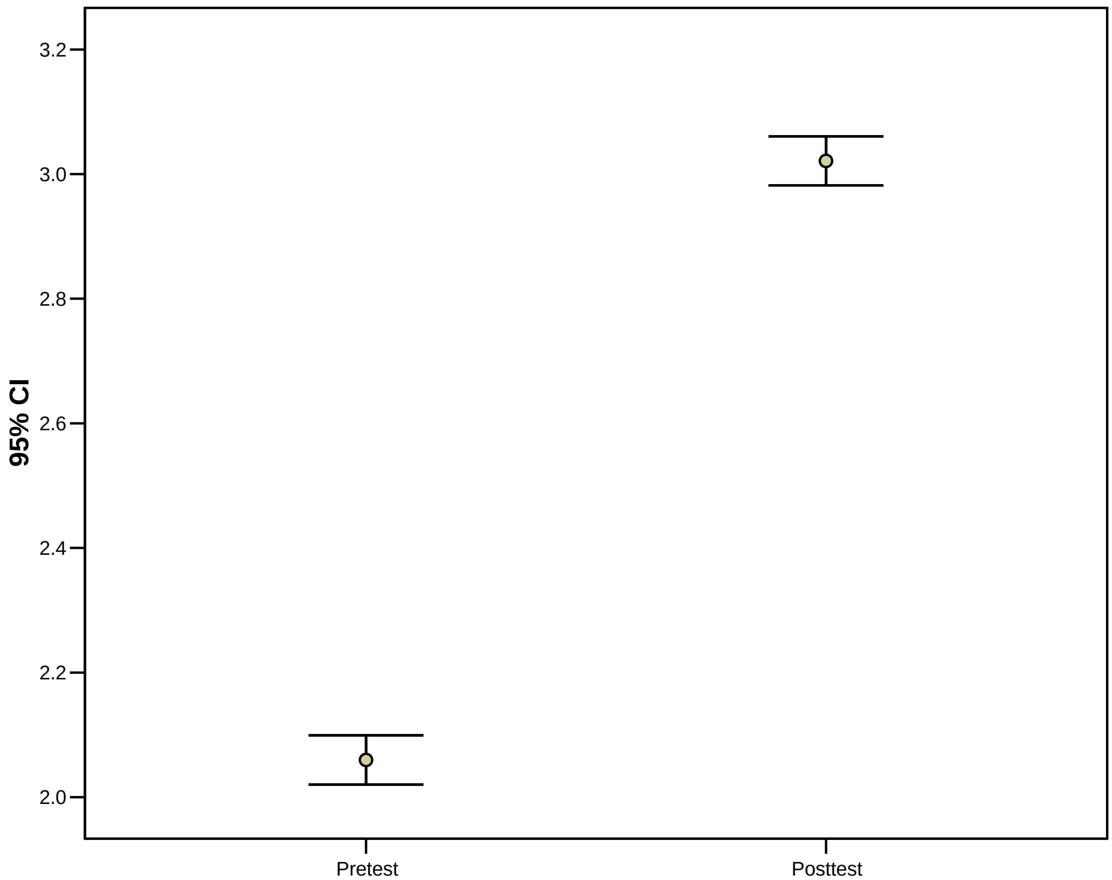

Figure 3. *Confidence Interval of Passive Pre-awareness and Post-awareness Scores (Normalized Data)*

Similarly, active interest dimensions appeared to be different based upon the inspection of the confidence intervals in *Figure 4.* The subsequent dependent t-test was statistically significant different, supporting the visual display. The active interest dimension post awareness (M=3.10, SD=.37) was significantly greater than the active interest dimension pre awareness (M=2.03, SD=.67), t (269) = -27.27, p=.000. The mean difference was -1.07 points between the two four-point Likert ratings for active interest pre and post awareness. Participants' active interest was enhanced after viewing the orientation video.

A comparison of the confidence intervals for the third dimension of activism also revealed a difference *(Figure 5)*. The dependent t-test supported that the comparison between pre- and post awareness was statistically significant. The activism dimension post awareness (M=3.04, SD =.31) was significantly greater than the activism dimension pre awareness (M=2.20, SD=.75), t (269) = -19.34, p=.000. The mean difference was -.84 points between the two four-point Likert ratings for active interest pre and post awareness. Participants' activism was enhanced after viewing the orientation video.

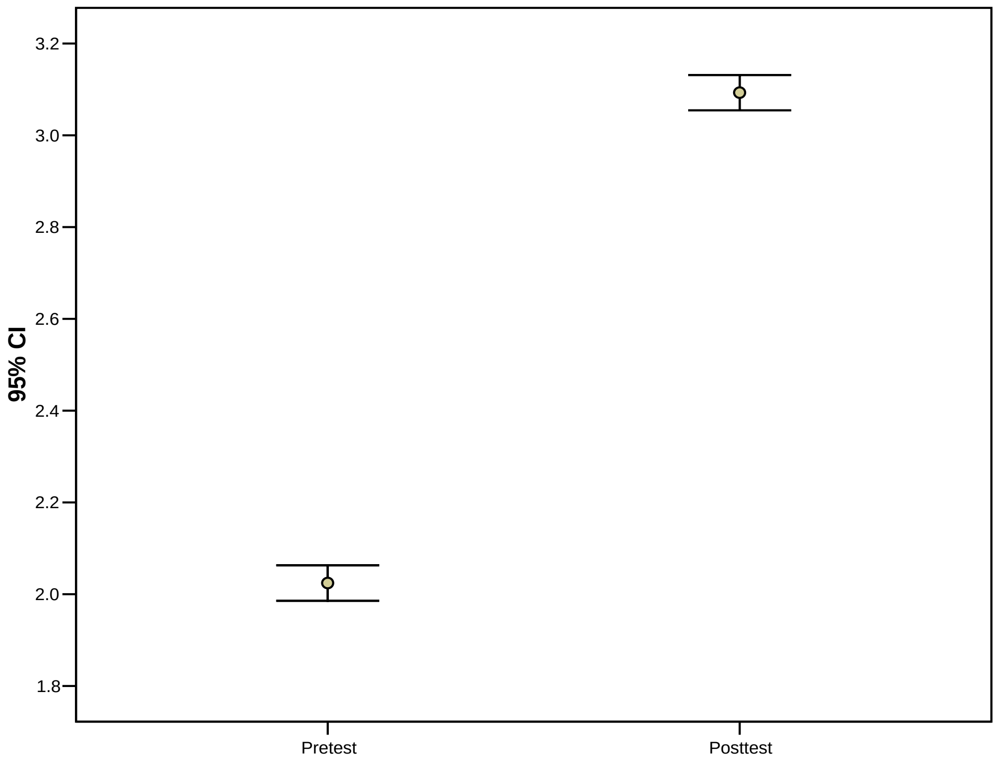

Figure 4. *Confidence Intervals of Active Pre-awareness and Post-awareness Scores (Normalized Data)*

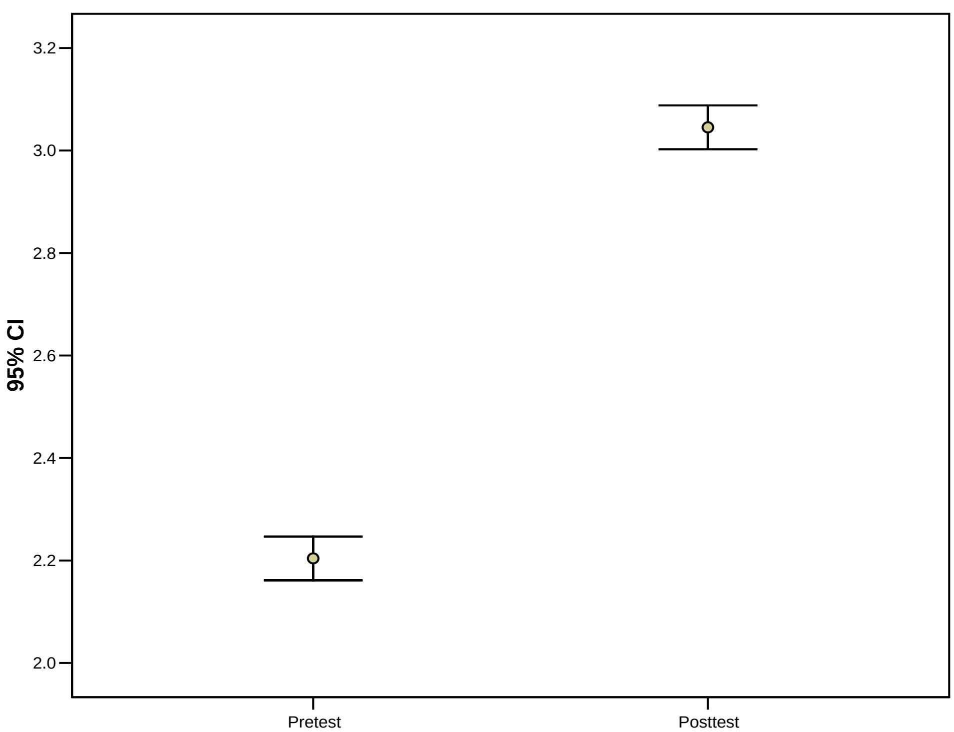

Figure 5: Confidence Intervals of Active Pre-awareness and Post-awareness Scores (Normalized Data)

Conclusions and Recommendations

The researchers recommend that findings of this study be interpreted with caution. Due to limitations in the design of the study, the results may not be generalized to subjects beyond the purposive sample. Having said this, the researchers feel confident that media systems dependency in a natural resources management context consists of the three underlying dimensions of passive interest, active interest, and activism as opposed to six constructs as advanced by DeFleur and Ball-Rokeach (1989). However, this conclusion needs to be supported by additional research that includes a larger sample randomly selected from a population. In addition, the research needs to be replicated using other natural resource management issues and in non-natural resource issues as well.

Items related to solitary play were the common denominator in the three dimensions *(Figure 6).* According to Taylor (1959), play is associated with spontaneous creativity. Spontaneous creativity is often seen in children and is exemplified in drawing and play. Subsequent research should further examine the linkage between spontaneous creativity and media dependency.

The researchers feel confident that the self-perceived, within-subjects attitudinal changes were statistically controlled for and did exist. It appears that based upon the context and complexity of a natural resources-related issue, that an individual could be influenced by an orientation/informational video. However, due to an absence of a control group and the absence of random assignment in this current study, numerous extraneous variables may influenced pre- and post-attitudinal changes between the subjects. For example, motivational levels of subjects are unknown. Most park attendees who completed the subjects were likely more interested in natural resource conservation issues than the general population. In terms of medium, would a video produce the same response as a narrated slide show? Is response based upon message and presentation? Is a response based upon type or complexity of natural resource issue? Subsequent research should be conducted to address these questions.

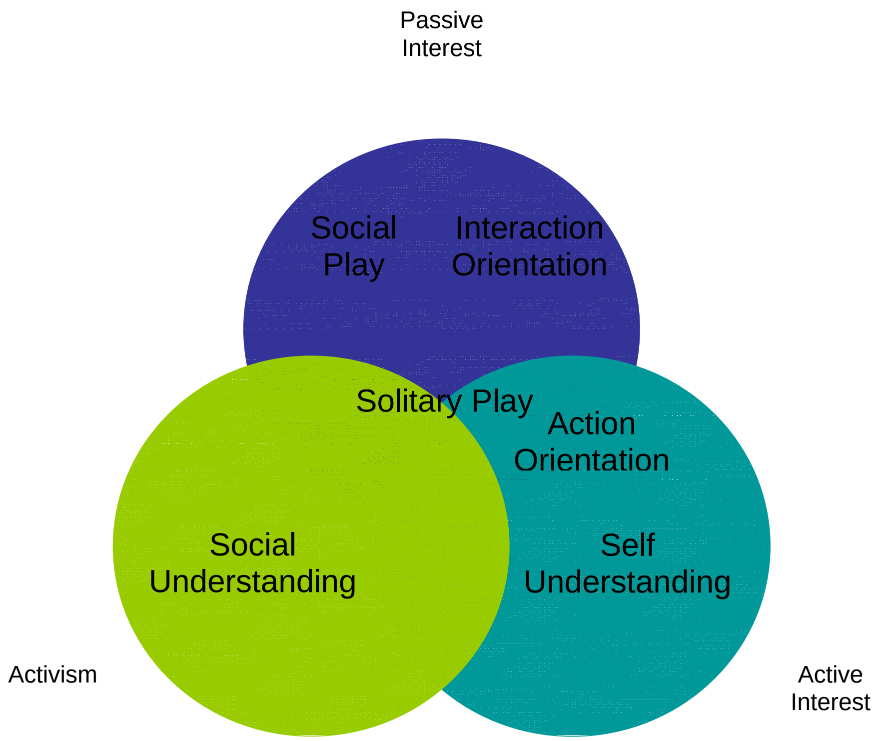

Figure 6. *Three Factors/Goal Dimensions of Media System Dependency Relations*

If subsequent research provides support of this research that is clearly connected to behavioral change of attendees, then park officials should consider mandatory orientation media at similar state parks that need protection.

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“How Would You Like Your Visuals?” - Student Perceptions of the Use of Computer-Generated Animation as Additional Visual Elaboration in Undergraduate Courses

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Abstract

The utilization of visual elaboration has long been a key component of the educational process in agricultural. Exponential technology advancement has allowed the development of new modes of visual elaboration in the form of high-quality computer-generated animation. This study, which is part of an ongoing study, investigated the perceptions of undergraduates who viewed animations in a lecture setting throughout an entire semester. The dual-coding theory was utilized as the investigation’s theoretical framework. This descriptive study utilized undergraduate students (N = 119) over two long semesters that were enrolled in “Agricultural Power Units,” an undergraduate agricultural power technology course. Following each semester of exposure to computer-generated animation a Likert-type survey instrument was administered to participants. Three objectives were developed; benefits to learning, examination performance, and benefits outside of the immediate course. Results indicate students overwhelmingly support the use of animation and believe that it enhances their learning experience. The authors call for replication and further study of the utilization of animation in agricultural topics.

Introduction/Theoretical Framework

Educators in agricultural education have traditionally been blessed with more educational tools than the average classroom teacher. We have prided ourselves on being some of the first to employ such strategies as cooperative learning, active learning, and learner centered environments long before the semantic labels were affixed. Many times we even have a choice of tactics to use and are able to evaluate the use of such strategies, visual aids, or teaching methods based upon the teaching environment and available students. It is good to have choices! What if a paradox developed that challenged us related to a specific tool that we used? What if a method, aid or strategy did not necessarily increase student learning? Would you use it? The obvious answer is of course, "No!" But wait, what if the method, strategy, or aid did not affect learning negatively and students perceived the tool as beneficial to their learning and enjoyed having it as a part of the learning experience?

Computer-generated animation stands poised to be at the center of the potential debate described above. The use of animations in a classroom for the benefit of student learning is nothing less than an empirical contradiction. Studies have found mixed results relating to the true effectiveness of animation as a significant contributor to learning (McGregor, Fraze, Baker, Drueckhammer, & Lawver, 2003; McGregor, Fraze, Baker, Haygood, & Kieth, 2003; Park & Hopkins, 1993; Rieber, 1990a) while many students favor and enjoy learning with animation (Rieber, 1990b, 1991; Rieber, Boyce, & Assad, 1990; Dooley, Stuessy, Magill, & Vasudevan, 2000). The following from Dooley, Stuessy, Magill, & Vasudevan (2000) describes one students feelings about animations that were utilized to teach biochemistry concepts.

> "I love these animations! They truly make learning these processes much easier. Seeing it on paper just isn't enough. It is great to watch and see how it actually works."

To better understand these phenomena, an explanation of the fickle nature of the animation's application, as well as a theoretical foundation is necessary. A computer-generated animation is a series of still computer-generated pictures that are presented in succession in order that the illusion of motion is developed, much like a picture flip-book (Burke, Greenbow, & Windschitl, 1998). Animations differ in that they offer two unique attributes that still pictures do not, trajectory and motion (Rieber, 1991). Therefore, animations represent a subset of instructional visuals (Rieber, 1990a) and receive general theoretical support from information processing learning theories proposed by individuals such as Gagné (1985) and Paivio (1971, 1983, 1986, 1990).

Animations tend to aid in high-level cognition situations such as problem solving, incidental learning, critical thinking, etc., rather than aiding students in low-level recall (Baek & Layne, 1988; Agnew & Shinn, 1990; Rieber, 1990a; Rieber, Boyce, & Assad, 1990; Mayer & Anderson, 1991, 1992; Park & Hopkins, 1993; Williamson & Abraham, 1995; Nicholls, Merkel, & Cordts, 1996). According to Park and Hopkins (1993), if a lesson is limited to low-level learning tasks, animations have the same effect as still illustrations. We also know from the literature that animations are specialized and must be used in the correct context, situation, and the appropriate philosophical perspective, (Rieber & Hannafin, 1988; Rieber, 1990a; 1990b; 1991; LoPresti & Garafalo, 1992; Park & Hopkins, 1993; Williamson & Abraham, 1995;

Nicholls, Merkel, & Cordts, 1996; Dooley, Stuessy, Magill, & Vasudevan, 2000) as well as with the appropriate learner (expert vs. non-expert learners, experienced vs. non-experienced learners, low-spatial vs. high-spatial ability learners, younger vs. older learners, etc.) or their effects are negated (Mayer, 1989; Rieber, 1990a; 1990b; Rieber, Boyce, & Assad, 1990; Park & Hopkins, 1993; Mayer & Sims, 1994; Williamson & Abraham, 1995; Mayer, 1997; Dooley, Stuessy, Magill, & Vasudevan, 2000). Next, through the work of Richard Mayer and others, we know that animations need narration to be most effective; preferably the narration and animation are delivered simultaneously (Rieber, 1991; Mayer & Anderson, 1991; 1992; Park & Hopkins, 1993; Burke, Greenbow, & Windschitl, 1998). It has also been found that animations can reduce the time it takes to complete a defined task such as model construction or test taking (Rieber, Boyce, & Assad, 1990; Park & Hopkins, 1993). Although there are not vast amounts of empirical evidence, animations have also been found to be excellent attention-gaining devices in the classroom (Baek & Layne, 1988; Park & Hopkins, 1993). Finally, we know that students view animation favorably, that animation helps to motivate students, and that practice can affect how students learn with animation (Peters & Daiker, 1982; Rieber, 1990a, 1990b, 1991; Nicholls, Merkel, & Cordts, 1996; Rieber, Noah, & Nolan, 1998; Rueter & Perrin, 1999; Dooley et al., 2000).

Primary theoretical support for the use of animations, as well as still illustration, and their effects on learning comes from the dual-coding theory (Pavio, 1971, 1983, 1986, & 1990). According to this theory, information is processed and represented by two separate codes known as verbal codes and non-verbal codes. The theory argues that humans understand the world around them through language and non-verbal objects and occurrences. Language is categorized as incoming and outgoing and shares a symbolic relationship to the non-verbal, which can be representative of such things as objects, events, and behaviors. The non-verbal code includes all information that can be processed from the senses, which includes non-verbal sounds. These verbal and non-verbal codes can be encoded information from a human's environment individually or simultaneously.

Verbal and non-verbal coding systems work as a sort of two-lane road in which information travels. As information travels along this roadway, many connections are developed during the process of cognition. As information is acquired, representational connections are made to verbal or non-verbal information received by the learner. These connections are exactly as their name implies, they are representative schema that activate prior knowledge or experiences that the learner may have in relation to what is being learned. For example, if a student views a brightly colored rubber orb, the structure is representative of a ball used for play, representation is developed between what is experienced by the senses and the individual's sense representation for what is experienced. Associative connections are made within the verbal and non-verbal "lanes," respectively, that is, actual words and an individual's verbal representations of the words are developed and connected. Also, words that may be associated to one another tend to make connections as well (i.e., the word tabby may also activate the word feline). Non-verbals are also connected associatively. Just as with words, smells may conjure visual memories or the sight of certain objects may cause flashbacks to scenes experienced by an individual. Put simply, associations are made, and words are related to other words and images to other images of the same or different sense perception mode (Pavio, 1971, 1986; Clark & Pavio, 1991). The third types of links are referential connections, which are connections that cross over "lanes" in order to create links between the verbal and non-verbal information. These types of connections are championed by supporters of multimedia instruction for the argument that if information is coded verbally, as well as through another sense such as sight (visually), the information is more likely to be remembered because one representation or reference can activate another. "When information is dually coded, the probability of retrieval is increased because if one memory trace is lost, another is still available" (Rieber, 1991, p. 319). Figure 1.1 is a visual representation of the dual-coding theory.

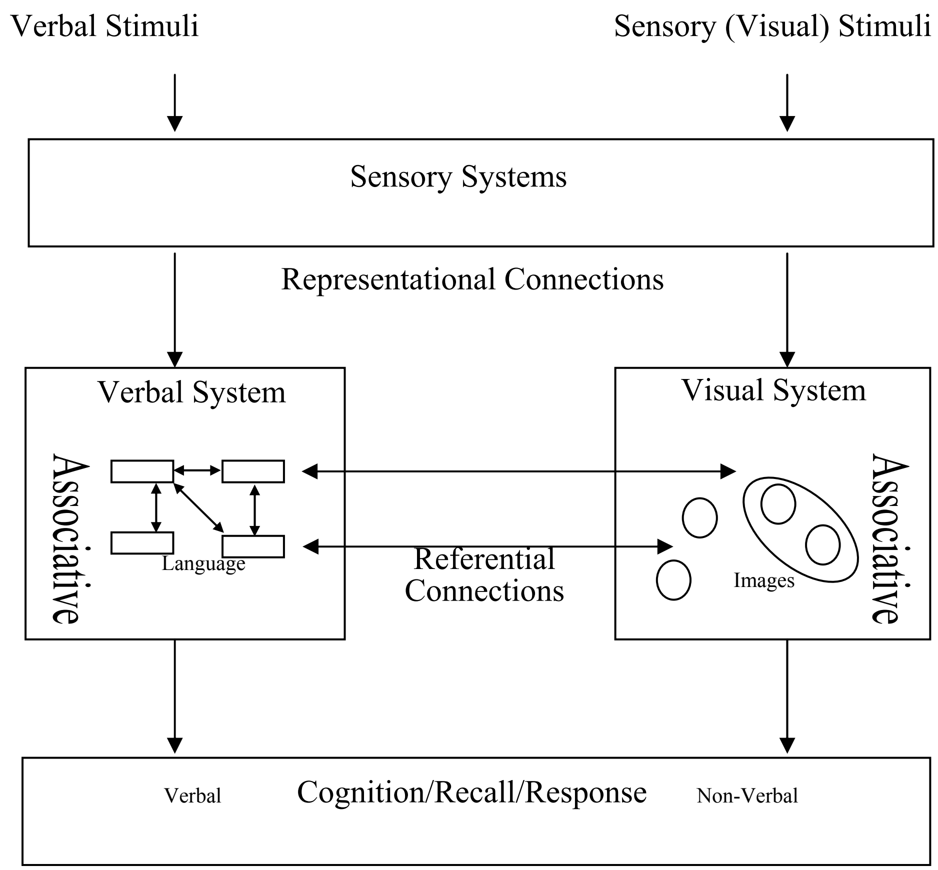

Figure 1. *A dual-coding model for processing animation and speech. Adapted from* <u>*Mental Representations: A Dual-Coding Approach*</u>*, Pavio, 1990.*

Purpose and Objectives

The purpose of the study was to describe the perceptions, held by students, of animations used throughout an undergraduate course. Undergraduate students enrolled in an agricultural power technology course were exposed to animation as a visual aid and studied in order to determine if the animations were desirable when compared to the traditional barrage of visuals used in the course. Consequently, the following research objectives were formulated:

1. Determine if students perceived animation to be beneficial to their learning.

2. Determine if students perceived animation to be beneficial to their examination performance in the course.

3. Determine if students perceived animation to be beneficial outside of this specific course.

Methodology

This descriptive study utilized a population that consisted of undergraduate students in Colleges of Agriculture whose major course of study requires an agricultural power course and/or students that may have a particular interest in an agricultural power course. Students self-selected themselves for the study by registering for Agricultural Engineering 2013 – Agricultural Power Units, which is offered every fall and spring semester of the year. A self-selected census (N = 119) was utilized for the study.

The data were collected during the fall semester 2003 and the spring semester of 2004. The course was scheduled for 9:25am-10:40am, Tuesday/Thursday and animations were used during every active course meeting during the semester. A lecture-style presentation was the most common teaching method utilized during the semester. All lectures were complimented with a Power Point® presentation with animations and still illustrations embedded in the presentation. Realia (equipment models, parts, and cutaways) were also utilized throughout the entire semester. The primary mode of student evaluation was through written exams. Exams consisted of multiple choice, true/false, matching, and short answer questions.

Participants were asked to indicate their level of agreement to statements posed on the instrument. Respondents marked the level of agreement to statements related to the use of animation in the course on a four-point Likert scale. Level of agreement selection items were labeled as strongly agree, agree, disagree, or strongly disagree. Responses were coded with 3 representing strongly agree and 0 representing strongly disagree.

The instrument was a researcher-developed instrument, which focused on student learning, student evaluation, and students' desire to use animation in other courses. The instrument was tested for face and content validity by a panel of experts in agricultural education. The reliability of the instrument was calculated using Cronbach's alpha, which yielded a reliability coefficient of $\underline{r}$=.96.

Following collection, data were entered into SPSS for Windows® and analyzed. All data were analyzed and presented in the form of counts, percentages, means, and/or standard deviations. Demographic data related to gender, age, cumulative GPA, and classification.

Results/Findings

Following analysis of all valid cases, it was found that 76 participants were male (61.8%) and 45 (36.6%) were female. The average age of the participants was 20.81 years (SD= 2.9) and the average cumulative GPA for all participants was 2.54 (SD=.55) on a 4.0 scale. Of the students who participated in the study, 22.0% were freshmen, 30.9% were sophomores, 33.3% of the participants were juniors, 8.1% were seniors, and 1.6% were graduate students.

Objective One

Objective one was to determine if students perceived animation to be beneficial to their learning. Five questions from the instrument were used to measure students' perceptions relating to the information to be learned in the course. Table 1 summarizes the instrument items used in objective one along with their means and standard deviations.

Table 1. *Students' Perception of Animation's Benefit to Learning*

Instrument Statement	Mean	SD
I feel that computer-generated animations increased my understanding of agricultural power topics.	2.61	.52
Computer-generated animations allowed me to learn more information during the course.	2.50	.54
The animations used in class helped me pay attention to the material as it was presented.	2.55	.56
I can create a mental image of an animation that I viewed in class and describe the process that it illustrates.	2.26	.60
The animations used in class were distracting.	.51	.57

SA – Strongly Agree (3); A – Agree (2); D – Disagree (1); SD – Strongly Disagree (0)

According to Table 1, participants overall agreed or strongly agreed that animation affected their learning in a positive way when considering understanding of concepts, amount of information learned, attention focusing, and mental imagery. However, students disagreed or strongly disagreed with the notion that animation was distracting.

Objective Two

Objective two was to determine if students perceived animation to be beneficial to their examination performance in the course. Four questions from the instrument were used to measure students' perceptions relating to examination performance. Table 2 summarizes the instrument items used in objective one along with their means and standard deviations.

Table 2. *Students' Perception of Animation's Benefit to Examination Performance*

Instrument Statement	Mean	SD
I used computer-generated animations on the Internet to study for tests during the course.	1.75	.78
I used a mental picture of the animations presented in class while taking a test.	2.17	.65
I believe that the animations I viewed in class helped me retain information longer.	2.41	.57
Viewing animations has had positive effect on my grade in this course.	2.44	.73

SA – Strongly Agree (3); A – Agree (2); D – Disagree (1); SD – Strongly Disagree (0)

Table 2 indicates that most students agree or strongly agree that animations positively affected their examination performance when considering mental imagery, retention, and course grade. However, there was less agreement with the statement concerning the use of animations on the Internet in order to study for examinations.

Objective Three

Objective three was to determine if students perceived animation to be beneficial outside of this specific course. Two questions from the instrument were used to measure students' perceptions relating to the value of animation outside of the immediate course. Table 3 summarizes the instrument items used in objective one along with their means and standard deviations.

Table 3. *Students' Perception of Animation's Value Outside of the Immediate Course*

Instrument Statement	Mean	SD
Computer-generated animations should be used in other courses.	2.74	.53
I will seek out animations for future courses even if the teacher does not utilize them.	1.99	.59

SA – Strongly Agree (3); A – Agree (2); D – Disagree (1); SD – Strongly Disagree (0)

Table 3 indicates that most students agree or strongly agree that animation should be utilized in other courses. However, there was less agreement with the statement concerning students' willingness to seek out animations for use in other courses.

Table 4 is a summary of all participants' responses to each statement contained in the instrument. Responses are reported as percentages of student agreement to each statement.

Table 4. *Summary of All Student Responses by Percentage*

Instrument Statement	SA	A	D	SD
I feel that computer-generated animations increased my understanding of agricultural power topics.	63.0%	35.3%	1.7%	0.0%
Computer-generated animations allowed me to learn more information during the course.	51.3%	47.1%	1.7%	0.0%
Computer-generated animations should be used in other courses.	58.0%	39.5%	1.7%	0.0%
I used computer-generated animations on the Internet to study for tests during the course.	16.8%	45.4%	33.6%	4.2%
The animations used in class helped me pay attention to the material as it was presented.	58.8%	37.8%	3.4%	0.0%
The animations used in class were distracting.	0.0%	3.4%	44.5%	52.1%
I used a mental picture of the animations presented in class while taking a test.	29.7%	58.5%	11.0%	0.8%
I believe that the animations I viewed in class helped me retain information longer.	44.9%	50.8%	4.2%	0.0%
I can create a mental image of an animation that I viewed in class and describe the process that it illustrates.	34.5%	57.1%	8.4%	0.0%
Viewing animations has had positive effect on my grade in this course.	36.1%	54.6%	7.6%	0.8%
I will seek out animations for future courses even if the teacher does not utilize them.	16.8%	65.5%	17.6%	0.0%

SA – Strongly Agree; A – Agree; D – Disagree; SD – Strongly Disagree

Conclusions/Recommendations

The results of the study indicate that students view computer-generated animations in a very positive light. Students find animation to be beneficial to learning, believe them to aid in performance, and are motivated to use them. All of these findings are supported by previous works searching to quantify the benefits of computer-generated animation in relation to student learning (Park & Hopkins, 1993; Peters & Daiker, 1982; Rieber, 1990a, 1990b, 1991; Nicholls, Merkel, & Cordts, 1996; Rieber, Noah, & Nolan, 1998; Rueter & Perrin, 1999; Dooley et al., 2000). However, empirical evidence still remains inconclusive in regard to the significant learning effects offered by animation even with the existence of student adoration (McGregor, Fraze, Baker, Drueckhammer, & Lawver, 2003; McGregor, Fraze, Baker, Haygood, & Kieth, 2003; Park & Hopkins, 1993; Rieber, 1990a).

Interestingly, results indicated that students were motivated to attend to information, believed that animation benefited their understanding of the topic, and felt confident in their ability to create mental images of animations for the purposes of recalling information. All of these actions were results of the instructor providing the stimulus. Furthermore, when asked if they sought animations for study purposes or would seek for them in future courses, a majority of students were willing to agree with the statements as posted in the instrument. In both of these instances a majority of students would feel compelled to take a greater level of responsibility for their learning.

Although the results of this study are favorable, the authors would like to advise readers to approach the findings with caution. Findings were based upon a subset of students from a limited geographical location in the United States. Also, generalizability could also be limited due to the study's sample size and limited available population. Furthermore, the authors would like to call for further research in this immediate area. First, this study should continue to be replicated each semester in order to reinforce these findings. Second, plans have been made for the investigation of student perception in comparison to actual achievement. Finally, the authors would like to compare students' perceptions of the use of animation in this setting with their individualistic learning styles.

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An Assessment of Life Skills Gained from Youth Exhibiting Beef, Swine, Sheep or Goat 4-H Projects

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Abstract

The purpose of this study was to determine the life skills gained by youth exhibiting beef, swine, sheep, or goat 4-H projects using a mailed survey technique. It was an ex post facto approach and correlational design. A 5% random sample was used to gather information from parents of youth exhibiting these projects. A total of 545 responses (35.2%) were returned for analysis. The scale used to measure thirteen life skills (1 = Not Influential At All, 2 = Mildly Influential, 3 = Moderately Influential, 4 = Highly Influential, and 5 = Essential). Beef respondents revealed accepting responsibility, setting goals, and develop self-discipline as the top three life skills influenced by exhibiting the beef project. Swine respondents noted accepting responsibility, develop self discipline and self motivation as their top three life skills. Sheep respondents yielded accepting responsibility, setting goals, and develop self-discipline as their top three life skills. Goat respondents noted accepting responsibility, build positive self esteem, and develop self-discipline as their top three life skills. Statistically significant (p<.05) low relationships were found between life skill development and years of exhibition for all thirteen life skills measured. Respondents indicated that life skills were being developed as a result of exhibition of these projects.

Introduction/Theoretical Framework

Boyd, Herring, and Briers (1992) said that the development of life skills through experiential learning is the cornerstone of the 4-H program. Brock (1992) reported the major life skills that are needed to function in the workplace through SCANS Report. Brock (1992) said that competent workers will be characterized by their basic skills, thinking skills, and personal qualities. Basic skills were defined as reading, writing, arithmetic/mathematics, speaking, and listening. Thinking skills were defined as ability to learn, creative thinking, decision making, problem solving, seeing things in the mind's eye, knowing to learn, and reasoning. Finally, personal qualities were defined as responsibility, self-esteem, self-management, sociability, self-management, and integrity/honesty (Brock, 1992).

The life skill development of youth exhibiting livestock 4-H projects is a common question from stakeholders of Cooperative Extension. There have been two recent manuscripts that have discussed general themes to determine benefits for exhibiting livestock. Davis, Kieth, and Fraze (2001) developed a study to validate the perceived benefits of competitive livestock exhibition by Texas 4-H members by qualitative means. The design of this study consisted of family interviews of youth exhibitors at the Houston Livestock Show & Rodeo. After categorizing and coding the results, the authors indicate that six major benefits surfaced as a result of competition through showing livestock: (1) social relations, (2) character, (3) family, (4) competition, (5) learning new cultures and environments, and (6) helping finance the youth's education. A follow-up article by Kennedy (2001) quoted a youth in Wharton County who said "I learned to be a winner all the way around - whether you are a ribbon winner or not. Translating to the real world - life is full of surprises - but you stay level headed and keep going " (p. 17-19).

Ward's (1996) study asked 4-H alumni in New Jersey to reflect on the impact exhibiting livestock projects had on the development of life skills. The specific life skills that were asked included ability to make decisions, development of a spirit of inquiry, ability to relate to others, maintaining of records, public speaking, give positive self esteem, and help accept responsibility. A five-point Likert scale was used to answer these questions. The scale was defined as 1=no influence and 5=great deal of influence. Fifty-two alumni responded to the mailed survey. The highest mean results revealed: help accept responsibility, ability to relate to others, spirit of inquiry, decision making, public speaking, maintain records, and give you a positive self-esteem as the highest life skills. Ward (1996) concluded that the 4-H animal science program does have a positive influence on life skill development.

Rusk, Martin, Talbert, & Balshweid (2002) sought to determine life skills gained from participation in the 4-H livestock judging program in Indiana. A questionnaire was sent to former 4-H youth who participated in livestock judging from 1975 to 1995. One hundred eighty five of 294 former livestock judging participants completed the mailed questionnaire. Ten life skills were selected from the Secretary's Commission on Achieving Life Skills (SCANS) report (Brock, 1992). The ten life skills that were selected were decision making, ability to verbally defend a decision, livestock industry knowledge, oral communication, organizational skills, problem solving, self-confidence, self-discipline, self motivation, and teamwork. The scale used to measure the influence livestock judging had on life skills was developed McCann and

McCann (1992). The five points were: 1 = *not influential at all*, 2 = *mildly influential*, 3 = *moderately influential*, 4 = *highly influential*, 5 = *almost essential* to the ultimate development of this attribute. The ranked order by mean scores was: verbally defend a decision, industry knowledge, oral communication, decision making, self-confidence, problem solving, teamwork, self-motivation, self-discipline, and organizational skills. Rusk et al. (2002) concluded that the Indiana 4-H livestock judging program has positively impacted the lives of its participants. This includes making personal and professional contacts to develop life skills necessary to live a productive life as an adult.

Purpose and Objectives

The purpose of the study was to determine the life skills gained by youth participating in the 4-H beef project in Texas by asking parents to address the life skill development of their children. The objectives were more specifically defined as:

1. Determine the life skills gained by youth participating in 4-H livestock projects as perceived by their parents;

2. Measure the relationship between individual life skills and days of ownership of 4-H livestock project; and

3. Measure the relationship between individual life skills and years of participation in 4-H livestock projects.

Methods and Procedures

This study was approved by the Institutional Review Board-Human Subjects in Research, Texas A&M University (project # 2002-307). The study used an ex post facto approach and a correlational design. The purpose of the correlational research was to evaluate the relationships between variables by using correlational statistics (Gall, Borg, & Gall, 1996).

Population. The target population was defined as parents of 4-H youth exhibiting beef, swine, sheep, or goat projects. Texas 4-H (2000) revealed that there were 31,002 youth who completed the enrollment form and said that they had intentions during 2001 to own a beef, swine, sheep or goat project. Parents of these 31,002 youth were considered the accessible population for this study. The 4-H project breakdown by specie was beef = 6,347; swine = 11,561; sheep = 5,130; and goat = 7,964. These youth were described as 4-H members ranging in age from 8-19 and were in 3rd to 12th grade in school. Youth names and mailing addresses were generated from the Texas 4-H enrollment report and placed into a data base management system for each of the four projects. This database served as the sampling frame for this study.

A simple random sample was used as the sampling procedure for this study. Therefore, a 5% random sample was drawn for each livestock project. This yielded the following sampling totals for the populations for each project: beef=317 selected respondents; swine=578 selected respondents; sheep=256, and goat=398.

*Instrument***.** A mailed questionnaire was used to collect data. Each of the four questionnaires asked the same information. The questionnaire was designed to collect the perceived life skills gained from youth exhibiting beef, swine, sheep, or goat 4-H projects. The specific life skills measured are listed below: decision making, ability to relate to others, develop and maintain records, accepting responsibility, build positive self esteem, self motivation, knowledge of the livestock industry, develop organizational skills, ability to problem solve, develop oral communication skills, setting goals, develop self-discipline, and working in teams.

Respondents were asked to provide their perceptions of the magnitude for life skill development as a result of raising the 4-H beef project. The scale was slightly modified from Rusk et al. (2002) and was defined as 1 = *Not Influential At All*, 2 = *Mildly Influential*, 3 = *Moderately Influential*, 4 = *Highly Influential*, and 5 = *Essential*. A second section was included to ask background information and demographic information.

The questionnaire was developed with input from fourteen Texas Cooperative Extension employees at Texas A&M University and one individual from Texas Tech University. More specifically, these individuals included: three faculty members in the Department of Agricultural Education, three faculty members from the Department of Animal Science, one faculty member from the Department of Agricultural Economics, three faculty members from the 4-H & Youth Development Program, four County Extension Agents-Agricultural & Natural Resources, and one faculty from the Department of Agricultural Education and Communications at Texas Tech University. As suggested by Gall et al. (1996), face and content validity were assessed by these fourteen individuals.

Twenty-five students from Texas A&M University enrolled in Animal Science 315 (Principles of Livestock Evaluation) were used to pilot the instrument. These respondents evaluated the instrument to assess for face validity. Several noted instructions and wording that were unclear to the reader. These students were also asked to complete the instrument and turn it in to the researcher with only the instructions provided in the document. Reliability (internal consistency) of the life skill development scale was estimated from these data. SPSS 11.0 for Windows was used for analysis. A Cronbach=s coefficient alpha was computed to be .87 for the thirteen statements in the life skill development section. As a result of this pilot test, final corrections were made and the instrument was deemed ready for mailing.

Procedures outlined in Dillman=s Tailored Design Method were used for mail survey implementation and data collection (Dillman, 2000). Each questionnaire was identified with an identification number keyed to each of the participants. This number was used to identify and follow-up with nonrespondents. Two follow-up notifications were sent to participants. After six weeks, a second complete packet was mailed to each nonrespondent. Throughout survey implementation, returned letters and packets with incorrect addresses were updated, where possible, and re-mailed.

Handling nonresponse error. To handle nonresponse error, the researcher used procedures outlined by Lindner, Murphy, and Briers (2001). This encompassed contacting nonrespondents to compare their data to respondents. A phone survey was developed to gather data for comparison. One-hundred, twenty sets of parents of youth participating in the 4-H beef, swine, sheep, and goat project were randomly selected from the nonrespondent database for participation (n = 30 for each project area). After random selection, the researcher contacted parents to interview using a phone survey. After data collection was complete, comparisons between respondents and nonrespondents were computed. Differences between respondents and nonrespondents were examined using an independent samples *t* test. No significant differences ($p > .05$) were calculated comparing respondents and nonrespondents.

Data Analysis. SPSS 11.0 for Windows software was used for data analysis. Descriptive statistics were used to summarize data. Frequencies, percentages, central tendency measures, and variability were used to describe the data. To determine the extent of the relationships between parents of youth participating in the 4-H these projects and the life skills gained, inferential correlational or comparative techniques were used. These techniques included analysis of variance. Confidence intervals and tests for statistical significance were set *a priori* at the 0.05 level.

Results/Findings

Overall, 1,549 surveys were mailed and 545 responses were returned (35.2%). The individual 4-H project response rate was beef = 41.9%, swine = 29.6%, sheep = 39.8%, and goat = 35.6%.

Profile of Participants/Respondents. Participants were parents of youth involved in beef, swine, sheep, or goat 4-H projects. These data that were reported reflect the parents' responses to questions/ statements concerning their children's participating in these projects. Five questions were asked pertaining to demographics. These five questions include: gender, age of child, how many years they have been exhibiting the project, how many shows they exhibited the project during 2002, and how many hours they spent working with their project during 2002. Of the 404 respondents to the gender question, 209 (51.7%) were male and 195 (48.3%) were female.

The next demographic question asked parents of youth participants to provide the age of the child selected for the study. For all four projects combined, mean age of youth was 14.38 years. Individually, the mean was 14.92 years for youth with beef projects, 14.14 years for youth with swine projects, 14.75 for youth with sheep projects, and 13.95 years for youth with goat projects.

The next question asked about years these youth have participated in the individual project. The overall mean was 4.80 years with beef = 5.00 years, swine = 4.88 years, sheep = 5.93 years, and goats = 3.96 years. Respondents were then asked at how many shows their children exhibited their projects during 2002. They were provided six choices. These choices included: 1-4 shows, 5-8 shows, 9-12 shows, 13-16 shows, 17-20 shows, or more than 20 shows. Of the 386 respondents, 280 (72.2%) selected "1-4 shows."

The last question on demographics asked respondents to estimate the number of hours their children spent working with their project during the year. Respondents were asked to determine how many hours their child spent with their project during an average week. The selection choices were: 1-4 hours, 5-8 hours, 9-12 hours, 13-16 hours, 17-20 hours, or more than 20 hours. Overall, 34.7% of the respondents said that their children spend 5-8 hours working with their project during each week. This was followed by "9-12 hours" at 22.9%, "1-4 hours" at 17.7%, "13-16 hours" at 13.1%, "21 or more hours" at 6.2%, and "17-20 hours" at 5.4%.

Objective 1. Objective one was to determine the perceived life skills gained from youth exhibiting beef, swine, sheep, or goat 4-H projects (Table 1). Thirteen life skills and measurement scale were developed from previous studies by McCann and McCann (1992) and Rusk et al. (2002). The scale was defined as: 1 = *Not Influential At All,* 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* 5 = *Essential* to the ultimate development of this attribute. Each of the projects were analyzed separately for life skill development.

The beef project. The thirteen life skills were analyzed individually to reveal mean values, standard deviations, frequencies, and percentages (Table 1). Parents were asked to determine if exhibiting the beef project influenced the development of these attributes in their children. The rank order for the top five mean scores were: "accepting responsibility" (4.48, *SD*=.62), followed by "setting goals" (4.28, *SD*=.82), "develop self-discipline" (4.24, *SD*=.72), "self motivation" (4.17, *SD*=.69), and "knowledge of the livestock industry" (4.16, *SD*=.86) where 1 = *Not Influential At All,* 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* and 5 = *Essential*. In addition, 54% of the respondents of the beef project survey said that the beef project was essential in the development of "accepting responsibility" for their children. These results for the life skill "accepting responsibility" are supported by similar findings noted by Ward (1996).

Also, 47.8% of these respondents said that exhibiting beef cattle was essential in teaching the life skill of "setting goals." An additional 38% said that exhibiting the beef project was essential in their children's "knowledge of the livestock industry." Rusk et al. (2002) found similar results in relation to the "knowledge of the livestock industry" life skill.

However, Ward's (1996) conclusions pertaining to "ability to relate to others" were not consistent with this study. This study revealed a mean score of 3.84 *(SD*=.84) for the life skill, "ability to relate to others" ranking this life skill tenth among the thirteen life skill statements.

Different results were noted between this study and studies conducted by Ward (1996) and Vondy Wacker and Boyd (1992)for the life skill "develop and maintain records." For the beef project, this life skill revealed the second lowest mean response and the highest frequency for the "not influential at all" category.

The swine project. Identical to the beef project, the thirteen life skills were analyzed individually to reveal mean scores, standard deviations, frequencies, and percentages for the swine project (Table 1). Parents were asked to determine if exhibiting the swine project influenced the development of life skills in their children. "Accepting responsibility" had a mean of 4.34 (*SD*=.79). This was the highest mean score of the thirteen life skills analyzed. The next four were: "develop self discipline" (4.11 *SD*=.86), "self motivation" (4.08 *SD*=.80), "setting goals" (4.02 *SD*=.87), and "building positive self esteem" (4.02 *SD*=.85) where 1 = *Not*

Influential At All, 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* and 5 = *Essential*.

Similar to the beef results, “accepting responsibility” revealed the highest mean score. Also, 49.4% of the respondents of the beef project survey said that the swine project was essential in the development of “accepting responsibility” for their children. These results for the life skill “accepting responsibility” are supported by similar findings noted by Ward (1996).

These findings also are supported by conclusions by Gamon and Dehegedus Hetzel (1994). Their study was devoted solely to the 4-H swine project in Iowa and noted an increase in all life skills, however they did not list specific skills in their manuscript.

The sheep project. The thirteen life skills were analyzed individually to reveal mean scores, standard deviations, frequencies, and percentages for the sheep project (Table 1). Consistent to the previously discussed projects, “accepting responsibility” yielded the highest mean score (4.43, *SD*=.62). This was followed by: “setting goals” (4.26, *SD*=.74), “develop self-discipline” (4.20, *SD*=.70), “build positive self esteem” (4.14, *SD*=.76), and “knowledge of the livestock industry” (4.12, *SD*=.82) where 1 = *Not Influential At All,* 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* and 5 = *Essential*.

Although means, frequencies, and/or percentages were not provided, Wahlberg and Umberger (1988) findings on the 4-H lamb project in Virginia noted similar life skill development theme

The goat project. The last of the four individual projects to discuss is the goat project (Table 1). The goat project is the fastest growing project in the Texas 4-H program (Boleman, Howard, Smith & Couch, 2001). Dr. Frank Craddock (personal communication, March 4, 2003) said that the meat goat project in Texas initiated major growth in the mid-1990's because of a new meat goat breed being imported to Texas. This was the South African Boer Goat.

Even though this is a newer project when compared to the other three previously discussed, “accepting responsibility” still surfaced as the life skill with the highest mean score (4.25, *SD*=.90). This was followed by: “build positive self esteem” (4.21, *SD*=.81), “develop self-discipline” (4.03, *SD*=.90), “self motivation” (3.95, *SD*=.92), and “setting goals” (3.92, *SD*=.86) where 1 = *Not Influential At All,* 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* and 5 = *Essential*.

The results from the goat project follow the same trends previously discussed for the other three projects.

Combined average life skill mean scores for all four projects. This section reveals the mean scores for the thirteen life skills by project type (Table 15). These mean scores were calculated by adding the thirteen life skill responses together and dividing by the total number of life skills. The results revealed that beef had an average life skill response of 4.01 (*SD*=.56), swine had an average life skill response of 3.86 (*SD*=.64), sheep an average life skill response of 4.00 (*SD*=.57), and goat had an average life skill response of 3.78 (*SD*=.67) where 1 = *Not*

Influential At All, 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* and 5 = *Essential*.

Comparisons of life skills by project type. An ANOVA using Tukey's HSD post was used for comparisons of life skills by project type (Table 1). Ten of the thirteen life skills revealed no significant mean differences ($p <. 05$) when comparing the four project types. These ten were: decision making, ability to relate to others, develop and maintain records, accepting responsibility, build positive self esteem, self motivation, ability to problem solve, develop oral communication skills, developing self discipline, and work in teams.

However, three of the life skills revealed significantly different ($p <. 05$) mean scores among at least one of the four projects. These three were knowledge of the livestock industry; develop organizational skills, and setting goals. For knowledge of the livestock industry, beef project respondents revealed the highest mean score (4.16 *SD* .86) and this was significantly higher than goat project respondents (3.70 *SD* .91). The swine respondents also revealed a significantly higher mean score (4.12 *SD* .82) when compared to goat respondents (3.70 *SD* .91).

Developing organizational skills and setting goals revealed the same significant differences ($p <. 05$) in mean values as the knowledge of life industry life skill. Both of these life skills revealed beef project respondents with the highest mean values and these were significantly higher ($p <. 05$) than goat respondents. In addition, swine respondents had a significantly higher mean scores when compared to goat respondents.

Table 1. *Analysis of Variance for Life Skills by Beef, Swine, Sheep & Goat 4-H Livestock Projects for All Respondents*

Life Skills	**Beef**		**Swine**		**Sheep**		**Goats**	
	n = 88		n = 132		n = 76		n = 107	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Decision Making	4.01[a]	.90	3.78[a]	.86	3.93[a]	.92	3.75[a]	.98
Ability to Relate to Others	3.84[a]	.84	3.92[a]	.93	4.07[a]	.79	3.92[a]	.87
Develop and Maintain Records	3.74[a]	1.06	3.61[a]	1.05	3.58[a]	1.03	3.42[a]	1.07
Accepting Responsibility	4.48[a]	.62	4.34[a]	.79	4.43[a]	.62	4.25[a]	.90
Build Positive Self Esteem	4.12[a]	.78	4.02[a]	.85	4.14[a]	.76	4.21[a]	.81
Self Motivation	4.17[a]	.69	4.08[a]	.80	4.07[a]	.79	3.95[a]	.92
Knowledge of Livestock Industry	4.16[a]	.86	3.83[ab]	1.02	4.12[ac]	.82	3.70[b]	.91
Develop Organizational Skills	3.84[a]	.92	3.70[ab]	.92	3.87[ac]	.84	3.48[b]	.93
Ability to Problem Solve	3.80[a]	.89	3.60[a]	.94	3.73[a]	.94	3.48[a]	1.01
Develop Oral Communication Skills	3.84[a]	1.02	3.52[a]	1.14	3.85[a]	.88	3.58[a]	.96
Setting Goals	4.28[a]	.82	4.02[ab]	.87	4.26[ac]	.74	3.92[b]	.86
Developing Self Discipline	4.24[a]	.72	4.11[a]	.86	4.20[a]	.70	4.03[a]	.90
Work in Teams	3.66[a]	1.14	3.71[a]	1.12	3.68[a]	1.09	3.46[a]	1.05
Sum of Life Skills	4.01[a]	.53	3.86[ab]	.64	4.00[ab]	.57	3.78[b]	.67

[abc] Means in rows having letter designations in common are <u>not</u> significantly different at the .05 level using Tukey's HSD post hoc analysis method. Scale: 1 = *Not Influential At All,* 2 = *Mildly Influential,* 3 = *Moderately Influential,* 4 = *Highly Influential,* and 5 = *Essential*.

Objective 2. Objective 2 was created to determine if years of exhibiting beef, swine, sheep, or goat 4-H projects impacted life skill development as perceived by parents. The overall mean score for years was 4.8 (*SD*=2.7). A test was developed to measure the relationship between life skill development and years of exhibiting the beef, swine, sheep, or goat project. A

Pearson product-moment correlation coefficient (r) was the statistical test used to compare these two continuous variables (Table 2).

Table 2. *Pearson Product Moment Correlation Coefficients Between Years of Exhibiting 4-H Livestock Projects and Life Skills Among All Respondents*

Life Skills	Years of Exhibition r	*p*
Decision Making	.241	<.01*
Ability to Relate to Others	.216	<.01*
Develop and Maintain Records	.165	<.01*
Accepting Responsibility	.124	<.05*
Building Positive Self Esteem	.117	<.05*
Self Motivation	.155	<.01*
Knowledge of Livestock Industry	.200	<.01*
Develop Organizational Skills	.205	<.01*
Ability to Problem Solve	.217	<.01*
Develop Oral Communication Skills	.173	<.01*
Setting Goals	.180	<.01*
Develop Self-Discipline	.217	<.01*
Work in Teams	.207	<.01*

*Significant at the .05 level.

Low, positive relationships are noted for all thirteen life skills. Two of the thirteen ("accepting responsibility" =.124 and "building positive self esteem" = .117) revealed low, positive relationships that were significant at the .05 level. The other eleven of thirteen life skills revealed higher, positive relationships that were statistically significant at the .01 level. These were "decision making"=.241, "ability to relate to others"=.216, "develop and maintain records"=.165, "self motivation"=.155, "knowledge of the livestock industry"=.200, "develop organizational skills"=.205, "ability to problem solve"=.217, "develop oral communication skills"=.173 "setting goals"=.180 "develop self-discipline"=.217 and "work in teams"=.207.

Objective 3. Objective 3 was developed to investigate the relationship between life skill development and average ownership days of projects regardless of type (beef, swine, sheep, or goats). A test was developed to measure the relationship between life skill development and ownership days of beef, swine, sheep, or goat 4-H projects. A Pearson product-moment correlation coefficient (r) was the statistical test used to compare these two continuous variables (Table 3).

Low, positive relationships are noted for all thirteen life skills compared to three categories of ownership days. However, six of the thirteen revealed statistically significant ($p<.05$) low, positive relationships. These six were "decision making"=.182, "develop and maintain records"=.148, "knowledge of the livestock industry"=.165, "ability to problem solve"=.159, "develop oral communication skills"=.145, and "setting goals"=.106.

Table 3. *Pearson Product Moment Correlation Coefficients Between Days of Ownership of 4-H Livestock Projects Among All Respondents (n=372)*

Life Skills	Ownership Days	
	r	*p*
Decision Making	.182	<.01*
Ability to Relate to Others	.043	.41
Develop and Maintain Records	.148	<.01*
Accepting Responsibility	.079	.13
Building Positive Self Esteem	.062	.23
Self Motivation	.085	.10
Knowledge of Livestock Industry	.165	<.01*
Develop Organizational Skills	.109	.04*
Ability to Problem Solve	.159	<.01*
Develop Oral Communication Skills	.145	<.01*
Setting Goals	.106	.04*
Develop Self-Discipline	.098	.06
Work in Teams	.054	.30

*Significant at the .05 level.

Conclusions/Recommendations/Implications

There were few documented studies that were specific to youth livestock exhibition or animal science. Those that were found were used to compare the results from this study to others pertaining to life skills. All four of these 4-H livestock projects revealed "accepting responsibility" as the highest mean score for life skills. This was certainly consistent with several youth livestock studies (Wahlberg & Umberger, 1988; Vondy Wacker & Boyd, 1992; Gamon & Dehegedus-Hetzel, 1994; Ward, 1996; Rusk et al., 2002). Moreover, "positive self esteem" and "ability to relate to others" all ranged in the high to middle range for mean values. This is also similar to results reported by Ward (1996) and Rusk et al. (2002).

However, several studies (Vondy Wacker & Boyd, 1992; McCann & McCann, 1992; Ward, 1996; Rusk et al., 2002) suggested that "record keeping," "working in teams," and "decision making" were life skills that were enhanced as a result of participation in livestock participation. Data from this study do not reveal these trends consistently. This could be explained partly by the differences in these cited studies. Vondy Wacker and Boyd's (1992) study focused on "urban animal science." Lessons were taught by learning record keeping methods. This study was more hands-on with the project.

McCann and McCann (1992) and Rusk et al. (2002) both studied these life skills attributed to livestock judging. Livestock judging is a team concept that stresses being able to defend a decision by presenting oral reasons. The livestock project does not necessarily require these skills.

Even though no studies specific to 4-H animal science projects revealed correlations between length of project feeding days or years of participation, there have been studies on 4-H leadership that measures these correlations. Boyd et al. (1992) revealed that there was a moderate positive relationship between leadership and 4-H participation by year and low relationships for communicating, working with groups making decisions, and understanding self with 4-H participation. Seevers and Dormody (1994) also concluded that participation in 4-H leadership activities had a positive relationship with youth life skill development.

Finally, this study was unique because it asked parents to provide results based on their perceptions of life skill development of their children. All of the previously discussed studies relied on the youth's perception of their life skill development.

Moore (2003) recently published a front page article in a large market newspaper condemning livestock shows by discussing cheating by youth. In light of these such articles, it is important to highlight positive attributes of youth that participate in this program. This study was developed to determine if life skills were being developed through raising these projects. The results from this study should be used to defend and promote these programs. They should also be used to develop a more effective educational program for youth and family participants.

This study revealed items that should be discussed to ensure that this program is educationally effective. The 4-H Program needs to develop a list of specific life skills that should impact youth by participating in these projects. This could include the thirteen that were measured in the study and/or more or less life skills. Once the Texas 4-H Program establishes these life skills, educational curriculum should include these in the programming process. Most current 4-H livestock curriculum is subject matter focused. Life skill components should be built into this curriculum so youth are taught the proper skills to work in teams, keep records, and accept responsibility. It is important that these 4-H programs are working with the correct end of the halter instead of the calf's end. If these projects can be accounted for in the area of life skill development, then these programs stand a far better chance to be around for the next generation.

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A Two Year Snapshot of Agricultural Youth Organizations and Learning Communities' Influence on Academic Achievement and Degree Completion

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Abstract

Colleges of agriculture today seek to recruit and educate high caliber individuals who are academically prepared to function in rapidly changing agricultural industries. This study compared the impact of enrollment in agricultural youth organizations (4-H/FFA) and participation in a university learning community, Freshman Interest Group (FIG), on academic performance and degree completion of students in the University of Missouri's College of Agriculture, Food and Natural Resources over a two-year period. Students enrolled in a college-wide learning and development course in the fall of 1997 (n = 245) and 1998 (n = 197) participated. Analysis of Covariance procedures were utilized to determine the impact of enrollment in agricultural youth organizations and participation in FIGs on academic performance. The Chi Square test for association was utilized to determine the influence of participation in agricultural youth organizations and FIGs on degree completion. Prior enrollment in an agricultural youth organization was found to have a significant association with students' academic performance as well as degree completion, yet participation in a FIG did not have a significant association to either variable. The study raises implications for the recruitment of individuals with prior experience in agricultural youth organizations as potentially successful students in colleges of agriculture.

Introduction/Theoretical Framework

"Nothing is permanent but change." This quote by the Greek philosopher, Heraclitus, presents a holistic summary of agriculture over the past century. It also provides an accurate projection of what agriculture is likely to experience in the new millennium.

Change has been a defining characteristic of agriculture. In 1950, 17% of the United States population lived on a farm, whereas today, less than two percent of the population resides on a farm. Yet, agricultural production has increased by 150% over the past 45 years (National Research Council [NRC], 1995). Furthermore, farming is not the only segment of agriculture that has experienced change. The food, fiber, and natural resource sectors currently employ 18% of the U.S. population and contribute 16% of total "value added" endeavors in the processing, marketing, and distribution of agricultural products (NRC, 1995). Through research, development, and education, colleges of agriculture across the nation have contributed greatly to this growth in productivity (NRC, 1996). However, with change comes challenge; and colleges of agriculture must face the challenges of providing education for the human resource base in a rapidly growing, increasingly global, and highly technological food, fiber, and natural resource system (NRC, 1996).

Possibly, the most important challenges facing colleges of agriculture today involve recruiting, retaining, and educating high caliber individuals who are academically prepared to function in a rapidly changing food, fiber, and natural resource industry. Goeker, Coulter, and Stanton (1995) predicted that at the turn of the millennium a shortfall of almost four percent would exist between employment opportunities and available graduates in food and agricultural sciences and cooperating fields. The previous prediction supported Russell's assertions of an impending "brain drain" in agriculture, or more specifically, a lack of qualified individuals with an agricultural background or experience (Russell, 1993). In addition to changing industry demands, colleges face great monetary investments dependent upon the academic success and degree completion of their students. With rising costs of education and depleting sources of funding, loss of students in colleges of agriculture translates to significant losses of instructional dollars (Dyer, Lacey, & Osborne, 1996). To remain viable, colleges of agriculture must meet these challenges by discovering ways of predicting the academic success and ensure the academic degree completion of its students.

In studying the complex phenomenon of education, Cruikshank (1990) suggested using theoretical models such as those developed and tested by Dunkin and Biddle. The theoretical framework for this study was derived from an adaptation of Mitzel's Model of learning and teaching, as presented by Dunkin and Biddle (1974). In their model, Dunkin and Biddle suggested that the study of teaching and learning involve four categories of variables: presage, context, process, and product (Figure 1).

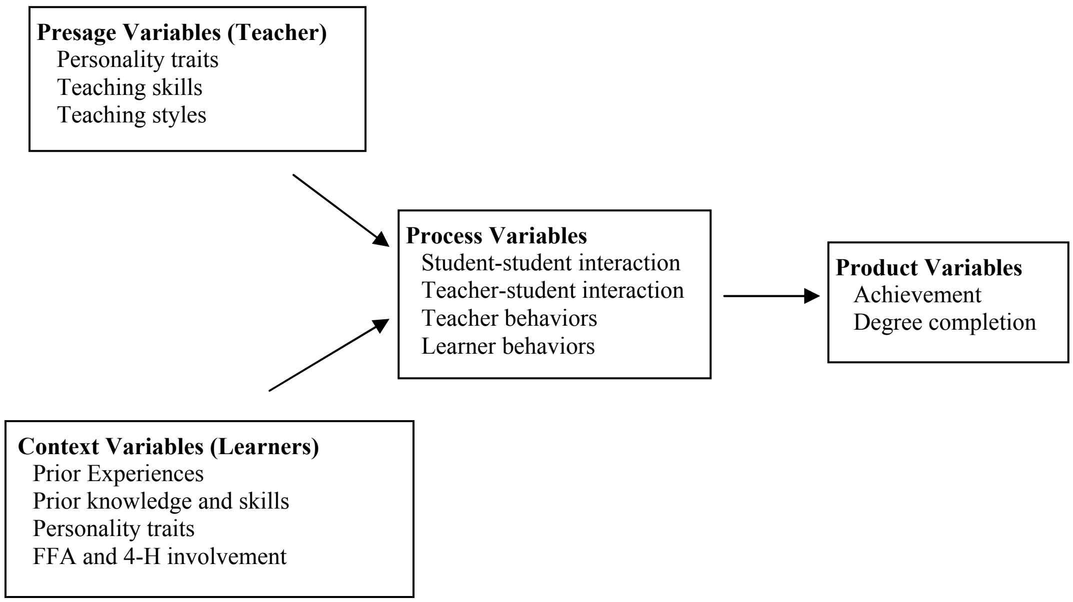

Figure 1. *Theoretical Model for the Study of Learning and Teaching*

Presage variables include those that influence teachers and their teaching behaviors (i.e., those things that teachers contribute to the learning process). Context variables are those that students contribute. Context variables include the background of learners, their prior knowledge and skills, their attitudes toward learning, and their involvement in organizations and activities that may potentially shape the nature of their personality and skill development, such as 4-H and/or FFA. Process variables describe the interaction of teacher and learner behaviors in the teaching-learning process. Examples include institutional activities and programs that support teacher-student or student-student interactions, such as learning communities. Finally, product variables include the knowledge and skills gained or attitudes modified as a result of teaching and learning.

At an ever-increasing rate, students who enter colleges of agriculture are deficient in agricultural experience (Dyer, et al, 1996; Scofield, 1995). Dyer, Lacey, and Osborne noted that colleges of agriculture could select students with the next best thing: experience in high school agriculture classes, 4-H, and FFA. Participation in 4-H and FFA was shown to influence the outcomes of achievement and life skill development (Fleming-McCormick & Tushnet, 1997; Junge, 1994; Pruckno & Miller, 1987; Seevers & Dormody, 1994; Thomas & Ladewig, 1985). In addition involvement in agricultural youth organizations has been shown to influence educational outcomes such as student achievement, skill attainment, and even student retention in colleges (Dyer & Breja, 1999; Dyer, et al, 1996). Although student retention is important, Adelman (1999) emphasized that degree completion should supersede retention as the focus. A lack of literature on college of agriculture students exists on the topic of degree completion in association with context variables such as involvement in agricultural youth organizations.

Another important influence on the products of teaching and learning is the educational setting or the academic institution in the teaching and learning process. Not all learning takes place in the classroom. Institutions of higher education nationwide have developed the concept of learning communities in response to the current needs for enhanced academic performance, as well as improved rates of student retention (Hill, 1990). Lenning and Ebbers (1999) defined learning communities as small subgroups of learners organized by common purpose and mode of interaction. For this study, learning communities served as a process variable for the purpose of interaction.

Learning communities are organized in a variety of approaches, such as freshmen interest groups, learning clusters, federated learning communities, and coordinated studies communities (Lenning & Ebbers, 1999; Tinto & Goodsell, 1994). Organized as clusters of students with common characteristics, similar academic interests, enrolled in similar courses, and living together in a residence hall, Freshman Interest Groups (FIGs) in particular have been noted to increase students' levels of academic performance and retention in postsecondary institutions (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994). Pike, Schreoder, and Barry (1997) concluded that student involvement in residential learning communities improved educational outcomes by fostering increased levels of student-student and faculty-student interactions, as well as enhanced student involvement in coursework. While a strong literature base supports FIGs as enhancing the outcomes of teaching and learning, research involving FIG participation among college of agriculture students is lacking. Specifically, can involvement in FIGs be utilized as a process variable to predict the product variables of student achievement and student degree completion in colleges of agriculture?

Most, but not all research has been conclusive in favor of learning communities. Edwards and McKelfresh (2002) investigated academic success and persistence in reference to whether or not students participated in a living learning center (LLC). They concluded that depending on the gender and ethnicity, students either benefited or did not benefit from having participated in a LLC. In other words, it worked for some but not for others. Kelsey and Sexten (2003) investigated how participation in Oklahoma State's college of agriculture learning community, Freshmen In Transition (FIT), impacted academic achievement, retention, and psychosocial development. Although those who participated in the FIT program had a high retention rate, participation was not linked with higher academic achievement or personal growth.

The current literature base is helpful in identifying context variables that can serve as predictors of student retention or life skill attainment. However, little research exists regarding the effectiveness of those context and process variables, specific to agriculture students, in predicting college students' academic performance. Can select context variables (4-H or FFA involvement) and process variables (participation in a FIG) be a distinguishing characteristic on the academic performance and degree completion of students in colleges of agriculture?

By targeting specific variables that have the potential to enhance academic performance and degree completion, colleges of agriculture have an opportunity to shape the changing face of agriculture, just as they have shaped scientific advancements and management practices in the past. While the population in the U.S. is on the rise, the population of individuals possessing experience with or a background in agricultural endeavors is in rapid decline (NRC, 1995). Colleges of agriculture across the nation must find ways to respond to the challenges of a population and a workforce in the midst of an agricultural "brain drain." Consequently, a research base is needed to identify characteristics that can be used in predicting the academic performance and degree completion of students in colleges of agriculture.

Purpose and Objectives

The purpose of this trend-type, longitudinal study was to compare the impact of enrollment in agricultural youth organizations (4-H/FFA) and participation in Freshmen Interest Groups (FIGs) on academic performance and degree completion of two groups of students in the College of Agriculture, Food and Natural Resources at the University of Missouri. The groups of students consisted of freshmen entering the college in the fall semesters of 1997 and 1998. The following research questions were used to guide the study and applied separately to both groups (1997 and 1998) of students:

1. Did students who enrolled in agriculture youth organizations (FFA and/or 4-H) have greater academic success than students who did not enroll in agricultural youth organizations?

2. Did students who participated in a Freshmen Interest Group (FIG) have greater academic success than those students who did not participate in a FIG?

3. Is there a relationship between enrollment in agriculture youth organizations (FFA and/or 4-H) and completion of a baccalaureate degree?

4. Is there a relationship between participation in a FIG and completion of a baccalaureate degree?

For the purpose of statistical analysis, the research questions were posed as null hypotheses and applied separately to both groups (1997 and 1998).

HO_1: There was no difference in the academic performance of students who had enrolled and those who had not enrolled in agricultural youth organizations, when controlling for the variance associated with ACT score.

HO_2: There was no difference in the academic performance of students who participated in a FIG and those who did not participate in a FIG, when controlling for the variance associated with ACT score.

HO_3: There was no relationship between enrollment in agriculture youth organizations (FFA and/or 4-H) and completion of a baccalaureate degree.

HO_4: There was no relationship between participation in a FIG and completion of a baccalaureate degree.

Methods/Procedures

The target population for this ex post facto, trend-type longitudinal study was freshman entering the College of Agriculture, Food and Natural Resources at the University of Missouri in the fall semesters of 1997 (N_{97} = 326) and 1998 (N_{98}=338). The sample consisted of intact groups of freshmen enrolled in a college learning and development course (n_{97} = 245; n_{98}=197).

Enrollment in agricultural youth organizations was determined by students' prior enrollment in either FFA and/or 4-H at the high school level. Because of the exploratory nature of this study in using agricultural youth organizations and degree completion, this variable was entered as yes or no as to the enrollment of the student in an agricultural youth organization. Enrollment information was obtained from the college's academic programs office. The information was self-reported by students during the university admissions process.

Involvement in a Freshman Interest Group (FIG) consisted of approximately 20 students living in the same residence hall. Participation requirements included concurrent enrollment in at least three courses and a weekly seminar led by a junior or senior student serving as a peer advisor and a faculty advisor. These operational definitions applied to both groups of students. Involvement in a FIG was obtained for the university's database. Students participating in a FIG had to enroll in a freshman advising seminar.

For both groups, students' academic performance was measured by their cumulative grade point average (CGPA) at the completion of the academic degree program. Degree completion was determined based upon students' attainment of a baccalaureate degree at the conclusion of five academic years. Descriptive statistics were generated for composite ACT score as well as CGPA at the completion of the academic degree program. Values for CGPA, composite ACT, and degree completion status were collected from university records. Research hypotheses one and two were analyzed using analysis of covariance (ANCOVA). An ANCOVA procedure was used because there were between group differences of ACT scores. Research hypotheses three and four were tested using the Chi Square test for association. An alpha level of .05 was established a priori for all statistical tests.

Results/Findings

Differentiated by the levels of the variable, enrollment in an agricultural youth organization, the means and standard deviations for CGPA and ACT scores of both groups are provided in Table 1. The difference in CGPA means between those who had enrolled in an agricultural youth organization and those who had not was .42 for the 1997 group and .65 for 1998, both in favor of having been involved in an agricultural youth organization. For ACT scores, the difference between those enrolled and not enrolled was 1.0 for 1997 and 2.6 for 1998, again in favor of having been enrolled in an agricultural youth organization.

Table 1. *Descriptive Data for Academic Performance and ACT Score by Prior Enrollment in Agricultural Youth Organizations*

	1997				1998			
	Enrolled (*n*=96)		Not Enrolled (*n*=149)		Enrolled (*n*=62)		Not Enrolled (*n*=135)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
CGPA	3.14	.64	2.72	.71	3.10	.65	2.45	.72
ACT score (covariate)	25.4	4.0	24.4	4.0	25.5	3.5	22.9	3.8

The first null hypothesis was developed to ascertain if there was a difference in the academic success of students who had or had not enrolled in agricultural youth organizations. For both groups, the main effect, enrollment in agricultural youth organizations (FFA and/or 4-H), produced a significant difference in students' academic performance when controlling for the variance associated with ACT score (Table 2). Therefore, the null hypothesis asserting that there was no difference between the performance of students who had enrolled in agricultural youth organizations and students who had not enrolled in agricultural youth organizations was rejected for both groups.

Table 2. *Analysis of Covariance of Enrollment in Agricultural Youth Organizations by ACT Score*

	1997				1998			
Source	*df*	*MS*	*F*	*p*	*Df*	*MS*	*F*	*p*
Intercept	1	8.2	21.3	.01*	1	7.4	17.0	.01*
Covariate (ACT Score)	1	19.4	50.4	.01*	1	9.5	21.9	.01*
Main Effect (Ag Youth participation)	1	5.8	14.9	.01*	1	8.3	19.2	.01*
Error	236	.39			187	.43		

*p<.05

For involvement in Freshmen Interest Group, the means and standard deviations for CGPA and ACT scores of both groups (1997 and 1998) are provided in Table 3. These descriptive statistics are differentiated by the levels of the variable participation in a Freshmen Interest Group (FIG). The difference in CGPA means of those who participated in a FIG and those who had not, was .25 for 1997 and -.01 for 1998. For the 1997 group, the difference was in favor of having participated in a FIG; the negative on the 1998 group indicates a favor for having not participated in a FIG. For the covariate ACT score, the difference between mean scores for 1997 was 2.6 and for 1998, the difference was .6, both in favor having participated in a FIG.

Table 3. *Descriptive Data for Academic Performance and ACT Score for Freshmen Interest Group (FIG) Participation*

	1997				1998			
	Participated (*n*=164)		Had Not Participated (*n*=81)		Participated (*n*=44)		Had Not Participated (*n*=153)	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
CGPA	3.05	.65	2.80	.73	2.65	.81	2.66	.75
ACT score (covariate)	26.5	3.4	23.9	4.1	24.2	3.3	23.6	4.0

The second null hypothesis sought to ascertain if there was a difference in the academic success of students who participated or did not participate in a FIG. For both groups, the main effect, participation in a FIG, did not produce a significant difference in students' academic performance when controlling for the influence on academic performance associated with ACT score (Table 4). Therefore, the null hypothesis asserting that there were no differences in academic performance between students who participated in a FIG and students who did not participate in a FIG was not rejected for both groups.

Table 4. *Analysis of Covariance of FIG Participation by ACT Score*

	1997				1998			
Source	*df*	*MS*	*F*	*p*	*Df*	*MS*	*F*	*p*
Intercept	1	3.1	6.5	.01*	1	5.8	14.3	.01*
Covariate (ACT Score)	1	17.4	36.3	.01*	1	20.1	49.0	.01*
Main Effect (FIG participation)	1	.01	.02	.88	1	.02	.05	.83
Error	187	.48			236	.41		

*$p < .05$

The purpose of the third null hypothesis was to determine if no relationship existed between enrollment in agriculture youth organizations (FFA and/or 4-H) and completion of a baccalaureate degree. Of the 149 students in the 1997 group, who did not enrolled in an agricultural youth organization, 55 did not complete a baccalaureate degree in the five year time span. For 1998, of the 135 students who had not enrolled, 70 did not complete a degree (Table 5). Of the 96 freshmen in the 1997 group, and 62 in the 1998 group that had enrolled in an agricultural youth organization, 10 did not complete a baccalaureate degree in 1997 as compared to the 12 students of the 1998 group. Pearson's Chi Square yielded a value of 21.76 ($p < .05$) for 1997 and a value of 19.14 ($p < .05$) for 1998, which was significant for both groups. Thus, the null hypothesis asserting that there was no relationship between enrollment in agriculture youth organizations and completion of a baccalaureate degree was rejected.

Table 5. *Contingency Table by Degree Completion and Agricultural Youth Organization Enrollment*

	1997			1998		
	Completed a Degree			Completed a Degree		
	Yes	No	Total	Yes	No	Total
Not Enrolled in Ag Youth Organizations	94 (63.1%)	55 (36.9%)	149	65 (48.1%)	70 (51.9%)	135
Enrolled in Ag Youth Organizations	86 (89.6%)	10 (10.4%)	96	50 (80.6%)	12 (19.4%)	62
Total	180 (73.5%)	65 (26.5%)	245	115 (58.4%)	82 (41.6%)	197

χ^2_{97} (1, n = 245) = 21.76, $p < .05$; χ^2_{98} (1, n = 197) = 19.14, $p < .05$

The final null hypothesis sought to determine if there was no relationship between participation in a FIG and completion of a baccalaureate degree. For the 1997 group, 164 students had not participated in a FIG, and out of those, 46 did not complete a degree. In 1998, 153 students had not participated in a FIG, and out of those 65 did not complete a degree. Regarding the 81 students who had not participated in a FIG in 1997, 19 did not complete a baccalaureate degree. For 1998, 44 had not participated in a FIG and 17 of those had not completed a degree. Pearson's Chi Square yielded a value of .581 (p = .446) for 1997 and .206 (p = .650) for 1998, which was not significant for either group. Therefore, the null hypothesis asserting that there was no relationship between participation in a FIG and completion of a baccalaureate degree was not rejected.

Table 6. *Contingency Table by Degree Completion and FIG Participation*

	1997			1998		
	Completed a Degree			Completed a Degree		
	Yes	No	Total	Yes	No	Total
Had Not Participated in a FIG	118 (72.0%)	46 (28.0%)	164	88 (57.5%)	65 (42.5%)	153
Participated in a FIG	62 (76.5%)	19 (23.5%)	81	27 (61.4%)	17 (38.6%)	44
Total	180 (73.5%)	65 (26.5%)	245	115 (58.4%)	82 (41.6%)	197

χ^2_{97} (1, n = 245) = .581, $p > .05$; χ^2_{98} (1, n = 197) = .206, $p > .05$

Conclusions/Recommendations

For entering freshmen in 1997 and 1998, students who had enrolled in agricultural youth organizations possessed important differences in performance measures associated with CGPA. This finding is consistent with Dyer et al. (1996). The practical implications of this difference forms striking distinctions between those who are selected and those who are excluded from college admission and/or scholarships based upon CGPA. In addition, students who were enrolled in agricultural youth organizations scored 1.0 points higher on the ACT for the 1997 group and 2.6 points higher for 1998. Yet, when utilizing ACT score as a covariate to equate the groups on performance measures, enrollment in agricultural youth organizations was still found to have a significant influence on CGPA.

Enrollment in agricultural youth organizations was found to have a significant association with the attainment of a baccalaureate degree for both groups of students. These findings were consistent with previous research indicating the influence of involvement in FFA and 4-H as an important indicator for retention in a college of agriculture (Dyer et al., 1996; Dyer & Breja, 1999). Thus, prior experiences, such as enrollment in agricultural youth organizations, can serve as significant context variables in their influence on the product variable of academic performance and retention in a college of agriculture. The implications of this finding are twofold. First, colleges of agriculture, in order to ensure the success of their students, should continue efforts to recruit individuals with prior experiences in agricultural youth organizations. Secondly, colleges of agriculture should continue to educate individuals in the fields of agricultural and extension education to maintain a quality pool of FFA chapters and 4-H clubs from where future college of agriculture students may be selected. Finally, this study was exploratory in nature, which is to say, mere enrollment versus some other, more complex measure of involvement in agricultural youth organizations was used. Therefore, other studies are warranted in finding a more in depth measure of involvement in agricultural youth organizations to determine what, about these organizations, influences academic achievement and degree completion. If such specific variables can be determined, perhaps these variables can be replicated at the college level to enhance academic achievement and degree completion.

In terms of CGPA, students averages were higher for those who had participated in a FIG, compared to those who had not for the 1997 group. Conversely, the higher of the two CGPA scores for 1998 was the group who had not participated in a FIG, by .01 average points. When utilizing ACT scores as a covariate to equate the groups on performance measures, participation in a FIG was not found to be a significant process variable in its influence on academic performance. Additionally, participation in a FIG was not found to possess a significant association with the completion of a baccalaureate degree. This finding contradicts prior studies (Hill, 1985; Lenning & Ebbers, 1999; Pike, 1999; Tinto & Goodsell, 1994) indicating the positive influences of FIG participation on a student's academic performance and retention at the postsecondary level.

While research has pointed toward FIGs as an effective solution for increasing students' degree completion and academic performance across universities as a whole, college of agriculture students may not experience the benefits of FIG participation in a similar fashion as do students in other colleges. What is good for one academic unit may not be good for all. This study, in concert with the Kelsey and Sexten (2003) study suggest this to be true for colleges of agriculture. In addition, further research is needed to determine the direct effects of FIG participation specific to college of agriculture students. In addition, continued studies are warranted to further indicate presage, context, and process variables that can enhance the products of student achievement and degree completion in colleges of agriculture.

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CARS and Textbook Use in Agricultural Education

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Abstract

Agriscience teachers are increasingly being called upon to demonstrate their contributions to student achievement in math, science, and reading. This national survey of 216 agriscience teachers investigated the current attitudes and practices related to reading in agriscience. Agriscience teachers generally appreciated reading for personal development and learning, but were in less agreement about allocation of time for reading. Further, teachers agreed that reading was important in agriscience, but were in less agreement about their role in teaching content area reading strategies (CARS). Reading is a fundamental part of instruction in agriscience, with nearly 20% of class time being devoted to reading. Teachers exhibited limited knowledge of, confidence in, and frequency of CARS use. Teachers understood how to select textbooks and how to assess student comprehension. Indications suggested that teachers helped students monitor comprehension and activate background knowledge prior to reading.

Introduction

Students need literacy skills for succcessful careers, households, citizenship, and personal lives (D'Arcangelo, 2002; Meltzer, 2001; National Reading Panel, 2000; Vacca, 2002). Good readers internalize information, make critical decisions, form opinions, and respond intelligently (D'Arcangelo), which are necessary skills for analyzing and comprehending the plethora of knowledge and facts available today (Moore, Bean, Birdyshaw, & Rycik, 1999; Vacca). Yet, American students compare poorly with their foreign counterparts, especially where content knowledge and literacy is central to the curriculum (Snow, 2002).

Reinforcing reading is a shared responsibility among all teachers (Readence, Bean, & Baldwin, 1998; Vacca, 2002). As a student moves from middle to high school, students must become more adept at meeting the challenges of more sophisticated content area reading and information (Meltzer, 2001; Musthafa, 1996; Snow, 2002; Tomlinson, 1995). Even though building literacy skills enhances learning, few content area teachers employ content area reading strategies (CARS) (Barry, 2002; Durkin, 1978). Further, content area teachers, including agriscience teachers are being called upon to enhance student achievement in math, science, and reading (Belcher, McCaslin, & Headley, 1996; Conroy & Walker, 2000). Thus, how do agriscience teachers perceive their role in developing students' reading comprehension skills? What are agriscience teachers' personal values of reading? What are teachers' interest and effectiveness in implementing CARS? How do agriscience teachers use texts in the classroom?

Theoretical and Conceptual Framework

The RAND Reading Study Group (RRSG) (Snow, 2002) developed a research agenda for research on comprehension, which provided the theoretical framework for this study. The RRSG defined reading comprehension as "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (p. xiii), which comprised three elements: reader, text, and activity or purpose for reading, all occurring in a larger sociocultural context, including the teacher (see Figure 1). The reader brings cognitive capabilities, motivation, knowledge, and experiences to the reading processes. Texts can include many forms. Reading activity involves the purposes, operations, and outcomes of reading, including problem solving, knowledge gain, or engagement. Context is the student's sociocultural environment, which encompasses the classroom, teacher, community, and world.

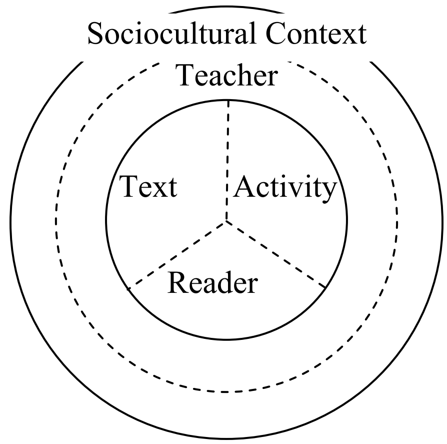

Figure 1. A *Heuristic for Thinking about Reading Comprehension (Snow, 2002).*

Teachers are often reluctant to implement CARS in the content areas, because they 1) feel inadequate to handle reading problems in their classrooms, 2) feel that reading instruction infringes on content area time, and 3) deny the importance of reading techniques (Barry, 2002; Bean, 1997; Bintz, 1997; Durkin, 1978; Ivey, 2002; Moore et al., 1999; Snow, 2002; Stewart, 1990; Stewart & O'Brien, 1989). Because content area teachers expect students to possess adequate reading skills, they perceive their role in education to be content area experts (D'Arcangelo, 2002; Forget & Bottoms, 2000; Moore et al.; Snow; Vacca, 2002; Vaughn, Klinger, & Bryant, 2001). O'Brien and Stewart (1990) found that 85% of preservice agriscience teachers rejected content area reading. Choosing to ignore reading as a tool (p. 118), agriscience teachers felt they reinforced content area reading and needed little instruction in strategies.

A teacher's attitude toward reading affects student reading performance (Bintz, 1997; Jorgensen, 2001; Morawski, 1995; Readence et al., 1998). Digisi (1993) found that 215 biology teachers viewed reading as essential to learning biology, yet lacked knowledge of strategies and how to incorporate them. Surveying 61 mixed-experience teachers, Menke and Davey (1994) found that experienced teachers provided more class time for reading, used text less often to supplement instruction, and exhibited less reading strategy instruction.

Purpose and Objectives

The purpose of this national study was to describe practices and attitudes associated with reading in agriscience. Specifically, the study pursued the following objectives:

1. To ascertain the emphasis on and importance of reading in the secondary agriscience,
2. To identify how teachers select and use textbooks, and
3. To identify content area reading intervention strategies employed by teachers.

Procedures

This study used a sample of the population of active and life members of the National Association of Agricultural Educators (NAAE) as listed in the 2003-04 database of membership provided by the NAAE (*N* = *6586*). From the accessible population a random sample of 367 members was selected to estimate the distribution of characteristics within the population (Dillman, 2000).

The researcher-developed questionnaire consisted questions related to the objectives of the study and was reviewed by two content area reading experts to establish face and content validity. To ensure construct validity and reliability, the survey instrument was administered to 14 agriscience teachers. Reliability for attitudinal and behavioral items ranged from 0.77 to 0.88. Because other items involved questions for which respondents had "an accurate, ready-made answer" (Dillman, 2000, p. 37), items did not elicit demands for considerable time, thought, nor variation, and thus posed no considerable reliability risk.

Data was collected from February 26, 2004, through May 4, 2004. The study was administered via the suggested survey design with a mailed questionnaire as outlined by Dillman (2000). Teachers were mailed a cover letter from the investigators, a letter from National FFA Advisor Dr. Larry Case, the questionnaire, and a two-dollar incentive to enhance response, resulting in 216 returned usable questionnaires for a 58.9% response rate.

To control for non-response error, researchers compared early to late responders (Ary, Jacobs, & Razavieh, 2002; Linder, Murphy, & Briers, 2001). Research has shown that late responders are often similar to early responders (Goldhor, 1974; Krushat & Molnar, 1993). Early responders were those participants who returned their survey prior to mailing the reminder postcard, while late responders were those who responded after the second questionnaire was mailed. Researchers compared respondents based on gender, years of teaching experience, education level, college reading course completion, and the summated means of personal attitude toward reading, attitude toward reading in agriscience, and general approach to reading. No significant differences existed between early and late responders.

Findings

Respondents represented 44 states and consisted of 84.6% males who held standard or permanent teaching licenses (96.7%). Years of teaching experience ranged from one to 39 years and averaged 17.4 years. High school teachers represented 80.1% of the sample. On average teachers taught 6.03 agricultural education courses and 0.25 non-agricultural education courses. Over one-third of the sample held bachelor's degrees (35.7%), 62.9% held master's degrees, and 1.4% held degrees above the master's level. A college content area reading course was completed by 38.8% of teachers.

Related to objective 1, teachers were asked about their attitudes toward reading (see Table 1). Internal consistency for the construct was $\alpha = 0.88$. Agreement on the nine construct items ranged from 96.7% to 23.3% with means ranging from 4.78 to 2.66. Teachers generally agreed with the value of reading (over 80% agreement), but were in less agreement as to their personal engagement with reading as a hobby or on a daily basis (less than 60% agreement). Teachers were also asked about their attitudes related to reading in agriscience. Internal consistency for the construct was α = 0.77. Teachers generally agreed that reinforcing reading was part of the responsibility of agriscience teachers (over 80% agreement), but were in less agreement for actually teaching reading skills (less than 80%).

Table 1. *Teachers' Personal Reading Attitudes and Attitudes Toward Reading in Agriscience (n = 211)*

	Agree[b]	Undecided	Disagree[b]	M[c]	SD
Personal reading attitude					
Reading is a good use of time.[a]	96.7%	0.5%	2.9%	4.78	0.69
A person learns a lot from reading.[a]	96.2	1.0	2.9	4.78	0.71
Reading has been useful for my personal development.	90.1	5.2	4.8	4.42	0.88
Reading is almost never boring.[a]	84.1	10.6	5.2	4.35	0.92
Books help us understand people and ideas.	86.6	6.7	6.7	4.24	0.98
I enjoy reading.	81.5	11.9	6.7	4.17	0.92
Reading for pleasure is one of my hobbies.	52.7	21.1	26.3	3.41	1.25
I make time for reading every day.	40.5	21.9	37.7	3.08	1.26
I do not have enough time to read books.	23.3	27.6	49.1	2.66	1.16
Attitude toward reading in agriscience					
Reading is important in agriscience.	93.4	4.3	2.4	4.44	0.69
Reading textbooks, magazines, and other publications is necessary for success in agriscience.	94.3	2.8	2.8	4.41	0.69
Reading is important for agriscience success.[a]	90.5	1.9	7.5	4.41	1.01
Agriscience teachers should reinforce effective CARS.	91.4	6.2	2.3	4.35	0.76
Agriscience teachers are responsible for developing students' reading skills.[a]	81.5	10.0	8.5	4.09	0.98
Good instruction in agriscience involves teaching CARS.	60.7	29.9	9.4	3.71	0.92
Agriscience teachers are responsible for teaching reading skills.	47.8	27.5	24.6	3.32	1.09

[a]Presented as a negatively stated items, but positively stated and reverse-coded data analysis.
[b]Strongly agree and agree were collapsed into agree column. Strongly disagree and disagree were collapsed into the disagree column.
[c]1 = Strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree.

Objective 2 sought to determine how teachers select and use texts. Related to this objective, 91.1% of teachers said that their agriscience program used textbooks. A classroom set of texts was available in 90.1% of classrooms, while students were assigned individual texts in

38.0% of classrooms. Trade books were used by 49.5% of teachers. Teachers selected textbooks 90.6% of the time, while the agricultural advisory committee and school boards were also involved (19.3% and 11.3%, respectively). Texts were generally replaced every five to seven years (58.9%) and as needed (24.4%).

Also related objective 2, teachers were asked to rate the frequency (fraction of class meetings per week) and intensity (minutes per use) of textbook use in their agriscience courses (see Table 2). Teachers used textbooks most frequently in animal science, introductory level, middle school, natural resource management, horticulture, and plant science courses (greater than 20% used texts on a daily basis). Teachers used textbooks most intensively in animal science, introductory level, agricultural mechanics, plant science, and middle school courses (greater than 30% of teachers used texts for 25 minutes per use).

Table 2. *Percent Frequency and Intensity of Textbook Use in Agriscience Courses (n = 216)*

		Frequency (fraction of weekly classes)					Intensity (minutes/use)				
Course	*n*	0	¼	½	¾	daily	5	10	15	20	25
Animal science	149	1.3	17.4	33.6	18.8	28.9	2.7	3.4	28.6	29.3	36.1
Introductory level	108	4.6	22.2	27.8	20.4	25.0	2.8	15.9	21.5	25.2	34.6
Middle school	33	15.2	33.3	12.1	15.2	24.2	24.2	18.2	9.1	18.2	30.3
Natural resource mgt.	89	4.5	23.6	32.6	15.7	23.6	5.7	9.1	36.4	22.7	26.1
Horticulture	122	4.1	23.0	34.4	18.0	20.5	3.4	12.6	25.2	31.1	27.7
Plant science	119	2.5	25.2	32.8	19.3	20.2	2.6	8.6	28.4	29.3	31.0
Floriculture	70	1.4	31.4	37.1	11.4	18.6	4.4	7.4	27.9	32.4	27.9
Agribusiness mgt.	92	2.2	39.1	23.9	17.4	17.4	3.3	15.2	27.2	30.4	23.9
Ag mechanics	128	4.7	47.7	16.4	14.1	17.2	8.1	22.0	19.5	17.1	33.3
Farm mgt.	65	0.0	41.5	24.6	18.5	15.4	6.5	22.6	21.0	24.2	25.8
Ag communications	48	8.3	41.7	22.9	12.5	14.6	6.4	21.3	36.2	17.0	19.1
Landscape mgt.	88	8.0	30.7	31.8	15.9	13.6	6.0	16.7	25.0	28.6	23.8
Ag leadership	112	6.3	34.8	38.4	8.9	11.6	6.5	20.6	30.8	23.4	18.7
Food science	35	8.6	51.4	17.1	11.4	11.4	5.9	29.4	17.6	23.5	23.5
Soil science	84	3.6	35.7	32.1	19.0	9.5	6.0	12.0	34.9	27.7	19.3
Biotechnology	54	9.3	44.4	24.1	13.0	9.3	9.4	22.6	26.4	22.6	18.9
SAE	118	18.6	40.7	22.9	11.9	5.9	17.7	25.7	30.1	11.5	15.0

Using the mean frequency and intensity of textbook use, the researchers computed the total amount and percent of class time per week spent using textbooks based on 250 minutes of instruction per week (see table 3). The weighted means were 51.8% of class periods per week, 17.7 minutes per use, 45.7 total minutes per week, and 18.3% of total class time. Teachers spent more than 50 minutes per week using textbooks in animal science, introductory level, plant science, horticulture, and natural resource management courses. They spent less than 40 minutes per week using textbooks in middle school, agricultural leadership, agricultural communication, food science, biotechnology, and Supervised Agricultural Experience (SAE) courses.

Objective 2 also regarded teachers' selection of textbooks. Teachers were asked about criteria for textbook selection (see Table 4). Mean agreement ranged between 4.68 and 2.50.

Means over 4.50 were found for current and relevant information, readability, and overall interestability to students. Items with the lowest agreement (less than 3.50) were for recommendations from the university, statewide textbook adoption, and the publishing company.

Table 3. *Use of Textbooks in Agriscience Courses*

		Mean			
Course	*n*	Frequency (percent)	Intensity (minutes)	Time/week (minutes)	Class time (percent)
Animal science	149	64.2	19.7	63.0	25.2
Introductory level	108	59.8	18.6	55.7	22.3
Plant science	119	57.4	18.9	54.1	21.6
Horticulture	122	57.0	18.4	52.3	20.9
Natural resource mgt.	89	57.6	17.7	51.0	20.4
Floriculture	70	53.6	18.6	49.8	19.9
Agribusiness management	92	52.2	17.8	46.5	18.6
Farm management	65	52.0	17.0	44.2	17.7
Landscape management	88	49.1	17.4	42.7	17.1
Soil science	84	48.7	17.1	41.7	16.7
Agricultural mechanics	128	47.9	17.3	41.4	16.5
Middle school	33	50.0	15.6	39.0	15.6
Agricultural leadership	112	46.2	16.4	37.8	15.1
Agricultural communication	48	45.9	16.1	36.8	14.7
Food science	35	41.4	16.5	34.0	13.6
Biotechnology	54	42.2	15.9	33.6	13.4
SAE	118	36.5	14.0	25.6	10.2
Weighted mean	---	51.8	17.7	45.7	18.3

Objective 3 sought to determine how teachers used CARS and which CARS were implemented in agriscience. Reliability for this construct was $\alpha = 0.87$. Researchers asked teachers 13 questions related to the application of general approaches to reading (see Table 5). Means for the general approaches to reading ranged from 3.85 to 2.24. Percent *often* and *always* ranged from 73.4% to 15.3% for the approaches to reading. Summarizing was taught by 73.4% of teachers, followed by determining important ideas (60.8%), generating questions (58.1%), defining unfamiliar words (57.6%), and identifying the purposes for reading (51.4%). The fewest teachers taught students to think aloud while reading (15.3%), make predictions (18.8%), and use more than one reading strategy (28.5%).

Also related to objective 3, teachers were asked about their knowledge of, confidence in, and frequency of implementation of a series of 11 specific CARS (see Table 6). Teachers' knowledge of CARS ranged from 1.16 to 3.05 with zero being *none* and five representing *expert* knowledge. Agriscience teacher's confidence in the use of CARS ranged from 1.17 to 3.04 with zero representing *no* confidence and five representing *expert* confidence. The range of strategy use per week was 1.80 to 0.14 strategies per week. Agriscience teachers used an average of 6.78 CARS per week.

Table 4. *Mean Criteria for Textbook Selection in Agriscience (n = 212)*

Criteria	Mean[a]	SD
Current and relevant information	4.68	0.524
Readability	4.55	0.586
Overall ability to interest students	4.54	0.595
Curriculum associated with the text	4.42	0.786
Organization and structure	4.40	0.664
Vocabulary	4.24	0.706
Graphics	4.19	0.706
Pictures	4.13	0.773
Associated curriculum materials (overheads, handouts, etc.)	4.03	0.997
Recommendations from other agricultural education teachers	4.03	0.963
Overall appearance	3.74	1.046
Price	3.67	1.154
Supplemental websites	3.56	1.189
Recommendations from the university agricultural education program	3.26	1.163
Statewide textbook adoption	2.90	1.453
Publishing company	2.50	1.249

[a]1 = strongly disagree and 5 = strongly agree.

Table 5. *Percent Application of General Approaches to Reading (n = 206)*

In my agricultural education courses, students are taught to…	Often & Always	Occ.	Never & Seldom	Mean[a]	SD
…summarize what they read.	73.4	17.6	9.0	3.85	0.92
…determine important ideas.	60.8	29.7	9.5	3.64	0.94
…generate questions about the text.	58.1	26.4	15.4	3.54	1.04
…define unfamiliar words during reading.	57.6	27.1	15.2	3.57	1.08
…identify their purpose for reading.	51.4	33.3	15.2	3.44	1.04
…use text structure to build comprehension.	41.3	34.0	24.8	3.12	1.10
…monitor comprehension during reading.	40.4	37.0	22.6	3.17	1.04
…create visual representations to aid comprehension and recall.	38.1	37.1	24.8	3.13	1.12
…preview texts before reading.	35.1	28.4	36.5	2.92	1.21
…activate background knowledge.	34.5	36.4	29.2	3.02	1.10
…use more than one reading strategy.	28.5	33.3	37.7	2.81	1.11
…make predictions before reading.	18.8	33.3	48.1	2.58	1.03
…think aloud while reading.	15.3	22.4	62.4	2.24	1.10

[a]Never = 1 and daily = 5.

Correlation analyses were done comparing demographic variables to constructs of interest related to teachers' attitudes toward reading (see Table 7) and used the conventions provided by Davis (1971). Knowledge of CARS had a very high positive correlation with confidence in using CARS, a substantial positive correlation with frequency of use of CARS, and low positive correlations with attitude toward reading in agriscience and general approach to text use. Confidence in use of CARS had a substantial positive correlation with frequency of text use, a low positive correlation with attitude toward reading in agriscience, a moderate negative correlation with general approach to text, and low negative correlations with gender and years of teaching experience.

Frequency of strategy use had a moderate positive correlation with general approach to text use and a low positive correlation with frequency of strategy use. Education had a low positive correlation with years of teaching experience. Completion of a college reading course provided low positive correlations with confidence in the use of CARS and frequency of use of CARS. Personal attitude toward reading had a low positive correlation with attitude toward reading in agriscience. Attitude toward reading in agriscience had low positive correlations with years of teaching experience and general approach to text use. Gender had a moderate positive correlation with years of teaching experience. Completing a college reading course also had a low negative correlation with years of teaching experience.

Table 6. *Mean Knowledge of, Confidence in, and Frequency of Use of CARS (n = 216).*

Strategy	Knowledge		Confidence		Frequency	
	Mean[a]	SD	Mean[a]	SD	Mean	SD
Study guides	3.05	1.27	3.04	1.34	1.80	1.54
Guided reading procedure	2.28	1.29	2.27	1.34	1.11	1.36
Reciprocal teaching	2.18	1.11	1.69	1.08	.61	1.12
Graphic organizers	2.13	1.30	2.07	1.30	.95	1.50
Collaborative strategic reading	2.06	1.10	2.01	1.09	.91	1.21
K-W-L	1.49	1.00	1.43	0.91	.31	0.79
Jig-sawing	1.43	0.89	1.41	0.90	.27	0.76
SQ3R	1.34	0.78	1.32	0.77	.26	0.78
Cornell notes (2- or 3-column notes)	1.28	0.72	1.27	0.73	.21	0.71
Socratic seminar	1.22	0.63	1.26	0.72	.21	0.65
Directed reading-thinking activity	1.16	0.55	1.17	0.57	.14	0.54

[a]1 = none and 5 = expert.

Conclusions

Agriscience teachers in this study generally valued reading as a meaningful activity for learning, personal development, and enjoyment. However, they were not in agreement as to their allotment of daily time for engaging in reading. These agriscience teachers also placed high value on reading in agriscience, but were in less agreement as to their role and responsibility in teaching students reading skills. Prior research indicates that content area teachers perceive their responsibility to instruction about content, not teaching CARS (D'Arcangelo, 2002; Forget & Bottoms, 2000; Moore et al., 1999; Snow, 2002).

Teachers generally understood how to select textbooks and selected texts based upon appropriate criteria, including current and relevant information, readability, and interestability for students. Teachers allocate approximately 15-20% of their class time to using textbooks on a weekly basis. Classes where texts are more heavily utilized included animal science, introductory level, middle school, natural resource management, horticulture, and plant science courses. Predictably, teachers used texts least in SAE courses.

Table 7. *Correlations between Demographic Variables and Reading Criteria*

	1	2	3	4	5	6	7	8	9	10
1. Education[a]	---	-.07	.20**	-.03	.14	.07	.12	.05	.06	.02
2. College reading course[b]		---	-.14*	-.06	.11	.03	-.03	.13	.20**	.23**
3. Years teaching experience			---	.40**	.00	.16*	.03	-.08	-.19**	.01
4. Gender[c]				---	.00	.05	-.13	-.10	-.18**	.03
5. Approach to text use					---	.29**	.12	.27**	.34**	.39**
6.Attitude toward agriscience reading						---	.29**	.20**	.17*	.21**
7.Personal attitude toward reading							---	.09	.11	.09
8. Knowledge of CARS								---	.95**	.61**
9. Confidence in use of CARS									---	.80**
10. Frequency of use of CARS										---

*Correlation significant at $\alpha < .05$ level. **Correlation significant at $\alpha < .01$ level.
[a]Bachelor's degree = 1, master's degree = 2, doctoral degree = 3.
[b]No = 0, yes = 1.
[c]Female = 0, male = 1.

When approaching reading, teachers taught students to summarize, determine the important ideas, generate questions, define unfamiliar words, and identify their purpose for reading. Teachers did not regularly teach students to activate background knowledge, use more than one strategy, make predictions, or think aloud. Teachers possessed limited knowledge of specific CARS. Teachers were most knowledgeable and confident in use of study guides with lesser knowledge and confidence with the remainder of the CARS.

Knowledge of CARS, confidence in their use, and frequency of strategy implementation demonstrated the highest positive correlations in this study. However, completing a college reading course was positively correlated with knowledge and confidence in reading strategy use, as was the teacher's attitude toward reading in agriscience. A teacher's general approach to text use was positively correlated with his or her attitude toward reading, frequency of strategy use, and knowledge of CARS.

Teachers with more years of teaching experience tended to have graduated college without completing a content area reading course. However completing such a course tended to have a positive influence on confidence in and frequency of use of CARS. Yet, teachers with more experience also tended to have more positive attitudes toward reading, but were less confident in the use of CARS than teachers with less experience. Males were also less confident in use of CARS than females. Teachers who had a more positive attitude toward reading in agriscience also tended to have a more positive approach to text use and more knowledge of, confidence in, and frequency of use of CARS. If teachers were predisposed to a positive attitude toward personal reading, then they also tended to have a positive attitude toward reading in agriscience and more knowledge of, confidence in, and frequency of use of CARS.

Recommendations

Modeling an appreciation for reading and use of CARS encourages students to read and implement strategies. Agriscience teachers should be encouraged to model reading for their students, as well as incorporate CARS in classroom instruction. To further this aim, teacher educators can reinforce effective active CARS in their teaching methods courses and teach about proper text use, text selection, and general approaches to reading. Pre-service students should also be encouraged to complete content area reading courses as part of their plans of study.

Being called upon to demonstrate contributions toward student achievement (Belcher et al., 1996; Conroy & Walker, 2000), agriscience teachers can contextualize the reading experiences of students by implementing CARS when using texts in agriscience. As textbooks are utilized in nearly 20% of agriscience class time, agriscience teachers should learn and implement effective strategies for using this learning tool. Further research is needed in this area of inquiry in agriscience education. What are teachers' specific attitudes toward reading? How do teachers perceive their role in reinforcing CARS? How prepared are teachers to enhance students' reading?

Discussion and Implications

Teachers in this study generally agreed with the importance of reading from a personal and professional standpoint. However, they indicated less agreement as to the actual allocation of time to personal reading and less agreement as to their responsibility for actually teaching reading skills. The disconnection between attitude and behavior toward reading may give an indication as to the culture of reading in secondary agriscience.

While agriscience teachers in this study indicated textbook selection was based primarily upon current and relevant information and readability, two implications come forth. First, textbooks by nature contain questionably current information. On the other hand, trade books, magazines, and journals often contain more current information, yet teachers indicated that they used these sources of information least. Secondly, trade books and magazines are sold to the general public, thus they are often easier to read and more interesting. Additionally, these are the forms of text to which students will refer in their futures as lifelong learners.

Reading involves three microperiods: pre-reading, during reading, and post-reading (Snow, 2002). Content area teachers have traditionally excelled in assessing post-reading activities, such as summaries, quizzes, and questions from the end of the chapter, but have implemented fewer pre-reading and during CARS (Durkin, 1978). The agriscience teachers in this study would indicate the same. If one divided the responses from the general approaches to text use into the three microperiods, agriscience teachers implemented post-CARS most frequently, with during reading and pre-CARS lagging behind. Students who fail to understand the purposes of reading and neglect to monitor comprehension while reading will also struggle with assessments following reading.

Among the implications for this study is the need for teacher educators to ensure that CARS are a facet of the preservice experience. Further, teacher educators should do their part in reinforcing content area reading by implementing CARS, demonstrating an appreciation for reading, and helping students navigate the myriad of text options in agriscience.

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Immediate Cognitive Effects of Computer-Generated Animation Versus Realia Upon Undergraduates Enrolled in an Agricultural Power Technology Class

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Abstract

The utilization of visual elaboration has been a key component of the educational process for instructors of agricultural power technology. Since theoretical concepts that comprise the most basic operational processes of the internal combustion engine and its other processes are hidden; traditional still illustration and representatives of real equipment (realia) have been utilized to teach these hidden processes. This study, which is one part of a larger study, investigated the effects of computer-generated animations on low-level and high-level immediate cognition in undergraduates. The dual-coding theory was utilized as the investigation's theoretical framework. The study utilized an experimental pretest-posttest control group design. Participants were undergraduate students (n = 51) enrolled in "Agricultural Power Units," an undergraduate agricultural power technology course at a university in Texas. Following pretest, an immediate posttest was administered in order that learning decay could be measured. For this investigation, the dependent measure (multiple choice test) consisted of low-level and high-level cognitive questions. Three hypotheses were developed. Results indicate that no significant differences existed between the traditional and animated groups. Therefore, animation may be successfully substituted for realia in lecture situations. The authors call for further study that focuses on variations of the utilization of animation in agricultural mechanization topics.

Introduction/Theoretical Framework

A great deal of effort and creativity have been required of instructors who teach topics which cannot be conveniently viewed. One such topic area is agricultural power technology, this area restricts instructors because many of the processes are hidden or rapidly occur, and therefore students are not able to study the concepts taking place. This includes concepts or content that may be abstract, vague, hard to visualize, too fast or slow, or hidden from view, hence they are abstract concepts in the student's mind (Gagne', 1985). Agricultural power instructors have used a number of other visuals, such as, still pictorial representations, specialized learning aids, machinery cutaways, and actual parts to aid in combating the hidden or great speeds of many of the systems' processes. However, these illustrations do not fully represent this process. Also, the purchase of agricultural power equipment is expensive and the cost of keeping the equipment technologically current is expensive as well. Moreover, students may not gain the desired learning effects from many of these teaching aids; also this equipment can requires much time and money to develop.

New advances in the area of computer-generated animation may be one of the tools that aids student learning in such topics as agricultural power, while relieving some of the monetary and time constraints that are consistent with traditional methods of visual lesson reinforcement. Although much of the research conducted on the benefits of animation in a learning environment is not consistent (Park & Hopkins, 1993; Rieber, 1990a), many students favor and enjoy learning with animation (Rieber, 1990b, 1991; Rieber, Boyce, & Assad, 1990; Dooley, Stuessy, Magill, & Vasudevan, 2000).

A computer-generated animation is a series of still computer-generated pictures that are presented in succession in order that the illusion of motion is developed, much like a picture flip-book (Burke, Greenbow, & Windschitl, 1998). Animations differ in that they offer two unique attributes that still pictures do not, trajectory and motion (Rieber, 1991). Therefore, animations represent a subset of instructional visuals (Rieber, 1990a) and receive general theoretical support from information processing learning theories proposed by individuals such as Gagné (1985) and Pavio (1971, 1983, 1986, 1990).

Animations tend to aid in high-level cognition situations such as problem solving, incidental learning, critical thinking, etc., rather than aiding students in low-level recall (Baek & Layne, 1988; Agnew & Shinn, 1990; Rieber, 1990a; Rieber, Boyce, & Assad, 1990; Mayer & Anderson, 1991, 1992; Park & Hopkins, 1993; Williamson & Abraham, 1995; Nicholls, Merkel, & Cordts, 1996). According to Park and Hopkins (1993), if a lesson is limited to low-level learning tasks, animations have the same effect as still illustrations. We also know from the literature that animations are specialized and must be used in the correct context, situation, and the appropriate philosophical perspective, (Rieber & Hannafin, 1988; Rieber, 1990a; 1990b; 1991; LoPresti & Garafalo, 1992; Park & Hopkins, 1993; Williamson & Abraham, 1995; Nicholls, Merkel, & Cordts, 1996; Dooley, Stuessy, Magill, & Vasudevan, 2000) as well as with the appropriate learner (expert vs. non-expert learners, experienced vs. non-experienced learners, low-spatial vs. high-spatial ability learners, younger vs. older learners, etc.) or their effects are negated (Mayer, 1989; Rieber, 1990a; 1990b; Rieber, Boyce, & Assad, 1990; Park & Hopkins, 1993; Mayer & Sims, 1994; Williamson & Abraham, 1995; Mayer, 1997; Dooley, Stuessy, Magill, & Vasudevan, 2000). Next, through the work of Richard Mayer and others, we know that animations need narration to be most effective; preferably the narration and animation are delivered simultaneously (Rieber, 1991; Mayer & Anderson, 1991; 1992; Park & Hopkins, 1993; Burke, Greenbow, & Windschitl, 1998). It has also been found that animations can reduce the time it takes to complete a defined task such as model construction or test taking (Rieber, Boyce, & Assad, 1990; Park & Hopkins, 1993). Although there are not vast amounts of empirical evidence, animations have also been found to be excellent attention-gaining devices in the classroom (Baek & Layne, 1988; Park & Hopkins, 1993). Finally, we know that students view animation favorably, that animation helps to motivate students, and that practice can affect how students learn with animation (Peters & Daiker, 1982; Rieber, 1990a, 1990b, 1991; Nicholls, Merkel, & Cordts, 1996; Rieber, Noah, & Nolan, 1998; Rueter & Perrin, 1999; Dooley et al., 2000).

Primary theoretical support for the use of animations, as well as still illustration, and their effects on learning comes from the dual-coding theory (Pavio, 1971, 1983, 1986, & 1990). According to this theory, information is processed and represented by two separate codes known as verbal codes and non-verbal codes. The theory argues that humans understand the world around them through language and non-verbal objects and occurrences. Language is categorized as incoming and outgoing and shares a symbolic relationship to the non-verbal, which can be representative of such things as objects, events, and behaviors. The non-verbal code includes all information that can be processed from the senses, which includes non-verbal sounds. These verbal and non-verbal codes can be encoded information from a human's environment individually or simultaneously.

Verbal and non-verbal coding systems work as a sort of two-lane road in which information travels. As information travels along this roadway, many connections are developed during the process of cognition. As information is acquired, representational connections are made to verbal or non-verbal information received by the learner. These connections are exactly as their name implies, they are representative schema that activate prior knowledge or experiences that the learner may have in relation to what is being learned. For example, if a student views a brightly colored rubber orb, the structure is representative of a ball used for play, representation is developed between what is experienced by the senses and the individual's sense representation for what is experienced. Associative connections are made within the verbal and non-verbal "lanes", respectively, that is, actual words and an individual's verbal representations of the words are developed and connected. Also, words that may be associated to one another tend to make connections as well (i.e., the word tabby may also activate the word feline). Non-verbals are also connected associatively. Just as with words, smells may conjure visual memories or the sight of certain objects may cause flashbacks to scenes experienced by an individual. Put simply, associations are made, and words are related to other words and images to other images of the same or different sense perception mode (Pavio, 1971, 1986; Clark & Pavio, 1991). The third types of links are referential connections, which are connections that cross over "lanes" in order to create links between the verbal and non-verbal information. These types of connections are championed by supporters of multimedia instruction for the argument that if information is coded verbally, as well as through another sense such as sight (visually), the information is more likely to be remembered because one representation or reference can activate another. "When information is dually coded, the probability of retrieval is increased because if one memory trace is lost, another is still available" (Rieber, 1991, p. 319). Figure 1.1 is a visual representation of the dual-coding theory.

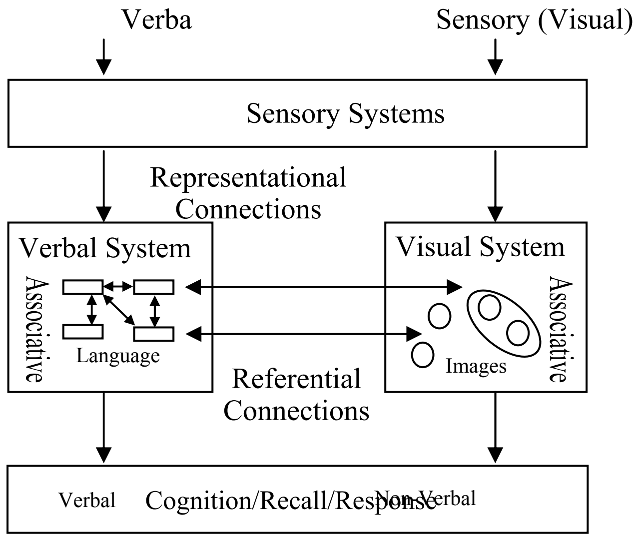

Figure 1. *A dual-coding model for processing animation and speech. Adapted from* *<u>Mental Representations: A Dual-Coding Approach</u>, Pavio, 1990.*

Current research indicates that animation tends to have a cognitive orientation; therefore, a low/high level cognitive orientation was implemented in this study (Baek & Layne, 1988: Agnew & Shinn, 1990; Rieber, Boyce, & Assad, 1990; Mayer & Anderson, 1991 & 1992; Park & Hopkins, 1993; Williamson & Abraham, 1995; Nicholls, Merkel, & Cordts, 1996). The investigation of the immediate effects of animation on testing is limited, therefore, the study also researched the immediate cognitive effects of animation as prescribed by prior research in this area (McGregor, Fraze, Baker, Drueckhammer, Lawver, 2003; McGregor, Fraze, Baker, Haygood, Kieth, 2003).

Purpose and Hypotheses

The purpose of the study was to determine if there were any measurable learning effects, which would result from the use of computer-generated animations as a replacement for realia on an immediate posttest with a combination of low and high-level cognitive questions. Undergraduate students enrolled in the course were studied in order to determine if there are any significant differences that exist between students who view computer-generated animations that were added to static illustrations, in comparison to students who viewed static illustrations and realia. Consequently, the following research hypotheses were formulated:

H_o1: There are no significant differences between the illustration/realia (traditional) group and the illustration/animation (animation) group on the immediate low-level cognitive test scores.

H_o2: There are no significant differences between the illustration/realia (traditional) group and the illustration/animation (animation) group on the immediate high-level cognitive test scores.

H_o3: There are no significant differences between the illustration/realia (traditional) group and the illustration/animation (animation) group on the total immediate cognitive test scores

Methodology

The research design for this study was an experimental, randomized subjects, pretest-posttest control group design (Ary, Jacobs, & Razavieh, 1996). Even though the subjects were self-selected into a particular course through registration for the course, rationale for selection of this design does exist because of random assignment of subjects to experimental treatment was possible (Kirk, 1995; Ary et al., 1996; Gay & Airasian, 2000). The population consisted of undergraduate students in Colleges of Agriculture whose major course of study requires an agricultural power course and/or students that may have a particular interest in an agricultural power course.

Data were collected during the fall semester of 2003 and the actual experiment took place during one instructional week. The pretest was administered two weeks prior, and the immediate posttest immediately following the instructional unit. Pretest and Posttest questions were identical. The groups participated at 9:25 a.m., the regularly scheduled class time. Subjects were asked to participate in the class as they normally would, attending to the content in the lesson and take notes as they wanted. Subjects were informed of the immediate posttest that would follow the lesson. Both of the lessons lasted approximately one hour and thirty minutes; included in this time frame were the instructional and testing time.

A lecture style presentation was presented to participants in the traditional (control) and animation (treatment) groups. The content of the lecture focused on the operational theory of the spark ignition internal combustion engine. Students in the animation group viewed a PowerPoint® presentation, which included illustrations and animations that were inserted into the presentation. The traditional group also viewed a PowerPoint® presentation, which covered the same material, only differing in that there were realia utilized in place of the animations that were utilized for the treatment group.

Following the lesson's content, a 45 question multiple-choice test was administered to each participant. This administration served as the immediate posttest. Students were given as much time as needed to complete the posttest. The instrument was a researcher-developed test that coordinated with the lesson's content and material. The overall instrument's item content varied according to high and low cognitive levels, according to the levels of cognition developed by Newcomb and Trefz (1987), which were adapted from Bloom's Taxonomy. Newcomb and Trefz consolidated Bloom's Taxonomy into four levels of cognition, which are remembering, processing, creating, and evaluating. Test items classified as low-level cognitive questions were directly taught during the instructional setting, and therefore students needed only to recall information in order to be successful on each low-level question. Test items classified as high-level challenged students to combine, create, or evaluate the information given in the lesson in order to arrive at the appropriate answer.

The instrument was tested for face and content validity by a national panel of experts in agricultural education, agricultural mechanization, and agricultural engineering whose research areas have focused on agricultural mechanization/engineering, cognitive levels for testing, and educational objectives. The overall reliability of the test was measured by the Kuder-Richardson-20 (KR-20) formula upon completion of the immediate posttest. Initial reliability coefficients for the overall pretest (.68) and overall immediate posttest (.75) were more than acceptable when compared to similar research in this area.

After completing the testing periods, data were entered into and analyzed using SPSS for Windows. Data that were collected include low and high level cognitive test scores from each test: pre-test and immediate posttest, also total scores from each of the test, gender, GPA, and classification.

Mean comparisons were made utilizing an analysis of variance for all hypotheses. The final number of scores available for analysis was n = 51; therefore, the control (traditional) group (n = 28) and the treatment (animation) group (n = 23) were un-equated when considering frequency. According to Green, Salkind, and Akey (2000), if cell sizes are not equal, it is suggested that un-weighted means (estimated marginal means) be reported. All hypotheses were tested at the $p < .05$ level.

Results/Findings

Following analysis of all valid cases, it was found that 31 participants were male (60.7%) and 20 (39.3%) were female. The average age of the participants was 20.76 years (SD= 3.39) and the average cumulative GPA for all participants was 2.51 (SD=.57) on a 4.0 scale. Of the students who participated in the study, 16.9% were freshmen, 42.4% were sophomores, 28.8% of the participants were juniors, 10.2% were seniors and 1.7% were graduate students.

Table 1 reports the estimated marginal mean scores, standard error, and confidence intervals for each testing administration during the course of the experiment for the traditional (control) and the animation (treatment) groups.

Table 1. *Summary of Pretest and Immediate Posttest Administrations to Participants*

	Traditional Group				Animation Group			
			Confidence Interval (95%)				Confidence Interval (95%)	
Test Administration	EMM	SE	Lower	Upper	EMM	SE	Lower	Upper
Low-Level Pretest	40.2	2.86	34.42	46.03	35.2	3.27	28.65	41.82
High-Level Pretest	37.8	2.56	32.62	42.94	38.5	2.91	32.63	44.32
Total Pretest	38.6	2.42	33.72	43.46	37.0	2.74	31.43	42.48
Low-Level Immediate Posttest	83.4	1.84	79.70	87.08	81.5	2.03	77.45	85.59
High-Level Immediate Posttest	59.7	2.67	54.35	65.08	60.4	2.95	54.43	66.27
Total Immediate Posttest	70.2	2.02	66.11	74.25	69.8	2.23	65.34	74.31

EEM – Estimated Marginal Mean
SE – Standard Error

Hypothesis One

Hypothesis one tests the hypothesis of no differences between traditional and animation groups for the immediate low-level posttest. Table 2 summarizes the results of an analysis of variance utilized to test the hypothesis of no differences.

Table 2. *Analysis of Variance Comparing Traditional and Animation Groups on Immediate Low-Level Cognitive Posttest Scores*

Source	SS	df	MS	*F*	p
Between	44.210	1	44.210	.468	.497
Within	4624.418	49	94.376		
Total	4668.627	50			

Although the traditional group (M=83.4) did score higher on the immediate low-level posttest in comparison to the animation group (M=81.5), no significant differences were detected. According to the non-significant *F*-ratio, the finding indicates that the use of animation develops equivalent learning effects when compared to realia on an immediate low-level cognitive test.

Hypothesis Two

Hypothesis two tests the hypothesis of no differences between traditional and animation groups for the immediate high-level posttest. Table 3 summarizes the results of an analysis of variance utilized to test the hypothesis of no differences.

Table 3. *Analysis of Variance Comparing Traditional and Animation Groups on Immediate High-Level Cognitive Posttest Scores*

Source	SS	df	MS	*F*	p
Between	5.068	1	5.068	.025	.874
Within	9786.932	49	199.733		
Total	9792.000	50			

Although the traditional group (M=59.7) did score lower on the high-level posttest in comparison to the animation group (M=60.4), no significant differences were evident. This finding was consistent with the immediate low-level cognitive examination. According to the non-significant *F*-ratio, the finding indicates that the use of animation develops equivalent learning effects when compared to realia on an immediate high-level cognitive test.

Hypothesis Three

Hypothesis three tests the hypothesis of no differences between traditional and animation groups for the immediate high-level posttest. Table 4 summarizes the results of an analysis of variance utilized to test the hypothesis of no differences.

Table 4. *Analysis of Variance Comparing Traditional and Animation Groups on Total Immediate Cognitive Posttest Scores*

Source	SS	df	MS	*F*	p
Between	1.569	1	1.569	.014	.907
Within	5619.441	49	114.682		
Total	5620.980	50			

As described in table 4 the traditional group (M=70.2) did score higher on the total immediate posttest in comparison to the animation group (M=69.8), no significant differences were evident. This finding was consistent with the immediate low-level and high-level cognitive examination. According to the non-significant *F*-ratio, the finding indicates that the use of animation develops equivalent learning effects when compared to realia on the immediate cognitive test.

Conclusions/Recommendations

Hypothesis One

The results of this study indicate the addition of animation to an agricultural power lesson can be successfully interchanged with realia without concern for a significant loss in learning on an immediate low-level posttest. This finding is consistent with prior research that has found that, typically, no differences exist between animation and illustration/realia when considering low-level recall information (Mayer, 1989; Rieber, 1990a, 1990b, 1991; Rieber, Boyce, & Assad, 1990; Rieber & Kini, 1990; Mayer & Anderson, 1991, 1992; Park & Hopkins, 1993). If asking students to perform simple tasks related to remembering and processing (Newcomb & Trefz, 1987), still illustrations and computer-generated animation are just as effective as realia coupled with still illustrations.

Hypothesis Two

The results from this study indicate the addition of animation to an agricultural power lesson can be successfully interchanged with realia without concern for a significant loss in learning on an immediate high-level posttest. This finding contradicts prior research relating to animation's beneficial effects on higher-level cognition (Baek & Layne, 1988; Agnew & Shinn, 1990; Rieber, 1990a; Rieber, Boyce, & Assad, 1990; Mayer & Anderson, 1991, 1992; Park & Hopkins, 1993; Williamson & Abraham, 1995; Nicholls, Merkel, & Cordts, 1996).

Hypothesis Three

Considering that hypothesis three was simply a culmination of hypotheses one and two, one would expect no difference between groups. Once again, results indicate that there were no differences between students who viewed animated visual aids rather than realia based models.

Discussion

The authors would like to advise the readers to approach the findings of this study with caution. Findings were based upon a subset of students from a limited geographical location in the United States. Also, generalizability could also be limited due to the study's small sample size and limited available population.

The current study has found that educators involved in the instruction of agricultural power topics cannot expect significant learning effects, negative or positive, from the addition of computer-generated animation to their lessons. However, instructors should find this study to be beneficial due to the fact that realia is costly, can be bulky and difficult to use in some situations; animation has none of these limitations. Therefore, the use of animations would alleviate traditional concerns related to the use of realia and not risk a loss in understanding. The addition of animation to traditional teaching methods did not affect total immediate cognition, nor did it affect learning decay.

The truly valuable finding that this study offers educators is the fact that animation can be successfully interchanged with traditional realia without regard for a reduction in immediate learning. According to the findings of this study a teacher has the ability to show a process that is perhaps hidden, to fast or slow, theoretical, etc. without leaving a traditional classroom. This is truly powerful for educators who face reduced budgets, but still would like to offer a rich barrage of visuals for their students while utilizing modern computerized classroom technology.

The authors would like to call for further study that focuses on variations of the current study. One such variation would explore a larger population. In addition, another study would investigate the effects of realia/animation combinations on secondary students enrolled in agriscience courses. Pressley (1977) promoted the position that adult learners with preset mental models for understanding tend not to rely on visual stimulation through the learning process as much as young learners. Finally, the authors would like to call for additional research with a different dependent variable that would more accurately measure higher-level cognitive thinking. Additional research will lead to a deepening in understanding that will add to the current and related disciplines.

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Listen to the Students: A Qualitative Study Investigating Adult Student Readiness for Online Learning

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Abstract

Distance education is growing at a rapid rate with 56 percent of post-secondary schools offering distance education courses in 2000-2001, and the number is growing every year (National Center Education Statistics, 2004). Agriculture is listed as one of the top ten disciplines developing distance education at the post-secondary institutional level (Irani, Scherler, Harrington & Telg, 2000). Studies show that adults are the most numerous distance education students. As more graduate courses and complete degree programs are moved online, it is necessary to understand how to transition an adult into a new learning paradigm (Brescia, Miller, Ibrahima & Murry, 2004). This study is a qualitative analysis, designed from the inside out, to give voice to adult distance students in order to understand what they need to be successful in a distance learning environment. The specific objectives were to explore and describe student readiness for online learning and explore and describe what preparation adult students feel they need prior to starting a doctoral program of study. Findings show that some students are willing to "jump in" and "learn as they go," however other students feel "lost" before they get started. This study can serve as a spring-board for other distance education programs in assisting learners in their transition to online learning.

Introduction

The World Wide Web (WWW) has increased the ability to communicate with people all over the world. Higher education is harnessing the use of the web to deliver classes and complete degree programs. Over the last decade the use of the WWW as an instructional medium has increased dramatically. The most recent study by the U.S. Department of Education's National Center for Educational Statistics (2004) reported 56 percent of all postsecondary institutions offered distance education courses in 2001-2002, up 34 percent from 1998-1999. Continued growth is expected. The number of students enrolled in courses increased from 1.7 million in 1997-1998 to 3.1 million in 2000-2001 (National Center Education Statistics, 2004).

Online learning has been highlighted as a delivery system in higher education as it can provide students who are dispersed across the nation with a wealth of interaction and rich learning experiences (Reiser, 2002). The discipline of Agricultural Education is offering classes and complete degree programs via online learning (Dooley, Kelsey & Lindner, 2002). Higher education, traditionally focused on young adults learning in a classroom, is experiencing a paradigm shift towards providing online education to a variety of age groups (Bates, 2000). According to Moore and Kearsely (1996), most distance education students are adults between the ages of 25 and 50. Given today's changing student population to include adult learners in most of higher education institutions and programs, there is a critical question of how to motivate them to fully be absorbed in the online learning process. Strategies need to be developed based on adult learner characteristics (Park, 2004).

Theoretical Framework

The theoretical framework for this study is based on constructivism (Piaget, 1973). The learning theories of Dewey (1938), Piaget (1973), Vygotsky (1978), and Bruner (1996) propose that learners will construct new knowledge based on their prior knowledge. In this perspective the instructor is a facilitator of knowledge. For Dewey (1938) knowledge is based on active experience. The main purpose of education is to improve the reasoning process as applied to solving problems. Knowledge builds around the process of discovery and is dynamic (Dewey, 1938).Vygotsky (1978) placed additional emphasis on the social context of learning. His theory called *social constructivism* stressed the importance of interaction with other people, i.e. other students and teachers.

Adult Learners

Distance education, built upon a unique relationship between learners and instructors, calls out for a qualitatively new pedagogy (Huang, 2002). One of the most salient attributes of online learning is that it allows adults to pursue their education, arranging it around their everyday lives (Vrasidas & McIsaac, 2000). Adult learners bring their particular needs to the online learning environment. The learning theory of constructivism has been proposed as being applicable to online learning (Jonassen, Davidson, Collins, Campbell & Haag, 1995). Petraglia (1998) expands that thought by arguing we should make "the attempt to make learning materials and environments correspond to the real world prior to the learner's interaction with them" (p. 53).

Knowles theorized that adults learn differently than children (Knowles, Holton III & Swanson, 1998). Andragogy, adult learning theory, has six principles. First, adults need to know why they are learning something. Second, adults are self-directed learners, meaning they take control of how they learn. Third, prior learning impacts what is to be learned. Fourth, adults need to be ready to learn. Fifth, adults prefer a problem solving approach to learning. They learn best when the knowledge is presented in a real-life setting. And finally, for adults to be motivated to learn, the new knowledge must help them solve problems they perceive as important. Another adult learning theorist, Brookfield (1986), investigated four unique, exclusive adult learning processes. First, self directed learning is how adults take control of their learning. Then, after adults have found the appropriate resources, they can think contextually and critically about the information. Third, teaching should be based on adults' experiences, which are a valuable resource. Finally, learning to learn is crucial for adult development. This leads to lifelong learning.

Andragogy and constructivism stress an individual's ownership of the learning process, through experiential learning and a problem-solving approach to learning (Knowles et al., 1998). The assumptions of distance learning for adults meet the guidelines of Learner-Centered Psychological Principles (American Psychological Association, 1997).

Learner Readiness

For adults, becoming a self-directed learner includes not only knowledge of study strategies but also practice and attitudes (Schräder-Naef, 1999). As the population ages, the demand for continuing education among older adults will increase. It has been pointed out that the ability of an adult to be a self-directed, lifelong learner cannot be taken for granted (Straka & Stöckl, 1998). The readiness and ability for an adult to succeed in an online learning format is furthered when there is a combination of appropriate learning environments with strategic training (Straka & Stöckl, 1998).Wickersham and Dooley (2001) reported that the learner and their willingness to be self-directed, control the difference between completion and non-completion of an online course. Online retention rates are a concern among higher education institutions. While the percentage of students who drop out of brick and mortar institutions has held steady at 40-45% for the last 100 years (Tinto, 1982), the impression is that the drop out rate for online classes may be 10 to 20 percentage points higher (Diaz, 2002).

Grow (1991) posits that the ability and confidence for a student to be educationally self-directed is linked to their expertise and familiarity within a particular field. Motivation, especially confidence, is related to achievement (Keller, 1999). Bandura (1982) and Mager (1992) believe that performance depends on a feeling of self-efficacy. Online learning presents many obstacles for adults who have little else but classroom exposure for their learning environment. Adults have known from the age of five onwards, that learning equals course, curricula and classrooms. Most adults have had 13 years of classroom experience in school, possibly followed by 4 years of college lectures, and then back to the classroom at work. This experience must be overcome if new learning models are to be successful (Clark, 2002). Smith (cited in Bernard, Brauer, Abrami & Sturkes, 2004) is quoted as stating "With an increasingly diverse range of pedagogical methods being employed by academics, little that students have previously learned in traditional classrooms has prepared them for the era of online learning" (p. 43). Students in our culture are used to the educational paradigm of the instructor as the *sage on the stage*. In an online environment the instructor is more of a facilitator or *guide on the side*, allowing students to learn collaboratively from one another. This is a huge shift for many adult students, one in which they need to be prepared (Palloff & Pratt, 2001).

For adults to function in an online learning environment, it is suggested that "curricula mold the students' learning profile development" (Kell & Van Deursen, 2002, p. 32). Literature has suggested that university students are developing the skill sets needed to succeed in an online learning environment, but authors agree that universities need to address this issue in a formal way as they plan and deliver their academic programs (Oliver, 2001). Stokes, Basford and Cannavina (2004) find that students lack the educational readiness for interactive learning media. They also report that students have the transferable skills and enthusiasm to enable the use of those skills in future learning situations.

Students new to distance learning, specifically an online learning environment find themselves adjusting to a new educational environment supported by unfamiliar technologies (Kazmer, 2000). Students actively engaged in online learning recommend that increased training for using and managing the technology in their distance program would be beneficial (Kelsey, Lindner & Dooley, 2002; Dooley et al., 2002). Faculty have reported that students were unprepared to use web based technology and unprepared to communicate effectively via electronic means (Bozarth, Chapman & LaMonica, 2004; McVay Lynch, 2003). Increased training in technological skills and learning attitudes might increase learner satisfaction, leading to a greater student commitment to online learning (Biner, Dean & Mellinger, 1994).

Increasing Learner Readiness

Institutions of higher education offering online learning are turning to orientation classes to prepare students to be successful online learners. These classes are offered under a variety of forms. Some orientations are mandatory, others are only recommended.

Oscail – the National Distance Education Center in Ireland - developed the Student Passport for elearning (SPel) program as a learner-centered pedagogically driven module to gradually introduce students to the use of electronic media (Lorenzi, MacKeogh & Fox, 2004). All students entering Oscail programs are required to take an introductory module. Students are introduced to the use of the online medium and are asked to reflect on the learning experience. The orientation uses a scaffolding approach to acclimate students to the online learning environment. The Oscail orientation uses four categories of support: (a) support as learner-centered design, (b) support offered by a tutor, (c) peer support, and (d) technical support.

Tech Camp, a face to face orientation offered for the students in the Pepperdine University educational technology doctoral program, was established to create a community of learners out of a group of newly enrolled students (Zieger & Pulichino, 2004). This orientation was successful in establishing a community of learners but not very effective in the communities learning the technology required to practice in an online environment.

The Ohio State University College of Pharmacy offers the NonTraditional Doctor of Pharmacy Program, online. To prepare students it offers an online orientation that encompasses an introduction to technological infrastructure, pedagogical issues, communication skills and study and time management for an online community of learners (Mungall, Green & Skunza, 2001).

The College of Business Administration at Tarleton State University offers an online orientation for all new online graduate students (Gaide, 2004). The orientation helps create a sense of welcome to new students, it provides an orientation to course requirements, it has modules that advise students about administrative issues and it familiarizes students with WebCT. The online orientation uses the same look and feel of its regular online courses enabling students to experience what they will in a real class.

McVay Lynch (2003) designed an online orientation to provide tools for independent, self-directed learning in a web-based learning environment. This orientation was recommended for students new to online learning and it was recommended that a faculty development/orientation be developed as well. The goal of the research was to give students a satisfying experience in self-directed learning where they could develop technological competence and gain confidence in their ability to be successful, independent learners. After the initial orientation research, the results were very encouraging that the orientation was beneficial. The university required all new online students to take the orientation.

The Department of Adult and Community College Education at North Carolina State University offered a degree program completely online and needed an orientation to offer the new students (Bozarth et al., 2004). The topics covered in the orientation were setting appropriate guidelines, guidance in online etiquette, available student resources, an assessment of the student's readiness for online learning as well as technological skills.

The above mentioned distance education orientations have some common elements, however, at this point little is known about all the required components of an effective distance education orientation.

Purpose

This study is the first phase of a multiphase study that is examining adult learner readiness for distance learning and the effectiveness of orientation efforts. This first phase was designed to offer a unique perception, in that it examines learner readiness and orientation efforts from the inside out, instead of the usual design of outside in. To design an effective distance orientation, it is necessary to understand what adult students need. Meeting student needs is critical to the success of adults learning via distance education (Kelsey et al., 2002). The objectives of this phase of the study were:

1. To explore and describe adult students' perceived readiness for online learning.

2. To explore and describe what additional preparation (orientation) adults need to feel satisfied about their readiness to learn online.

Methods

This study is classified as expansion research within the qualitative research paradigm using naturalistic inquiry. The purpose is not to yield the same results as previous studies; the purpose is to expand on the constructed realities and processes of previous studies and "seek initial illumination of the context of another study" (Erlandson, Harris, Skipper & Allen, 1993, p. 45).

The natural setting for this study included all of the graduate students from two cohorts ('04 and '07) that have completed or are in the process of obtaining their doctoral degree in Agricultural Education. The program delivers instruction at a distance, using multiple delivery technologies. It is administered jointly by two institutions. The purposive sample had a total of 22 respondents, 10 from cohort '04 and 12 from cohort '07. There were 10 females and 12 males, with an age range of 27 to 62, spread out between the two cohorts. Respondents were coded with a unique identifier to tract trends in the data that ensured confidentiality.

An email interview, found to be credible and transferable, was developed by the researcher, and sent to all cohort members. Students were asked about their perceived readiness for distance learning prior to the start of their doctoral studies, and their technological and learning readiness after they had taken several classes via distance technologies. They were asked if anything could have been done to prepare them for distance learning. There is no attempt to extend the findings beyond those that responded.

The interviews were printed and the researcher used the constant comparative method to compare across categories and construct meaning (Erlandson et al., 1993).This method described by Glaser and Strauss (cited in Erlandson et al, 1993, pp. 112-113) employs four distinct stages: (a) comparing incidents applicable to each category, (b) integrating categories and their properties, (c) delimiting the theory, and (d) writing the theory. From this analysis, the researcher determined the relationship of adult student perceived readiness with student need for preparation and how that relationship might impact the future design of an orientation for adult students new to online learning. Studies using quantitative analysis provide truth value through internal validity, applicability through external validity, consistency through reliability and neutrality through objectivity. Trustworthiness in a naturalistic study is established using techniques that support truth value through credibility, applicability through transferability, consistency through dependability, and neutrality through confirmability (Erlandson et al., 1993).

Credibility is supported through prolonged engagement, establishing trust and a rapport with the respondents. The researcher is a member of cohort '07 and has had contact with members of both cohorts since August, 2003. Triangulation, enhancing credibility, occurs through two different cohorts' involvement in the study. Draft copies, for peer debriefing of the findings, were sent to a department head who teaches online classes and has participated in online classes, at a separate institution. Member checks were accomplished by sending a synthesis of each interview to respondents, asking for verification of accuracy. Transferability may be achieved by providing enough detail from the purposive sample and resulting thick description, so that others can decide if the findings may be applied to other situations. While naturalistic inquiry does not attempt to generalize the results of one study to another population, some generalizations may be applicable in similar situations. Dependability is achieved by keeping detailed records of all collected data and resulting analysis. A copy of each email interview was printed and a synthesis of the answers was provided to each respondent for verification or correction. All documents and notes are retained for inspection. Lastly, confirmability of the study was addressed by including quotes from the raw data that supported the construction of theory and conclusions proposed by the researcher. While researcher bias may be impossible to completely separate out of the study, the design of this study may introduce new or unique insights that follow from certain biases of the researcher.

Findings

Perceived Readiness for Online Learning

Respondents were asked to "Think back to the beginning of their program." "How did you feel about learning using distance education technology?" The overall theme from the respondents was one of excitement (2, 8, 10, 12, 16, 18, 22), however students were apprehensive (2, 4, 8, 11, 12, 13, 17, 18, 20, 21) about their ability to use and understand the technology. One student stated “unprepared, needing much help, but excited to dive in and learn” (7). Not all students were apprehensive about the technology; they were concerned that they would not be in a conventional classroom (2, 9, 11, 19), “it took some getting used to” (15).

Participants were asked to describe their perceived readiness, technologically, to participate in distance learning. Many of the respondents indicated that they were unsure of their technological skills, but were confident they could learn (1, 6, 7, 8, 9, 11, 12, 20, 22), one respondent “expected difficulties/frustrations” (2), while another “felt confident that I could learn what I didn’t know” (1). Several students felt “completely unprepared” (4, 5, 18, 21).

Participants were also asked to describe their perceived readiness of their learning skills. The major consensus was that the students felt their learning skills would be fine (5, 6, 7, 9, 10, 11, 13, 14, 15, 16, 17, 18, 20, 21, 22). One student stated “…did not realize all that distance learning meant, but was comfortable working independently, at least I thought I was. Ignorance was bliss” (3). Two students felt their learning skills might be “rusty” (12) and that their learning skills “need some sharpening” (8). Two other students felt there were as prepared as “anyone else” (3, 7,) that was starting the program. Those students assumed that everyone starting the program would have similar concerns about their ability to learn in a distance education setting.

Program Orientation Needs

When the participants were asked what could have been done at the beginning of the program to help them prepare for distance learning, two themes emerged: no prep was needed and prep is definitely needed. For those responding that no prep was needed, they “figured it all out anyway” (1), it was time to “jump in and swim” (12), distance learning “could not have been prepared for” (4), or that distance learning is “like on the job training, no preparation is necessary” (7).

For those responding that preparation is necessary, one student suggested a “full immersion in the program…a virtual trip through a class/semester in distance ed. An overview of the terms and a list of the “highs” and ‘lows” “pentacles and pitfalls” if you will” (5). Another student stated “I would have liked to have more time to learn about the technology and how it would work, before the program started. I felt like I was kind of thrown to the wolves….I felt all alone here” (20). Two students suggested, “Have a pre-course intro class” (9, 21). Another student commented “format of the courses, registration, course schedule etc, could have been explained more clearly. I feel like I was in a haze the first year, and was just going day by day” (6). Many students would have liked equipment and technology training before the first class (2, 4, 13, 14, 16, 18, 19, 20, 21), especially a “list of technology terms” (18) and training with the technology for the classes presented via Interactive Video (ITV) (1, 2, 4, 8, 16, 19).

Several students would like “printed instructions” on how to pay bills at both campuses, how to register at both campuses, and how to use and navigate within WebCT (6, 7, 11, 13). Students especially wanted help using the online libraries and how to effectively find research articles. Library usage was the biggest issue (4, 9, 11, 15, 17, 22), followed by a more comprehensive list of technology requirements at the beginning of the program.

After completing several classes delivered synchronously or asynchronously, respondents were asked to reflect and describe their feelings about participating successfully in the classes, both in learning skills and technological skills. Several students stated that they feel “anxious” at the beginning of each semester (2, 7). For two, their “skills kicked in after the 1st session” (13) and “technology became second nature” (15). For many of the students, their biggest concern was time management (7, 10, 11, 12, 14, 16, 17, 21).

When asked if there was anything that would have helped them to be more successful at this point, the number one request of the respondents was for information on using the online library and effectively using the library for research (4, 9, 11, 15, 17, 22). Other suggestions listed were: (a) more informal communication with cohort members (2), (b) better time management (7, 10, 11, 12, 14, 16, 17, 21), (c) students prefer flexible assignment schedules (4, 6, 8, 14, 22), (d) more technology information (2, 4, 13, 14, 16, 18, 19, 20, 21), (e) more dissertation/record of study writing information (14, 15), and (f) more face-to-face gatherings, spaced no more “than 6 months apart” (18).

Participants were asked to describe their favorite delivery method/s and what they liked about it/them**.** Four students like all delivery methods (1, 3, 7, 13), ten students prefer synchronous (2, 4, 5, 6, 10, 12, 18, 19, 20, 21) delivery ITV, and eight students prefer asynchronous delivery (8, 9, 11, 14, 15, 16, 17, 22). One student likes using chat while in an ITV session (6), allowing real-time conversation while the class is in session without worrying about audio delay. The overwhelming reason for ITV preference was the interaction between the instructor and the students. Those preferring asynchronous classes preferred doing class work on their own schedule.

Participants were also asked to describe their least favorite delivery method/s and what they didn’t/don’t like about it/them. Four students like all methods especially if there are no technical problems (1, 3, 7, 13). Five students dislike synchronous classes (2, 9, 11, 14, 18), nine students dislike asynchronous classes (2, 6, 12, 15, 16, 17, 19, 20, 21); one stated “I am missing the people aspect of the class. I am feeling lonely” (20). Two disliked viewing streaming video clips (15, 16). Two students do not like self-directed learning. One responded “Too much self-directed, and I don’t understand how to do all the assignments” (12). The other strongly responded “I will give up anonymity here, but we assume people will learn it on their own. That assumption is a major fault” (21). Several students do not like to participate in online threaded discussions (4, 12, 18); one stated “I do not care for the asynchronously delivered classes as well as the other. I am too much of a ‘people’ person for straight computer talk” (12). Another concern is that some asynchronous assignments were viewed as “busy work” (6).

Finally, participants were asked their overall feeling about distance learning. The dominant theme is that the advantages outweigh the disadvantages. Cohort members stated that distance learning is “effective” (1), “worked for me” (4), “fits the bill” (9), “I love it” (12, 16), they “recommend” (17) distance learning, and that it is the “mode of the future” (7). There were a few comments that the respondent would prefer a residency program (2, 9, 11, 19), but distance education was the only way they could obtain a doctoral degree and it “works in a pinch. It has its applications...and still has issues. However, I believe it to be in a state that is ever-evolving and will only become better with time” (5).

Conclusions, Implications, Recommendations

Qualitative research methods give the respondents *voice.* There is no definitive statement for each question of the interview; however, as we listen to the students of this study, we hear that they are excited about furthering their education through distance education. Along with that excitement is apprehension. The data indicate that the biggest concern for students is the use of the technology, followed by the desire to effectively use the online library. Several students felt they could learn to use the technology without any prior preparation; even so, they would appreciate help understanding and using the technology and with the requirements of being a distance doctoral student.

Some adult learners will be able to function in an online learning environment, learning what is needed, when it is needed. Yet, we can not ignore those students who feel lost before they begin their program of study. These students need more than a pat on the head and a pep talk. The data suggest that they have a feeling of frustration with the technology and their successful adaptation to self-directed learning. Many adult students have only known the learning paradigm of the teacher as the dispenser of information. When they encounter learner-centered instruction, delivered by technology they are not familiar with, then there is a disconnect between learner, instructor, and content. The data of this study support constructivism and adult learning theory as an instructional paradigm. Learners must also be taught technology skills and self-directed learning skills that will be needed to successfully function in an online learning environment. Once adult learners have the necessary technological skills, they can acquire new knowledge based on those learning experiences. By listening to the students, an orientation to online learning can be designed and tailored to their program of study.

The data compiled from this study suggest some elements that need to be included in an orientation to online learning. Those elements are: (a) a detailed list of technology requirements, (b) thorough training on the use of the required technology prior to the first class session, (c) instruction on saving documents in RTF format so all members can read distributed documents, (d) instruction and written handout on using WebCT and navigating within WebCT, (e) written directions for class registration, checking grades, financial aid, and paying tuition online, (f) instruction and written handout on effective library usage, and (g) instruction that helps a student transition towards self-directed learning.

This study examined doctoral students in one specific program. Future studies should look at adult student readiness as they enter a Master's program, an undergrad program or just in time training needed for their work environment. Different student populations may need different online orientations. Those orientations then need to be evaluated as to their effectiveness in preparing students for online learning. Irani, Scherler, Harrington and Telg (2000) remind us that Agricultural institutions can lead the way in developing an understanding of the factors that impact adult distance learners' future success. Land-grant universities and other Agricultural institutions have a mission to provide "life-long learning." These institutions have an extensive infrastructure that can facilitate the delivery of distance education courses to learners across the globe. Distance learning will not replace a brick and mortar institution, nor should it. Distance learning fills a unique need for students that are time and place bound, yet they desire to further their education. The discipline of Agricultural Education is working hard to make that educational experience the best it can be.

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Trade-Offs: A Comparison of Online and On-Campus Graduate Courses

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Abstract

The purpose of this study was to examine factors related to a graduate student's decision to take on-line courses in agricultural and extension education and to determine if differences exist in perceptions related to the seven principles of good practice in on-line courses and on-campus courses in a graduate program. The population for this study was all graduate students who had taken at least one on-line course and one on-campus course in an Agricultural and Extension Education graduate program. The theoretical framework for this study was based on Chickering and Ehrmann's (1996) explanation of technological strategies for the "Seven Principles of Good Practice" for teaching at the university level. Findings suggested that a major factor in students' decisions to enroll in distance education courses was the "convenience" factor; however, there is a trade off for this convenience. On-line courses do not compare favorably with on-campus courses in regards to the interaction between students and students and professors. On-campus courses were viewed more favorably in regards to the principle "Good Practice Respects Diverse Talents and Ways of Learning". Students did not perceive distance education courses to be easier than on-campus courses.

Introduction

In recent years, distance education has become a common mode of delivery of university courses due to the increase of student's accessibility to the Internet (Moore & Kearsley, 1996). In 2003, Roberts and Dyer found that 63% of agricultural education departments identified in the American Association of Agricultural Education directory had offered one or more distance education courses in the previous 12 months..

Much of the research related to the quality and effectiveness of distance education has focused on issues peripheral to teaching and learning such as student characteristics and attitudes. Hanson and his colleagues (1997) found that students who have taken distance education courses are more likely to be favorable toward distance education courses in general. In a comprehensive review of research, Thompson (1998) concluded that most research regarding characteristics of students have found that students who take distance education are married, female, older than the typical undergraduate, and likely to be a full time employee. He also detected a trend that students take distance education as an alternative because of their personality, learning style, and motivation; not because they are place bound. Wilson and Moore (2002) found that GPA, years in the profession and occupation explained some of the variance in those students who plan to enroll in distance education in a graduate agricultural and extension education program. They did not find gender, distance, age, or prior experience to be a factor.

A majority of distance education studies in agricultural and extension education conducted between 1992 and 2001 focused on the quality, effectiveness, and technology of distance education (Moody, Schauer, Fritz, King & Rockwell, 2002). Ample research exists related to studies of students enrolled in one distance education course. Recently Dooley, Lindner, & Richards (2003) found that students in a 15 week long graduate course offered both on-line and on-campus students achieved similar learning outcomes regardless of students gender, degree, major, or the method of course delivery. They concluded that it is the method not the media that makes a difference in the quality of agricultural and extension education courses. Dooley, Patil, & Linberger (2000) concluded that instructor contact and feedback was an integral part of an on-line multidisciplinary course delivered at a distance. Male and female students were compared in an on-line course by Hynes, Lindner, Dooley, & Price (2003). Overall performance of both males and females were similar but different patterns of voluntary course participation were observed.

Research regarding total agricultural education distance education programs is beginning to emerge in the literature as early adopter programs begin to graduate students from these programs. Kelsey, Lindner, & Dooley (2002) interviewed 18 students to determine their satisfaction with an on-line doctoral program called "Doc-at-a-Distance" shared by Texas A&M and Texas Tech University. They found that the students were very satisfied with the instructional design of the program, the support they received from others, and the convenience that the program offered. Students were dissatisfied with poorly functioning technology, inaccessible resources and cohort isolation. D'souza & Kelsey (2003) interviewed all students in a program who had taken distance education courses over a two year period and found that students enjoyed and benefited from instructor interaction but student to student interactions were not critical to their satisfaction.

In a literature review, Zirkle (2003) concluded that a majority of research in Career and Technical Education has dealt with issues of student access, characteristics, perceptions and performances, and faculty/instructor involvement in individual distance education courses. He also concluded that there was little research in career and technical education related to teacher education and that such research is warranted, especially research related to entire distance education programs.

Much research outside agricultural and extension education has been conducted in an attempt to determine if distance education courses are equal to on-campus courses in meeting learner outcomes. Russell (1999), after reviewing some 300 studies, concluded there was no significant difference between distance and on-campus courses. Merisotis (1999) stated that we should give up the “What’s the Difference” discussion because technology is here to stay. Instead, he argues that we should focus on where it makes a difference and on identifying effective strategies using technology to impact student learning.

In 1999, The Institute for Higher Education Policy conducted a review of distance education research for the American Federation of Teachers and the National Education Association. The review identified gaps in distance education research and suggests that most research conducted focuses on individuals in one or two courses and that research needs to be conducted to determine if an academic program delivered both through technology and traditional modes compare favorably. The reviewers hypothesize that even though distance education research as a whole is inconclusive, this new wave of research has revived discussion related to effective teaching and as a result has had a “salutary effect in that a rising tide lifts all boats” (p. 8).

Theoretical Framework

Limited research related to distance education has been conducted in agricultural and extension education that compares on-line and on-campus courses in relation to the use of distance education technology to perform good pedagogical practices. This study determined whether differences exist in students’ perceptions related to the seven principles of good practice in on-line courses and on-campus courses in an agricultural and extension education graduate program.

After examining decades of research related to good teaching practices at the university level, Chickering and Gamson (1987) published the hallmarks of quality education in a university setting, which are known as the “Seven Principles of Good Practice”. These principals are commonly cited in literature. Since 1987 the use of technology at the university level has increased exponentially and Chickering and Ehrmann (1996) realized the new technologies should be used in ways consistent with the Seven Principles to ensure effective teaching. They were concerned that teachers would not understand that technology can support different instructional strategies and that computers alone do not empower students. In response, they created appropriate ways to use the technological components of on-line distance education programs to ensure the seven principles were met and quality educational programs were conducted.

The theoretical framework for this study is based on the technological strategies for the "Seven Principles" presented by Chickering and Ehrmann (1996). They are as follows:

1. Good Practice Encourages Contacts Between Students and Faculty
   Electronic mail, computer conferencing, and the World Wide Web can be used to increase immediate feedback and communication. Asynchronous communication allows introverted students to feel more comfortable and students who speak English as a second language more time to consider their reactions and interpretations.
2. Good Practice Develops Reciprocity and Cooperation Among Students
   Email and list serves open up opportunities for cooperation and collaboration among students. By allowing students to learn more about each other through project work they feel more connected. Encourage students at the beginning of a course to introduce themselves and have students take and share personality assessments.
3. Good Practice Uses Active Learning Techniques
   Students should practice what they learn and then write reflectively about it. Have students use technological tools that agricultural education teachers would use: for example, in teacher education have students use SAE record book software. Have students complete analytical projects or participate in simulated activities.
4. Good Practice Gives Prompt Feedback
   Use e-mail to provide prompt feedback. Use video to analyze teaching performances. Use electronic portfolios to store and access student products and to compare the various stages of improvement in work.
5. Good Practice Emphasizes Time On Task
   Teaching strategies should emphasize the wise use of time. Time is saved because students do not have to waste time on commuting and can spend their time efficiently in their own homes.
6. Good Practice Communicates High Expectations
   Powerful learning challenges can be created on-line and expectations can be explicitly and efficiently communicated in course objectives and coursework.
7. Good Practice Respects Diverse Talents and Ways of Learning
   Students can work at an individualized pace and instructors can provide a variety of activities. Instructions can be explicit for the dependent learner and the independent learner can skip over detailed instructions if they are confident they already understand.

According to McDonald (2002), on-line education can achieve these practices just as well as on-campus education and in some instances can do an even better job. For example, asynchronous communication can provide a protected environment for those students who do not feel comfortable in group discussion, or a slower paced environment is provided where adults can take their time to ponder their responses. Instructors can also clarify expectations and provide samples of model work for students.

Most studies related to distance education have dealt with the comparison of students in one course or students who have taken only one distance education course. This study took place in a department that has been teaching on-line courses since 1998 and is currently offering more than 15 graduate level courses on-line. Typically, six to eight on-line graduate courses are taught each semester. Students can complete 100% of their Master's program through on-line courses. Web-CT is used in the delivery of some of the courses while others are stand-alone independent web classes. The distance education efforts of the department received an Honorable Mention for Excellence in Distance Education from the American Distance Education Consortium in 2004.

Purposes/Objectives

The purpose of this study was to examine factors related to a graduate student's decision to take on-line courses in agricultural and extension education and to determine if differences exist in perceptions related to the seven principles of good practice in on-line courses and on-campus courses in a graduate program.

More specifically, the study answered the following research questions:

1. What factors impact graduate students' decisions to take on-line courses?
2. Do graduate students perceive a difference between on-line and on-campus courses in the implementation of the Seven Principles of Good Practice?
3. Do graduate students who have completed four or more on-line courses perceive a difference between on-line and on-campus courses in the implementation of the Seven Principles of Good Practice when compared with students who have completed three or fewer on-line courses?

Methods/Procedures

The research design for this study was primarily descriptive. The population for this study was all graduate students who had taken at least one on-line course and one on-campus course in an Agricultural and Extension Education graduate program at North Carolina State University during the past five years.

A questionnaire was developed based upon variables related to principles of quality on-line education identified in the literature review. The instrument was reviewed by a panel of experts made up of Agricultural Education and Extension faculty for content/face validity. The instrument was then administered to pilot participants who were not in the final study. The instrument had three main sections; demographic data, a list of eight factors that might influence a student's decision to take an on-line course, and 28 items designed to measure student perceptions of on-line and on-campus courses.

In constructing the main section of the instrument (the 28 statements), the Seven Principles of Good Practice formed the framework. Three statements designed to measure each principle were developed. Thus, there were 21 statements to assess the implementation of the Seven Principals. Seven additional statements to assess the overall satisfaction of the student with the courses were also developed.

A Cronbach's Alpha for internal consistency was calculated for each of the seven sections of the instrument and the overall section. Since each of the seven "principles" section contained only three statements, one would not expect high coefficients of internal stability.

However, six of the principle sections and the overall evaluation yielded respectable coefficients. The Cronbach's alpha coefficient for each section of the instrument are as follows:

Seven Principles of Good Practice	N	Cronbach's Alpha
Good Practices Encourages Contact Between Students and Faculty	3	.64
Good Practice Develops Reciprocity and Cooperation Among Students	3	.84
Good Practice Uses Active Learning Techniques	3	.78
Good Practice Gives Prompt Feedback	3	.61
Good Practice Emphasizes Time on Task	3	.32
Good Practice Communicates High Expectations	3	.57
Good Practice Respects Diverse Talents and Ways of Learning	3	.62
Overall Course Evaluation	7	.82

The instrument and cover letter were mailed to all students whose current addresses could be found in the state directory for agricultural education teachers, extension agents and university students (n=143). Three weeks after the initial mailing, a follow-up letter was sent to those participants who had not responded along with another copy of the instrument. After two mailings, 109 students had responded to the survey for a total response rate of 76% (two returned surveys were blank). The late responders were compared with the early responders. There were no significant differences found between the two response groups on items measuring students' perceptions of the on-line and on-campus courses (t=1.55, p=.124).

Descriptive statistics and t-tests were used for data analysis. In analyzing the data, each of the seven principles and the overall satisfaction measure were treated as separate constructs. It would have been inappropriate to consider all 28 items as additive. Also the eight possible reasons for taking distance education courses were each treated independently. It is acknowledged that this approach could possibly lead to a type I error, because of using several t-tests to examine group differences, but the character of the data required this type of data analysis.

Findings

The experience with on-line courses varied greatly among the respondents. Twenty-six percent of the respondents had completed only one on-line course, while at the opposite end of the spectrum; thirty-one percent had completed six or more courses. Twenty-four percent of the respondents had completed two to three on-line courses while 16 percent had taken four to five on-line courses. These data are presented in Table 1.

The majority of the respondents (57%) were employed with the Cooperative Extension Service while 37% were teaching agriculture. The most commonly given reason for taking on-line courses was completing a graduate degree (71%), followed by obtaining a teaching license (22%). Females outnumbered males by 55% to 45%. The mean age of the respondents was 39 years, and the mean distance from the students' home to the university was 151 miles. These data are found in Table 1.

Table 1. *Characteristics of Respondents (N=107)*

Items	***N***	%
Number of On-line Courses Completed		
1 Course	28	26.2
2-3 Courses	26	24.3
4-5 Courses	17	15.9
6 or More Courses	33	30.8
Missing	3	2.8
Current Employment Status		
Work in Extension	61	57.0
Teaching	40	37.4
Private Sector	4	3.7
Other	2	1.9
Reason for Taking On-line Courses*		
To complete a graduate degree	76	71.0
To obtain a teaching license	23	21.5
Personal reason	18	16.8
Other	11	10.3
Gender		
Male	48	44.9
Female	59	55.1
Distance and Age	*M*	*SD*
Mean Distance From NCSU in miles	150.68	206.13
Mean Age in years	39	10.30

*Respondents could select more than one

Students were asked to rate the factors that impacted their decision to take a distance education course. Of the eight choices, three items were rated higher than 4 on a 5-point Likert-type scale. These three factors were “I did not have to travel to campus” (M=4.51, SD=1.02), “Allowed me to continue work” (M=4.38, SD=.98) and “I like the convenience of learning at the time of my own choosing” (M=4.01, SD=1.11). “Did not disrupt my family life” with a mean rating of 3.96 (SD=1.27) followed closely. The idea popular with some people that distance education courses are easier was not a factor in the students’ decision-making process. The statement “I believed that an Internet course would be easier than an on-campus course” had a mean rating of 1.80 (SD=1.09). The ratings of the factors impacting students’ decisions to enroll in a distance education class are presented in Table 2.

Table 2. *Factors Impacting on Students' Decisions to Take Distance Education Courses*

Factor	*M**	*SD*
I did not have to travel to campus.	4.51	1.02
Allowed me to continue to work.	4.38	.98
I like the convenience of learning at the time of my own choosing.	4.01	1.11
Did not disrupt my family life.	3.96	1.27
I prefer this approach to learning	2.68	1.08
The course(s) was (were) available only by distance education.	2.68	1.43
The cost of the Internet course**.	2.67	1.41
I believed that an Internet course would be easier than an on-campus course.	1.80	1.09

*Rating Scale was from 1-5 with (5) Major Factor, (3) A Factor, (1) Not a Factor
**Note: Internet courses cost less than on-campus courses at this university

This research sought to determine if on-line courses were equal to on-campus courses in fulfilling the widely regarded Seven Principles of Good Practice that were first promoted by the American Association for Higher Education. For each of the seven principles, three statements were constructed to measure that construct. There were an additional seven statements to ascertain the overall attitude of the student toward the courses. Thus, there were 28 statements on the instrument.

The rating scale ranged from 1 to 5 with a 3 being "No difference between On-campus and Internet Courses". A rating of 1 was "On-campus Courses Much More than Internet Courses" and a rating of 5 was "Internet Courses Much More than On-campus Courses." Therefore, ratings below 3 indicated on-campus courses excelled on the principle, while ratings above 3 indicated on-line courses excelled on the principle. After examining the mean scores, range of scores and standard deviations, the researchers established a practical significance range of 2.75-3.25. Any score in this range was considered neutral.

Three principles were found that favored on-campus courses, one principle was found that favored on-line courses, and three principles were in the neutral zone. The teaching principle the farthest distance from the 3.0 mid-point was "Good Practice Develops Reciprocity and Cooperation Among Students". The three statements that comprised this principle had a mean score of 2.04 (*SD*=.66). On-campus courses are seen as promoting more interaction among students than are distance education classes. The statements that comprised this principle and their mean scores are found in Table 3.

The next most distant principle from the midpoint was "Good Practice Encourages Contacts Between Students and Faculty". The three statements that comprised this principle had a mean score of 2.41 (*SD*=.63). On-campus courses are seen as promoting more interaction among the students and professors than are distance education classes. The lowest rated item on the instrument was found embedded in this principle, "Opportunity for interaction between students and professors", with a mean score of 1.73. The statements that comprised this principle and their mean scores are found in Table 3.

The third teaching principle that favored on-campus instruction was "Good Practice Respects Diverse Talents and Ways of Learning". The mean score on this principle was 2.65

(*SD*= .56). Of the three statements that comprised this principle, one of the statements lowered the score substantially. That statement was “A variety of teaching activities were used” with a mean score of 2.31. On-campus courses are seen as using more varied teaching activities and recognizing individual differences more than distance education classes. The statements that comprised this principle and their mean scores are found in Table 3.

The teaching principle that favored on-line courses was, “Good Practice Emphasizes Time on Task.” This principle had a mean score of 3.31. This is in accordance with the reasons given for taking distance education classes mentioned in Table 2. The highest rated item on the instrument was found within this principle, “I was able to use my time more efficiently” with a mean score of 4.01. The statements that comprised this principle and their mean scores are found in Table 3.

The three principles that fell in the neutral zone were “Good Practice Uses Active Learning Techniques”, “Good Practice Gives Prompt Feedback”, and “Good Practice Communicates High Expectations”. The overall course evaluation also was in the neutral zone. The statements that comprised these items and their mean scores are found in Table 3.

Table 3. *Student Perceptions of On-line and On-campus Courses Categorized According to the Seven Principles of Good Practice*

Principles and Contributing Statements	*M*	*SD*
1. Good Practice Encourages Contacts Between Students and Faculty	2.41	.63
Opportunity for interaction between students and professors	1.73	
Communication between the student and the professor was easily carried out	2.68	
Instructor is available when I needed help	2.84	
2. Good Practice Develops Reciprocity and Cooperation Among Students	2.04	.66
Opportunity for interaction between students	1.89	
Opportunity to collaborate with other students	2.04	
I am able to express my ideas to other students	2.19	
3. Good Practice Uses Active Learning Techniques	2.78	.71
Ability of the course to engage me in the content	2.58	
Promotes active learning	2.79	
Opportunity to apply information learned	2.95	
4. Good Practice Gives Prompt Feedback	2.88	.48
The feedback I received helped me to improve my academic performance	2.84	
My questions were answered appropriately	2.86	
Received feedback on my assignments in a timely manner	2.96	
5. Good Practice Emphasizes Time on Task	3.39	.58
Amount of time I spent on the course	3.22	
I was able to use my time more efficiently	4.01	
Course assignments were reasonable	2.93	
6. Good Practice Communicates High Expectations	3.14	.54
I learned a lot	2.88	
Academically challenging	3.12	
Amount of work required	3.39	
7. Good Practice Respects Diverse Talents and Ways of Learning	2.65	.56
Individual needs of learners were accommodated	2.79	
Instructor cares about me as an individual	2.83	
A variety of teaching activities were used	2.31	
Overall Course Evaluation	2.86	.47
Overall course quality	2.89	
My satisfaction with the quality of the instruction	2.92	
Method(s) used to determine my grade was appropriate	2.95	
Course expectation were clear	2.78	
Course objectives were clear	3.01	
Instructor is concerned about my progress in class	2.79	
I clearly understood the information presented in the course	2.65	

The scale was (1) On-campus Courses Much More than Internet Courses, (2) On-campus Courses Somewhat More than Internet Courses, (3) No difference between On-campus and Internet Courses (4) Internet Courses Somewhat More than On-campus Courses (5) Internet Courses Much More than On-campus Courses.

One of the concerns of the researchers was that students who had completed only one or two on-line courses might not have a realistic perception of distance education classes. If they had experienced a "bad" course and it was the only distance education class they had completed, this might present them with an inaccurate view. Likewise, they could have experienced one outstanding distance education class. In order to get the most accurate assessment of on-line courses, it was decided to compare the views of students who had completed three or fewer Internet classes, with students who had completed four or more classes. Students who had completed four or more on-line courses were identified as "frequent" distance education students, while those who had completed three or fewer classes were identified as "less frequent" distance education students.

Frequent distance education students differed from the less frequent distance education students on three of the seven principles of good teaching and the overall course evaluation. In each instance the frequent student has a more favorable rating toward distance education than did the less frequent student. On the principle "Good Practice Uses Active Learning Techniques", the mean rating of the frequent student was 2.96 (*SD*=.81), while the less frequent student had a mean rating of 2.64 (*SD*=.55, t=-2.39, p<.05). While both groups agreed that on-line courses were stronger on the principle that "Good Practice Emphasizes Time on Task", the frequent students mean rating was 3.52 (*SD*=.62) while, the less frequent students mean rating was 3.28 (*SD*=.54, t=-2.11, p<.05). Frequent students rated "Good Practice Respects Diverse Talents and Ways of Learning" higher than did the less frequent students (*M*=2.77, *SD*=55 and *M*=2.54, *SD*=.56 respectively) (t=2.07, p<.05). The mean overall course satisfaction for the frequent student was 2.96 (*SD*=.53) while the less frequent student had a mean course satisfaction score of 2.77 (*SD*=.39) (t=-2.06, p<.05). See Table 4.

There was one difference between frequent and less frequent students on factors influencing the decision to enroll in on-line courses. This factor was "Allowed me to continue to work." The frequent students rated this 4.65 (*SD*=.80) while the less frequent students rated this at 4.15 (*SD*=1.09) (t=-2.65, p<.01). See Table 4.

Table 4. *Comparison of "Frequent" and "Less Frequent" Distance Education Students Regarding On-line Courses*[1]

Factors Influencing Enrollment Decision	Less Frequent (N=54)		Frequent (N=49)		
	M	*SD*	*M*	*SD*	*t*
The cost of the Internet course	2.57	1.38	2.73	1.45	-.58
I did not have to travel to a campus	4.44	1.08	4.57	.98	-.62
I prefer this approach to learning	2.65	1.03	2.77	1.13	-.57
I like the convenience of learning at the time of my own choosing	3.91	1.17	4.16	1.05	-1.16
The course(s) was (were) available only by distance education	2.65	1.47	2.67	1.42	-.09
I believed that an Internet course would be easier than an on-campus course	1.89	1.14	1.71	1.06	.79
Allowed me to continue to work.	4.15	1.09	4.65	.80	-2.65**
Did not disrupt my family life	3.78	1.27	4.16	1.30	-1.52
Perceptions of Courses According to the Seven Principles					
	M	*SD*	*M*	*SD*	*t*
1. Good Practice Encourages Contacts Between Students and Faculty	2.35	.62	2.48	.65	-1.05
2. Good Practice Develops Reciprocity and Cooperation Among Students	1.98	.59	2.11	.75	-.95
3. Good Practice Uses Active Learning Techniques	2.64	.55	2.96	.81	-2.39*
4. Good Practice Gives Prompt Feedback	2.87	.45	2.91	.51	-.43
5. Good Practice Emphasizes Time on Task	3.28	.54	3.52	.62	-2.11*
6. Good Practice Communicates High Expectations	3.01	.40	3.23	.64	-1.36
7. Good Practice Respects Diverse Talents and Ways of Learning	2.54	.56	2.77	.55	-2.07*
Overall Satisfaction:	2.77	.39	2.96	.53	-2.06*

[1]Frequent = 4 or more courses
*p<.05,**p<.01

Conclusions/Recommendations/Implications

A major factor in students' decisions to enroll in distance education courses was the "convenience" factor. Students do not have to travel long distances (and hunt for a parking space). For some students, the distance to campus is a major prohibiting factor toward furthering their education. On-line courses enable students to complete a degree or teacher certification that would not be possible otherwise. An on-line course also allows students to continue working and does not disrupt their family life. Students believe on-line courses allow them to use their time more efficiently. However, there is a trade off for this convenience.

On-line courses do not compare favorably with on-campus courses in regards to the interaction between students and students and professors. While this conclusion is not unexpected, the professors involved in teaching the on-line courses were mildly surprised by these findings. The professors have worked diligently to implement electronic bulletin boards, e-mail discussion groups, and even on-line team activities to foster interaction. Most classes utilize interactive quizzes. The professors involved in the program respond quickly to e-mail and phone messages from on-line students. Careful monitoring of student courses evaluations each semester indicates students are pleased with the amount of interaction in the on-line courses. Yet, this does not seem to replace the actual human contact that is found in on-campus courses. Even students who were frequent users of on-line courses and who have no hesitation in contacting the professors rated on-line courses lower in the interaction arena than the on-campus courses.

Students who had completed four or more distance education courses had ratings that leaned more favorably toward on-line courses than did students who had taken fewer on-line courses. It could be assumed that these students had more varied experiences with on-line courses and thus could more accurately compare on-line and on-campus courses. The more frequent students found that on-campus courses excelled in only two principles—interaction among students and interaction among students and professors. They were also in agreement that on-line courses excelled in the time on task dimension.

Those involved in distance education should make every effort possible to build more interactive components into the course. This should include interaction between and among students and also interaction with the professor. On-line instructors should continue to use chat rooms, bulletin boards, and e-mail listserves. Instructors might also want to investigate using web cams and being in their office at selected times so students could contact them through web cams for both verbal and visual interaction. Additionally, instructors and universities may want to consider using newer technologies such as Macromedia's Breeze Live, which has enhanced interaction features.

On-campus courses were viewed more favorably with regard to the principle "Good Practice Respects Diverse Talents and Ways of Learning". On-line instructors need to be more creative in developing alternative ways to communicate the course content in order to meet the diverse needs of learners. Having on-line readings and a canned Power Point presentation may not be accommodating to all learning styles. The addition of streaming video vignettes, case studies, flash animations or other such devices may help reach different learning styles. On-line instructors should also consider having alternative assignments and different methods of assessing learning.

This research disproved the belief held by some "traditional" professors that distance education courses are easy. The statements "Amount of time I spent on the course", "Academically challenging" and "Amount of work required" all received ratings higher than the mid-point. On-line courses are just as rigorous and demanding as on-campus courses.

This research did not examine the question of how effective distance education courses are in bringing about learning. This has been studied extensively and the findings are consistent that there are no significant differences (Russell, 1999). This department has compared exam scores and final grades of students enrolled in on-line courses and on-campus courses and have found no differences. Faculty have monitored course evaluations and have rarely found a difference between on-line and on-campus courses. Students learn through on-line courses and are satisfied with them. This research identified possible deficiencies in on-line courses and has provided suggestions on how to address these deficiencies.

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Factors Contributing to Volunteer Administration Leadership Proficiency of Southern Region 4-H County Faculty

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Abstract

Volunteer administration leadership is an important component of any successful 4-H program. Proficiency in competencies associated with volunteer administration can prove to be one's greatest asset in his/her ability to successfully develop the leadership of youth. With that, leadership style is also an important consideration because it provides a means for working with individuals and reaching programmatic goals.

The purpose of this research was to determine factors, which contribute to volunteer administration leadership proficiency of 4-H county faculty in the southern region. In order to do this, demographics were analyzed, as well as, correlations among identified independent variables. The primary intent was to develop a prediction equation for perceived proficiency in VAL competence.

Seven variables correlated with perceived proficiency in VAL competence; however, two were found to have the greatest predictability of VAL proficiency. Organizational culture (importance) and age were responsible for 43% of the variation in the model.

These factors can guide efforts related to volunteer programming, including professional development opportunities for 4-H county faculty in the southern region. A focused curriculum addressing organizational culture and a mentoring program for faculty has the potential to increase VAL proficiency.

Introduction

In 2003, there were 7,090,920 youth enrolled in 4-H programs across the nation (National 4-H Headquarters, 2004). Yet, the NAE4-HA (2004) reported only 3600 youth development professionals as members, though this is not inclusive of all 4-H faculty, it provides a basis for comparison. This creates a county faculty to youth ratio of 1:1970, an ineffective means for producing outcomes, like “care,” “guidance,” and “wisdom” (National 4-H Headquarters, 2001). However, the National 4-H Headquarters (2004) reported 449,966 volunteers last year, decreasing the adult:child ratio to 1:16, a ratio more appropriate for programmatic effectiveness.

Today, the 4-H county faculty member wears a number hats, educator, facilitator, leader, and volunteer administrator. Boyce (1971) addressed the concerns that 4-H county faculty alone would not be able to serve the growing number of youth in 4-H programs. It is essential for 4-H county faculty to understand volunteer administration leadership (VAL), when 450,000 adults contribute to 4-H programs across the nation. The most effective way to ensure the continued contributions of volunteers to the 4-H mission is by providing a quality volunteer experience. Boyce (1971) explored the notion of withholding information as power in his application of the ISOTURE model to 4-H adult volunteer leaders. He understood the value of volunteers to the organization and provided a framework for 4-H county faculty to adhere.

Volunteer administration is only 20 years old, yet the contributions of extension personnel to the field are still prominent (Boyce, 1971; Culp, Deppe, Castillo & Wells, 1998; Kwarteng, Smith & Miller, 1987; Penrod, 1991). Previous researchers examined extension faculty’s perceptions of volunteer administration models across the U.S. (Culp& Deppe, 2001; Culp & Kohlhagen, 2004; Hange, Seevers, & VanLeeuwen, 2002), including needs assessments, use of job descriptions, resource location and recruitment (Culp, 2001). Hange, Seevers, and VanLeeuwen (2002) showed differences between perception and importance in nine competency areas of volunteer administration existed, supporting King (1997).

Cooperative Extension Service (CES) faculty, especially those having a high level of interaction with volunteers, like 4-H county faculty, can benefit from research initiatives; including pinpointing key characteristics of 4-H county faculty proficient in the discipline of VAL. While research in VAL has been focused on the importance of and proficiency in competencies, there as been a piece missing - the prediction of VAL proficiency.

Theoretical Framework

Volunteer Administration

For 44 years The Association for Volunteer Administration (AVA) has been the professional organization supporting the needs of volunteer administrators. The AVA has continued to progress the field as a true profession and is recognized internationally for the wide array of services and resources it provides. This includes the establishment of professional competencies for volunteer administrators encouraging many professionals to seek new and challenging educational opportunities (Association for Volunteer Administration, 2001). In 2003, the AVA identified five core competencies of VAL which were (a) professional principles, (b) leadership, (c) management, (d) planning, and (e) human resource management.

Competency-based criteria are an important in developing a profession and Boyd (2003) identified the competencies that professionals in VAL would need in the coming decade as: (a) organizational leadership, (b) systems leadership, (c) organizational culture, (d) personal skills, and (e) management skills.

Stedman and Rudd (2004) developed the theoretical dimension of the discipline including seven key competencies. These competencies were the basis for the development of the Volunteer Administration Leadership Competency Instrument (VALCI) Stedman (2004). The seven competences integrated both the AVA (2001) and Boyd (2003) competencies.

Stedman and Rudd (2004, p.10) identified the competencies as:

> (a) Organizational Leadership: leadership taking place in the context of the organization includes planning and operation at the program level, (b) Systems Leadership: leadership involving the expressed knowledge of one's discipline, (c) Accountability: knowledge and practice of skills addressing the planning, operation, and evaluation of a volunteer program, (d) Management Skills: knowledge and skills addressing the day-to-day operations of a volunteer program, (e) Personal Skills: knowledge and skills addressing effective communication and relationship building in volunteer programs, (f) Organizational Culture: knowledge and skills addressing positions and relationships within a volunteer organization, and (g) Commitment to the Profession: knowledge and skills addressing individual commitment to the field.

These competencies provided the framework for evaluating southern region 4-H county faculty's VAL perceived proficiency and competency importance.

Leadership Styles

In an effort to address the leadership styles of 4-H county faculty in the southern region, the model of Full Range Leadership (Avolio & Bass, 1991) guided the researchers. Full range leadership specifies a leader has three styles, which should guide them in their leadership; transformational, transactional and laissez faire (Bass & Avolio, 2000b). With transformational being the most effective and active of the leadership styles, followed by transactional and laissez-faire.

The Multifactor Leadership Questionnaire (MLQ) developed by Bass and Avolio (2000a) measures nine behaviors (factors), which influence three leadership styles (outcomes). The nine factors are:

> a) Idealized influence attributed (refers to the socialized charisma of the leader, whether the leader is perceived as being confident and powerful, and whether the leader is viewed as focusing on higher-order ideals and ethics) , b) idealized influence behavior (refers to charismatic actions of the leader that are centered on values, beliefs, and a sense of mission), c) intellectual stimulation (gets followers to question the tried and true ways

> of solving problems), d) inspirational motivation (provides followers with a clear sense of purpose that is energizing; a role model for ethical conduct which builds identification with the leader), e) individualized consideration (focuses on understanding the needs of each follower and works continuously to get them to develop to their full potential), f) contingent reward (focus on clarifying role and task requirements, rewards for fulfillment of contractual obligations, g) management-by-exception active (focuses on monitoring task execution for any problems that might arise and correcting those problems to maintain current performance levels), h) management-by-exception passive (tends to react only after problems have become serious to take corrective action; wll avoid making any decisions at all), and i) laissez-faire leadership (avoid accepting their responsibilities, are absent when needed, fail to follow up requests for assistance, and resist expressing their views on important issues) (Antonakis, Avolio, & Sivasubramaniam, 2003, p. 264-265; Bass & Avolio, 2000b, p. 29)

Within the CES, research aimed at identifying leadership style of county faculty has become of interest due to the changing goals facing extension programs (Woodrum & Safrit, 2003). With that, measurement instruments like the Multifactor Leadership Questionnaire (MLQ) (Bass & Avolio, 2000a) have proved to be valuable tools in county faculty leadership development (Rudd, 2000; Woodrum & Safrit, 2003).

Demographics

The prevalence of women in 4-H in state and county level positions provided the impetus for further study of gender on leadership. In the past thirty years, the study of gender on leadership grew considerably (Bass, 1990; Carless, 1998). However, empirically based research has shown a significant lack of evidence to support gender differences in leadership behaviors.

There is no conclusive evidence as to the relationship between race and leadership. In some instances, researchers were able to show a difference in either how followers perceive leaders or how they measured on leadership inventories. In others there was no relationship found.

Moore (2003) found in using the MLQ within the CES no significant findings in the relationship between age and leadership style. Sykes (1995) concluded age was a significant factor in younger CEDs (<45 years of age) perceptions that they demonstrate more leadership behaviors; however, Sykes concluded age was not a significant factor significantly influencing leadership behavior. Organizational tenure is important to the CES and Moore (2003) did find individuals reporting a longer tenure were less likely to engage in the transactional leadership style of Management-by-Exception (passive and active).

In order to maintain a high quality volunteer programs, which attract and retain the best volunteer resources, professional development of 4-H county faculty is a necessity. By focusing on the two elements which have the greatest impact on the administration of volunteer programs, volunteer administration leadership proficiency and leadership style, there can be a greater effort to focus professional development opportunities for 4-H county faculty in the southern region. Researchers combined the theoretical framework of leadership (Avolio & Bass, 1991) with the theoretical framework of VAL (Stedman & Rudd, 2004) to provide a basis for measuring and interpreting the role of leadership and volunteer administration competence importance in predicting 4-H county faculty's volunteer administration proficiency.

Purpose and Objectives

The purpose of this research was to determine contributing factors to volunteer administration leadership proficiency of 4-H county faculty in the southern region.

The objectives of this study were to:

1. Determine selected demographics of southern region 4-H county faculty,
2. Identify the relationship between selected demographics, leadership styles, and perceived volunteer administration importance and proficiency, and
3. Predict volunteer administration leadership proficiency based on demographics, leadership style and perceived volunteer administration leadership competency importance.

Procedures

This study used a survey research methodology with three questionnaires to collect information necessary to accomplish the objectives. This was a correlational study with the intent of assessing the predictability of the criterion, perceived volunteer administration leadership proficiency, by demographics, leadership styles, and perceived importance of VAL competencies.

The data collection for this study was completed during a larger national 4-H study, which had the target population of all 4-H county faculty in the United States (Stedman, 2004). Researchers considered each extension region as an individual population, with the final study sample including a random selection of states within each region. Selected states were contacted regarding use of their 4-H county faculty database, in order to randomly select individual participants representing the state and region. Using Dillman's (2000) Tailored Design Method researchers minimized sources of error, including coverage, non-response, and sampling error. Sixty-five participants were randomly selected from the southern region to participate in the study. Researchers calculated a response rate of 52% (n=34).

Early and late respondents were compared in order to determine if any statistical difference existed (Lindner, Murphy, & Briers, 2001). The double-dipping technique was used to determine if nonresponse was a concern. Miller and Smith (1983) reported late respondents are often similar to early and this was the case when the two groups were compared in this study. Analysis confirmed no significant differences existed between early (the first 50%) and late respondents (the last 50%).

The questionnaires used in the collection of data were the Volunteer Administration Leadership Competency Instrument (VALCI), the Multifactor Leadership Questionnaire (MLQ) and a short demographic instrument. The VALCI was designed as a web-administered questionnaire containing 52 independent statements allowing respondents to provide answers on two levels, perceived proficiency and importance. The questionnaire was divided into seven categories, each addressing one of the seven competencies of volunteer administration. The reported Cronbach's alphas for each construct were: organizational leadership (α=.88), systems leadership (α=.83), accountability (α=.85), management skills (α=.88), personal skills (α=.87), organizational culture (α=.82) and commitment to the profession (α=.80). Perceived proficiency statements were measured using a Likert-type scale of 1 (Poor) to 5 (Excellent) and perceived importance statements used a scale of 1 (Strongly Disagree) to 5 (Strongly Agree). The mean difference between perceived proficiency scores and perceived importance scores determined competence in volunteer administration. The researcher-developed demographic questionnaire was included with the VALCI for ease of data collection. Demographics included were gender, race, age, and tenure. A literature review revealed each of the selected demographics had some influence on leadership outcomes.

The MLQ was a 45-statement questionnaire measuring leadership behaviors and styles (Bass & Avolio, 2000b). Transformational leadership was measured using 20 statements associated with five of the factors, transactional leadership was measured using 12 statements associated with three factors, and laissez-faire leadership was measured by four statements, comprising the final, ninth factor. Using a Likert-type scale, 0 (Not at all) to 4 (Frequently) respondents self-reported leadership styles. For the purposes of this study, the questionnaire was administered on the web. Bass and Avolio (2000b) reported the reliability of leadership factors, ranging from .74 to .91 and leadership outcomes, ranging from .91 to .94.

Findings

Objective 1. Determine selected demographics of southern region 4-H county faculty

Of the faculty responding, 76.5% (n=26) were women, with 23.5% (n=8) reporting male. Race was analyzed as dichotomous variables, white and people of color. There were significantly more white respondents (82.4% (n=28) than people of color 8.8% (n=3).

The highest percentage of southern region 4-H faculty were under age 30 (26.5%, n=9), with the majority of respondents under age 40 (67.7%, n=23), depicted in Table 1. Tenure ranged from 1-5 years (32.35%, n=11) to 21-25 years (5.88%, n=2).

Table 1. *Age of Southern Region 4-H County Faculty (n=34)*

Age Range	f	Percent	Cumulative Percent
26-30	9	26.5	26.5
31-35	7	20.6	47.1
36-40	7	20.6	67.6
41-45	3	8.8	76.5
46-50	5	14.7	91.2
51-55	2	5.9	97.1
56-60	1	2.9	100.0
Total	34	100.0	

Objective 2. Identify the relationship between selected demographics, leadership styles, and perceived volunteer administration leadership importance and proficiency

Pearson product-moment correlations were computed to determine the strength of the linear association between variables. Perceived VAL competence proficiency was found to have relationships with seven variables. Relationship strength was determined using the scale: .00-.19 (Negligible), .20-.49 (Low), .50-.69 (Moderate), .70-.85 (High), and .86-1.00 (High) (Ary, Jacobs, Razavieh, 1996).

With an alpha level of .05 set apriori, seven variables had a significant correlation. There were five variables categorized as having low relationships age, r=.46, p<.05, race, r=.44, p<.05, systems leadership (perceived importance), r=.45, p<.05, accountability (perceived importance), r=.43, p<.05, commitment to the profession (perceived importance), r=.47, p<.05. Two variables were categorized as having a moderate relationship perceived VAL importance, r=.58, p<.05 and organizational culture (perceived importance), r=.57, p<.05. These relationships are summarized in Table 2. Variables associated with leadership style were found to have no significant relationships with perceived VAL competency proficiency.

Table 2. *Pearson Product-Moment Correlations for Perceived Volunteer Administration Leadership Competency Proficiency and Importance, Leadership Style, and Demographics*

	Perceived Volunteer Administration Leadership Competency Proficiency	
Variable	r	n
Accountability (Importance)	.43*	23
Race	.44*	24
Systems Leadership (Importance)	.45*	24
Age	.46*	25
Commitment to the Profession (Importance)	.47*	24
Organizational Culture (Importance)	.57*	25
VALC (Importance)	.58*	20

*p<.05

Objective 3. Predict volunteer administration leadership proficiency based on demographics, leadership style and perceived volunteer administration leadership competency importance

The goal of objective three was to predict perceived volunteer administration leadership competency proficiency based on demographics, leadership style and perceived volunteer administration leadership competency importance. The Pearson product-moment correlations from objective three guided the building of a predictive model. With that, there were seven variables analyzed for their predictability of perceived volunteer administration leadership competency proficiency using stepwise regression. However, due to the low number of respondents, only two variables were analyzed at a time. This process was repeated to determine the model with the greatest level of predictability, R^2.

During analysis, two variables were found to have the greatest predictability on the dependent variable of VAL proficiency. Organizational culture (perceived importance), β=.52, t=3.37, p<.05 and age, β=.40, t=2.58, p<.05. The completed model had an adjusted R^2 of .43, F=10.04, p<.01. Table 3 summarizes the findings of the regression model.

Table 3. *Multiple Regression Explaining Perceived Volunteer Administration Leadership Competency Proficiency in Southern Region 4-H County Faculty (n=21)*

	B	*SE* B	β
Constant	9.53	15.73	
Organizational Culture (Importance)	.60	.18	.52*
Age	2.26	.88	.40*

Note. R^2=.43. **p*<.05

Conclusions

In presenting the following conclusions and recommendations, the researchers provide there should be careful consideration made due to the selection process of the participants.

Objective 1

The impact that demographics may have on leadership and volunteer administration were the basis for collecting the data. In the southern region, 76.5% of 4-H county faculty were female, which is higher than the 66% reported nationally (Stedman, 2004). Male county faculty in the southern region are not as well represented, at 23.5%, versus at the national level (33.0%). However, the southern region is considerably lower in percentage of male 4-H county faculty when compared to the national percentage. 4-H county faculty in the southern region have a higher percentage of non-white faculty (8.8%) compared to the national level (4.2%) (Stedman, 2004). The percentage of non-white faculty members at both the national and regional level is not proportional to the number of 4-H youth reported as non-white (31% national and 40% southern region) (National 4-H Headquarters, 2004).

Southern region 4-H county faculty are younger than their national counterparts, with 47% (*n*=16) 35 years of age and younger compared to 29% (*n*=28) at the national level (Stedman, 2004). Another dimension measured was tenure; tenure represented the length of time in extension and length of time as a volunteer administrator. Similar to the age of respondents, 55.9% (n=19) of respondents reported tenure 10 years and less. These two variables, when considered together indicated that 4-H is investing time and energy in acquainting and preparing younger and less experienced faculty for their roles as 4-H county faculty.

Objective 2

The purpose of objective two was to determine the strength of the linear association between the variables, perceived proficiency in VAL competence, perceived importance of VAL competencies, leadership styles, and demographics. Taking into consideration objective three, correlations were identified as they related to VAL proficiency.

There were seven of twenty-one variables identified as having significant relationships with perceived VAL proficiency. Age was a natural fitting relationship, although positive low, showing older people report themselves more proficient in this area (r=.46). However, tenure, which took into consideration length of time in extension and volunteer administration did not correlate significantly. Additionally, race had a low positive correlation indicating non-white respondents reported a higher level of perceived proficiency (r=.44). Organizational culture (r=.57) had a positive moderate relationship, providing evidence supporting the importance of knowledge and skills addressing positions and relationships within a volunteer organization. VAL competency importance also correlated highly with perceived proficiency (r=.58). This indicated if respondents believed VAL was important, they also believed themselves to be proficient.

Objective 3

In building a predictive model for perceived proficiency in VAL, there were two key variables, which contributed to 43% of the variability in the model. Age (β=.40, p<.05), contributed to the model and provided a means for addressing the notion that the older an individual is the more proficient they are due to various factors, including more varied experience, education, and practice. Organizational culture (β =.52, p<.05) contained items related to encouraging professional development, confidence in volunteers, seeking additional resources, identifying motivational needs, and designated organizational resources for volunteer development, all items identified as also important in VAL (Stedman, 2004).

However, there should be additional research addressing proficiency. First, the number of respondents brings into question the predictability of the model. In multiple regression a small sample size may introduce questions about the generalizability of the model. The adjusted R^2 value was used to compensate and be conservative due to the smaller sample size. The model was found to be significant (F=10.04, p<.01).

Recommendations

There are some general recommendations that were derived from the findings and conclusions of this study. These are only recommendations that may be applicable to 4-H county faculty serving the southern extension region.

- There needs to be a stronger initiative to recruit and retain faculty that are more representative of the population that is being served (National 4-H Headquarters, 2004).

- Candidates that are qualified and underrepresented, including men and people of color perspectives, should be sought out and encouraged to apply for opened positions.
- There should be a concerted effort to ensure more in-service educational program opportunities, especially to meet identified needs.
- Implementation of a mentoring program that orients and provides a supportive contact for new or younger faculty members can assist in overall job satisfaction and retention (Kutilek, Gunderson & Conklin, 2002; Zimmer & Smith, 1992).
- Research should address the actual competence of 4-H county faculty versus their self-perceptions of their proficiency.
- Professional development opportunities should be tailored around items related to organizational leadership.

Discussions/Implications

It is important to continue discussions related to the VAL competence and leadership styles of 4-H faculty, nationwide. If volunteer administrator educators are to guide programs based on needs prediction models can provide a great source of information about sources of variation among the learners. However, when there is uncertainty in the validity of the model, researchers must be prepared to continue the effort.

As we begin to gain a better of understanding of the effects of these independent variables on VAL proficiency, we can also develop strategies, which integrate these principles into planning. The support for this need is apparent in the number of youth seeking services from 4-H county faculty, this fact has not varied over the years, and remains a driving force of extension program offices. Volunteers are in the position to assist in the reaching of organizational objectives and can assist 4-H in meeting the needs of all their clients and staff.

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Factors Which Influence Leadership Participation in Agricultural Organizations

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Abstract

This study examined why individuals may accept greater leadership responsibilities within organizations. A sample of active members of the Florida Farm Bureau Federation, a voluntary agricultural organization, were given an instrument to measure their sources of motivation, attitudes towards volunteering, and their views on serving on county Farm Bureau boards. Demographic information was also obtained in this survey. Multiple regression was used to determine which factors influence individuals to accept greater leadership responsibilities and serve on their local Farm Bureau boards. This study found that how high the volunteer activity is evaluated will be the greatest determinant in serving on a county Farm Bureau board.

Introduction

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

Rural communities that are supported by agriculture were once the foundation of the United States and still make up large parts of the country, though rural communities are diminishing due to urbanization and the decrease of agricultural industries that provide the community base. McCaslin (1993) states, "one of the overriding concerns of those individuals working towards the stabilization and future growth of rural communities is the lack of active participation by many of its citizens" (p. 46). The process of stabilization and revitalization in agriculture begins with effective and active leadership and participation. As Farm Bureaus can be found in most rural communities in the country and in Florida, this leadership can be found in the membership of local county Farm Bureaus.

Family or individual farms make up the largest majority of farms in the United States. Over 1.9 million farms are family farms, which has increased by 250,000 from 1992. The trend of growth of smaller farms is also evident in Florida. Family farms are the largest type of farm, with over 37,000 in this category, approximately 10,000 more than in 1992 (USDA, 2004). But why are those actively involved in agriculture not taking on leadership responsibilities in the Florida Farm Bureau organization? Do they lack training, skills, abilities, time or knowledge? Or do they not have a desire to lead? This study provided data to assist in answering these questions.

The problem leading to this research was: To keep a strong voice and presence at the local, state, and national level, agriculture needs qualified leaders who are willing and able to work on behalf of agriculture, rural communities and their livelihoods as agriculture in the United States and the state of Florida is rapidly changing.

In this study, a researcher designed leadership behavior instrument was given to a sample of active Florida Farm Bureau members to determine their motivations and their attitudes towards volunteering to serve on their county Farm Bureau boards. Active members are Farm Bureau members who are full-time farmers, part-time farmers, or farm managers. Currently only active members are elected to county boards or other leadership positions in the Farm Bureau organization (P. Cockrell, S. Butler, & R. Hemphill, personal communication, July 17, 2003).

Theoretical Framework

Farm Bureau is:

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

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

Inherited in the legacy in America is volunteering on behalf of the common good. People are identifiers of needs, issues, and problems and expect to participate in the decision making on how to respond to these. Voluntary activities range from short-term events, which have a time limit, to longer-term commitments of service such as serving on a board. The choice to sit on an organization's board is an important decision (Scott, 2000).

A majority of volunteer work is completed in associations or organizations. In 1995, 71% of the adults in the United States were members of associations, not including memberships to churches and synagogues. In 1991, 53% of the population participated in active unpaid volunteer work for non-profit organizations and associations (Smith, 2000).

Omoto and Snyder (2002) developed a conceptual model of the volunteer process, which explains volunteering on various levels. At the individual level, the model focuses on activities and the psychological processes of the individuals which include: expressing their personal values, satisfying their need to help others, community concern, personal development, and to fulfill esteem enhancement needs. At the intrapersonal level, the dynamics of helping relationships between the volunteers and the recipients of their help are incorporated. At the organizational level, the focus is now on the goals associated with the recruitment, management, and retainment of volunteers. At the societal level, the model takes into consideration the linkages between individuals and the social structures of their society.

Self-actuation is the motivation of individuals to seek ways to fully express their interest, talents and potentials as human beings. The people who are characterized by these motives may have talents or power over others by the virtue of their knowledge or talents. Altruism is the principal motivational theme for people who seek opportunities to help others (Cavalier, 2000). In rough terms, altruism is defined as an internal concept that refers to the tendency or disposition of an entity to help others (Smith, 2000).

The theoretical rationale on the roles of motives comes from Snyder's (1993) functional approach to prosocial behaviors, which are based on the notion that much of human behavior is motivated by specific goals or needs. To fully understand why a person is engaging in a behavior, the purpose or need being served by that behavior should be identified. The fundamental concerns of motivational inquiry, is understanding the processes that move people to action and the processes that initiate, direct and sustain action. Clary et al. (1998) describe the functional perspective of volunteering as encouraging the consideration of the wide range of personal and social motivations that promote sustained behavior.

An instrument used to measure motivation sources was developed by Barbuto and Scholl (1998), the motivation sources inventory has been used to predict leadership influence tactics, transformational leadership behaviors and follower compliance using sources of motivation which include: intrinsic, instrumental, external and internal self-concept. It has shown to be reliable and valid in reported studies and captures the sources of motivation.

Intrinsic process motivation is described as when a person is motivated to perform certain kinds of work or to engage in certain types of behavior for the fun of it. The work acts as an incentive and it is derived from immediate internal gratification. Instrumental motivation is when individuals perceive their behavior will lead to pay, promotions, bonuses, or other extrinsic tangible outcomes (Barbuto et al., 2001).

Self-concept-external motivation is based on an individual who is primarily other-directed and seeking affirmation of traits, competencies, and values. The individual behaves to satisfy reference group members to gain acceptance and then status (Barbuto et al., 2001). Deci and Ryan (1995) describe this type of motivation as extrinsic motivation, the behavior where the reason for doing it is something other than an interest in the activity itself. It may be due to something a person feels pressured to do.

Self-concept-internal motivation is internally based. The individual sets internal standards that become the basis for the ideal self and is motivated to engage in behaviors that reinforce these standards (Barbuto et al., 2001). Internal motivations also are motivations for cooperation that flow from individuals' values and attitudes and shape their behavior (Tyler, 2002).

Loyalty or commitment to the group or organization can also be a motivation of volunteering as people in groups come to identify with those groups. Tyler (2002) describes social identity theory as one that individuals in groups identify with those groups and merge their sense of identity with the groups and when people identify with groups they put the welfare of the group above their own. When there is no identification with a group, if an individual believes that the organization does not represent their interests or if an individual is content, they may become apathetic and do not feel the need to participate.

Leaders play an important role in creating and sustaining a group with which individuals can become loyal and committed to. The feeling of group identification encourages cooperation on behalf of the group because people merge their sense of themselves with the group. The important role of attitudes and values in stimulating cooperation suggests the importance of creating a supportive culture or value climate within a group. "Leaders need to stimulate intrinsic interest in group roles, identification with the group, and the development of moral values and feelings that group authorities are legitimate" (Tyler, 2002, p. 779).

Results of a study done by Martinez and McMullin (2004) found that members who were active in an organization belonged almost twice as long as non-active members. Both groups had similar competing commitments on their time. Active members witnessed the effects of their efforts, witnessed organizational success and achieved a level of personal accomplishment; they believed they could make a difference. For those that were not active, the potential benefits and outcomes may have been important but unknown.

Martinez and McMullin (2004) state "volunteer roles may appeal to people with certain lifestyles based on (a) ones' position in a job; (b) whether one is employed full-time, part-time is retired, or is a home maker, (c) age and (d) the expectations and associated responsibilities of the role(s) one would fill" (p. 114). The success of the volunteer experience is largely determined by whether the volunteer experience meets the person's expectations. The more that is known about those expectations, the more effort can be made to ensure the volunteer remains motivated (Eisinger, 2002).

The generations of individuals who compose the volunteer segment of the population are facing different issues and pressures. Individuals who belong to the "baby boomer" generation are facing pressures of the needs of their children and their aging parents. Those individuals who were born between 1960 and 1980, the members of Generation X, are inwardly focused and less inclined to be involved. They are facing personal and professional pressures as they build their careers and families. Life pressures, particularly those of time and family are limiting the availability of traditional volunteers (Safrit & Merrill, 2002).

Organizations need to find ways to structure volunteer work, which will allow people increased flexibility to move in and out of volunteering as work and family pressures affect their lives. Turnover rate is influenced by the importance and structure of an organization, as well as age, family status, work, family stage, and life stage (Martinez & McMullin, 2004).

Joining organizations, such as Farm Bureau, also increases an individuals' social capital. An essential characteristic of a properly functioning society is engagement in civic activities because cooperative actions enable citizens to efficiently pursue common goals. Self-confident leaders are more trusting in other people, they are satisfied with their life and their achievements, and they are more likely to engage in various forms of community activities.

The trend in civic engagement, shown by membership records of organizations, has declined by roughly 25 to 50% over the last three decades. There are many reasons why social capital has eroded: time pressures, economic hard times, residential mobility, surbanization, movement of women to the paid work force, disruption of marriage and family times, the electronic revolution and other technological changes. A social trend, which influences social capital and coincides with the downturn in civic engagement, is the breakdown of the traditional family unit. Since the family is a key form of social capital, its eclipse is part of the explanation for the reduction in joining and trusting in the wider community (Scheufele & Shah, 2000).

It has been shown that a greater number of social ties increased the likelihood that a group will be more successful in organizing for concerted action (O'Brien, Hassinger, Brown & Pinkerton, 1991). Social capital is important when discussing agricultural organizations as social capital has strong influences in these organizations.

When discussing leadership in agricultural organizations, the leaders have traditionally been male. With recent demographic shifts in the volunteers of organizations, more women will become a part of the leadership of these organizations. In a study of volunteer leaders in agricultural organizations, the motivations to serve in leadership roles in agricultural organizations were found to be a concern for people, the responsibility to support their profession, it's something they believe in, it's an outlet for their talents, it's a source of enjoyment and satisfaction, it's their duty to use their talents in service to others, and they believe they owe it to their industry (Kajer, 1996).

Farm Bureau is an agricultural organization which relies on its' members to fill leadership positions within the organization. Individuals who belong to Farm Bureau have unique motivations to why they belong. It is important to understand the motivations of volunteers as understanding what motivates volunteers will allow organizations to better utlize their volunteer members.

Purpose(s)/Objective(s)

The purposes of this study were to explain: individual motivations, attitudes towards volunteering, and opinions on serving on county Farm Bureau boards. Demographic information was also collected for use within the multiple regression model.

The objective of this study was to determine the reason(s) why local Farm Bureau members chose to participate or not participate in leadership roles in local county farm bureau boards

Methods/Procedures

A leadership behavior instrument was developed to examine leadership attitude/will/desire within Farm Bureau members. This instrument was administered to a sample of active Florida Farm Bureau members (active members are those who are full or part time farmers or farm managers). The instrument used in this study was pilot tested to ensure validity. Members of the pilot test were taken from a sample of active Farm Bureau members.

The researcher was given a computer generated random list of active members and mailed surveys to 419 of these members. The size of this population of active members was 36,100 (P. Cockrell, personal communication, September 10, 2002). Using a 50/50 split with a ±5% sampling error, 419 members of this population were selected to participate in this study.

The basic survey procedure outlined in Salant and Dillman (1994) was used for the data collection of this survey instrument. This procedure was used to produce an acceptable response rate so as to try to avoid nonresponse error. The response rate for this survey was 25%. To defend this return rate, Hager, Wilson, Pollak, and Rooney (2003) determined that surveys of organizations typically receive substantially lower return rates, with a return rate of 15% reaching a level of acceptability for organizational surveys. In a study by Green and Hutchinson (1997) on the *Effects of Population Type on Mail Survey Response Rates and on the Efficacy of Response Enhancers*, the authors found that the response rate for those involved in agriculture was 30%, while the general public had a return rate of 35%.

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

The instrument used in this study was a leadership behavior instrument which was composed of three parts: a motivation sources inventory, a semantic differential scale to measure volunteering attitudes, and a Likert scale inventory to assess respondents' desire about serving on a county board. The motivation sources inventory was developed by Barbuto and Scholl (1998) and measures the sources of motivation. The authors developed this inventory to predict behaviors of individuals. The inventory was used in this context, as a factor that contributes to members will to serve (or not to serve) on their county Farm Bureau boards. This instrument was pilot tested with a group of active Florida Farm Bureau members who were not included in the final sample.

The Cronbach's alpha of the entire motivation sources inventory was 0.8, which indicates that the inventory had a high level of internal consistency or reliability. The Cronbach's alpha for the overall semantic differential scale was 0.81, which indicates a high reliability for the scale. The high Cronbach's alpha of the Likert scale, 0.838, indicates that all the items in this scale are measuring the same underlying theme, which is the respondents view of serving on county Farm Bureau boards.

From the literature, motivation factors, attitudes on volunteering and demographic variables have been identified as influences on participation in organizations and whether individuals will step forth for additional leadership responsibilities within these organizations. These contribute to the attitude/will/desire that was measured by this instrument. A conceptual model, which represents this part of the study, is provided in Figure 1. In this model, leadership is a function of motivation factors, volunteering attitudes, a desire to serve and demographic variables.

Figure 1. *Conceptual Model of Leadership*

L		f(M		V		S		D)
(Leadership)	=	Motivation Factors	+	Volunteering Attitudes	+	Desire to Serve	+	Demographic Variables
		Internal Self-Concept		Evaluative				Gender
		External Self-Concept		Potency				Age
		Intrinsic Process		Activity				Marital Status
		Instrumental						Children
								Belong to Orgs.
		(Will)		(Attitude)		(Desire)		

Multiple linear regression was used in the accomplishment of this objective. Regression is used to determine the nature of the relationship between a dependent variable and more than one independent variable (Black, 1999). For this analysis, the dependent variable is participation on a county board, and the independent variables were: motivation external self-concept (a factor derived from obtaining the mean of the six external self-concept statements on the Motivation Sources Inventory section of the instrument), motivation internal self-concept factor (derived from the six internal self-concept statements), motivation intrinsic process (derived from the six intrinsic process statements), motivation instrumentation (derived from the six instrumentation statements), volunteering evaluative factor (derived from obtaining the mean of the four evaluative adjective pairs on the volunteer section of the instrument), volunteering potency factor (derived from obtaining the mean of the four potency adjective pairs), volunteering activity factor (derived from obtaining the mean of the four activity adjective pairs), years of membership in Farm Bureau, family involvement in Farm Bureau, time devoted to Farm Bureau, Farm Bureau events attended in the past year, involved in other agricultural organizations, belong to other organizations, marital status, children, gender, age, member of 4-H, member of FFA, member of other youth development organizations, participated in leadership development programs, farm size, and work off the farm

Results/Findings

There were a total of twenty-four independent variables that were considered for use as predictors in this stepwise, backward multiple regression analysis. Table 1 provides the initial Pearson correlation, degrees of freedom, and significance values for these variables that were identified as predictors of participation on local county Farm Bureau boards. Pearson correlation values, *r*, that are close to or above .3 (both positive and negative) were identified. The "volunteering evaluative factor" had the highest *r-value* of .47.

Table 1. *Pearson Product Moment Correlations Between Independent Variables and Serving on County Boards (N=81)*

	df	r	Sig.(2-tailed)
Serving on County Boards	79	1.00	.
Motivation External Self-Concept Factor	79	.16	.12
Motivation Internal Self-Concept Factor	79	.26	.01
Motivation Intrinsic Process Factor	79	-.11	.32
Motivation Instrumental Factor	79	-.07	.54
Volunteering Evaluative Factor	79	.47	.00
Volunteering Potency Factor	79	.17	.11
Volunteering Activity Factor	79	.39	.00
Years of Membership in Farm Bureau	79	.08	.49
Family Involvement in Farm Bureau	79	.11	.31
Time Devoted to Farm Bureau per Month	79	.12	.29
Number of Farm Bureau Events Attended	79	.30	.01
Involved in Other Agricultural Organizations	79	.14	.18
Belong to Other Organizations	79	.35	.00
Marital Status	79	.04	.71
Children	79	.20	.06
Gender	79	-.05	.67
Age	79	-.13	.34
Member of 4-H	79	.20	.06
Member of FFA	79	-.09	.93
Member of Other Youth Development Organizations	79	.38	.00
Participated in Leadership Development Programs	79	.31	.00
Farm Size	79	.20	.14
Work Off Farm	79	.16	.17

Note: Model is significant at the 0.01 level (2-tailed)

Seven independent variables were used in the final multiple regression analysis. As Table 2 indicates, these independent variables have a significant relationship and impact on the dependent variable, participation on local county Farm Bureau boards. These factors were: motivation internal self-concept, volunteering evaluative factor, volunteering activity factor, number of Farm Bureau events attended, belong to other organizations, member of other youth development organizations, and participated in leadership development programs.

Table 2. *Regression Analysis with Variables which Made Significant Contributions (N=86)*

	df	r	Sig. (2-Tailed)
Motivation Internal Self-Concept	84	.26	.01
Volunteering Evaluative Factor	84	.47	.00
Volunteering Activity Factor	84	.39	.00
Number of Farm Bureau Events Attended	84	.30	.01
Belong to Other Organizations	84	.35	.00
Member of Other Youth Development Organizations	84	.38	.00
Participated in Leadership Development Program	84	.31	.00

Note: Correlation is significant at the 0.01 level (p<.05)

In the final multiple regression model, a stepwise backward selection was utilized. Two variables met the removal criterion: belong to other organizations and motivation internal self-concept factor. These two variables did not make a statistical significant contribution to how well the model predicts the dependent variable. The final multiple regression analysis with the remaining five variables is presented in Table 3. Why individuals take on additional leadership roles such as serving on their local county Farm Bureau boards is explained by these five variables. As discussed in the literature, how individuals evaluate volunteer opportunities, the volunteer activities they are engaged in, how active they are in the organization (represented by the number of events they attended) and if they have participated in other organizations or leadership development programs all factor into whether individuals will step forth and assume greater leadership responsibilities.

Table 3. *Final Regression Analysis with Variables which Made Significant Contributions (N=86)*

	β	Beta	*t*	df	Sig.	R^2	Adj. R^2
Constant	-.50		-.63	79	.53		
Volunteering Evaluative Factor	.46	.34	2.75	79	.01		
Volunteering Activity Factor	.24	.17	1.43	79	.16		
Number of Farm Bureau Events	.20	.19	1.93	79	.06		
Attended	.39	.20	1.86	79	.07		
	.46	.17	1.61	79	.11		
Member of Other Youth Development Organizations						.40	.36
Participated in Leadership Development Program							

Note: F=9.96; α < .05

The adjusted R^2 value ($R^2 = .36$) describes how much of the variance in the dependent variable (serving on county boards) is explained by the model. The five independent variables that are included account for 36% of the variance. The F-value of 9.96, which was significant at the .05 level, represents the ratio of the improvement in prediction as a result of fitting the model relative to the inaccuracy that still exists in the model (Field, 2000). From this table, "volunteering evaluative factor" has the highest Beta value of .34 and is statistically significant, which indicates the largest explanatory power between this variable and the dependent variable.

Conclustions/Recommendations/Implications

In the multiple regression analysis, how individuals evaluate volunteering was the strongest determinant whether they volunteer for additional leadership responsibilities in the Farm Bureau organization such as serving on county boards. Other factors which accounted for participation on county boards included: volunteering activity factor, Farm Bureau events attended, member in other youth organizations, and participation in leadership development programs. Being involved in youth organizations may serve to encourage future participation in organizations as adults, especially if the membership was a positive experience.

Though the literature provided evidence that family status, gender and age were all variables that influenced volunteering; these factors were not found to be significant for this study and whether individuals will participate on their local county boards. The literature also described the importance of motivation and why volunteers chose to participate in organizations and volunteer opportunities. In the regression model used for this analysis, the four motivation factors were eliminated and were not included in the final analysis. This could be due to a problem with the instrument used in this study as the respondents may not have understood the nature of the questions and how they relate to their volunteer roles in organizations.

Organizations and the boards that guide their direction are changing due to the motivations of the members that volunteer for the organization and who the organization serves. The FFBF uses boards on the county and state level and could provide valuable research on organizational boards and specifically what motivates board members to participate. Information on organizational boards and the motivations of board members is lacking and Farm Bureau could be an indispensable source of this information.

Three demographic questions that were asked on this survey instrument asked if respondents had been members of 4-H, FFA, or other youth leadership organizations and results indicated that close to half of those who responded had belonged to either 4-H, FFA, or other youth development organizations. It would be interesting to continue this line of research and investigate the influence of these organizations on leaders. Those who had participated in such organizations could be compared to those who have not and differences noted.

Farm Bureau should make serving on county farm bureau boards appealing to individuals on a personal level. They should believe that their participation will add value to their lives, give them a sense of personal achievement and that the organization they volunteer for allows them to use their skills and talents. Results showed that active Farm Bureau members place a high value on the volunteer activity and how they evaluate this activity. Activities that had positive or high evaluative terms are more appealing to individuals. Farm Bureau should make the volunteer experience a positive one for its members, as if they feel it is uninteresting or unimportant they are less likely to participate.

From this analysis, it could also be concluded that Farm Bureau members want to be active; they want to accomplish something and derive more satisfaction in volunteer activities that allow them to do this. For those individuals who participated in volunteer activities, they witnessed the effects of their efforts, witnessed organizational success and achieved a level of personal accomplishment; they believed they could make a difference. (Martinez & McMullin, 2004).

In addition to the changing demographics in rural communities and a changing constituency that Farm Bureau represents, the Farm Bureau organization itself needs to be examined, as organizations today are different than the organizations that were formed almost a century ago, such as Farm Bureau.

Florida Farm Bureau also should understand the motivations of its' volunteer members to retain the membership levels of its active members. As volunteers are the backbone of this organization, there is a great need for the retainment and recruitment of new volunteers for the organization. Additional research could be conducted in this area to determine exactly what motivates individuals to accept great responsibilities in Farm Bureau.

Participating in youth organizations and leadership development programs were found to be important determinants in accepting leadership roles in the Farm Bureau organization. Further research should be conducted which examine these findings. The leadership programming offered by Farm Bureau should be evaluated, and additional programming offered to active members to encourage the facilitation of increased leadership responsibilities by these members.

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Teaching Leadership in Agricultural Science: Behavioral Factors that Influence Secondary Agricultural Science Leadership Instruction

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Abstract

This study sought to explain why agricultural education instructors teach leadership in their classrooms. The variables measured were instructor leadership teaching behavior, instructor attitude towards teaching leadership, instructor demographics, instructor leadership knowledge, and instructor expectations of students after the teaching of leadership.

This study revealed that instructor attitude towards teaching leadership, selected instructor demographics, and instructor expectations were significant predictors of instructor leadership teaching behavior. Instructor leadership knowledge had no significant contribution to instructor leadership teaching behavior.

It was recommended that pre-service instructors be encouraged to take a leadership course so they will be better prepared to teach leadership concepts as an instructor; leadership professional development programs should be offered to current instructors to increase instructor leadership knowledge; and teacher preparation institutions should provide pre-service instructors with LifeKnowledge curriculum training so new agriculture instructors will be prepared to teach leadership in agricultural science classrooms.

Introduction/Theoretical Framework

The extent to which leadership is being taught in agricultural science classrooms is unknown and the attributes of high school agricultural science instructors that influence their decision to formally teach leadership are unclear. Research has been conducted to determine predictors of agricultural science program quality (Vaughn & Moore, 2000) and how leadership skills affect youth (Carter & Spotanski, 1989; Dormody & Seevers, 1994a; Ricketts & Newcomb, 1984; Rutherford, Townsend, Briers, Cummins, & Conrad, 2002; Townsend & Carter, 1983) and community (Brannon, Holley & Key, 1989) but no research has been conducted to determine the extent to which leadership is being taught in the formal agricultural science classroom or why high school agricultural science instructors choose to teach leadership.

The need for people with leadership skills will increase in the coming decades. As baby boomers retire, they will take with them leadership skills that have benefited the workforce. Due to the lower birthrates in the 1960's and 1970's a smaller pool of young talent will be available to fill future leadership positions, causing a leadership void (Figura, 1999). To help fill this void, high schools should teach leadership skills to youth so they may be prepared to assume these leadership positions (Barrett, 1983). Students who have been taught leadership are better prepared to act in a leadership capacity because they better understand the phenomena of leadership as a personal and attainable undertaking (Ricketts & Rudd, 2002).

Over the previous twenty years research has shown that participation by high school students in FFA activities increases the self perceived leadership skills in youth (Townsend & Carter, 1983; Ricketts & Newcomb, 1984; Rutherford et al., 2002; Dormody & Seevers, 1994b; Wingenbach, 1995). Yet, not all youth enrolled in agricultural science courses participate in FFA activities. Some may be an FFA member and choose to not participate in these activities, while others are enrolled in an agricultural science course and do not join FFA. If leadership is to be taught to these students, it must be taught in the classroom rather than through out of class activities. A curriculum to teach leadership in the classroom was needed for agricultural science instructors.

The LifeKnowledge curriculum was developed to fill this need. The curriculum grew out of the mission statement of the National FFA Organization (2003): To make a positive difference in lives of students by developing their potential for premier leadership, personal growth, and career success through agricultural education. This curriculum provides quality instructional materials so instructors can infuse premier leadership, personal growth, and career success into every facet of agricultural education and to provide instructors with additional practical learning strategies and corresponding instructional materials to empower youth to live the FFA mission every day (Derner, 2004). While the LifeKnowledge curriculum addresses the three areas of the FFA mission statement, this study addressed only the leadership component of this curriculum.

To assist in describing and explaining the teaching behavior of agricultural science teachers the Triandis behavior model (1971) was chosen. This model has been successfully used in previous studies to explain the behavior of agricultural education instructors (Rudd & Hillison, 1995). This model uses four indicators to explain human behavior: attitude, social norms, habits, and expectations. For the purpose of this study attitude is defined as "a mental position with regard to a fact or state" (Merriam-Webster, 2003) towards teaching leadership.

Triandis (1971) defined social norms as "what people think they should do" (p.14), based upon experiences or beliefs. Although no studies could be found that defined the social norms associated with teaching leadership in agricultural science, elements of leadership education in agricultural science classrooms measured by researchers in previous studies were public speaking, judging contests, chapter banquet, committee work, leadership camp, parliamentary procedure, state conventions, proficiency awards, national convention, program of activities planning, and holding FFA office (Brannon, Holley & Key, 1989; Clark, 1977; Dormody & Seevers, 1994a; Karr, Keith, Lockaby, & Vaughn, 2001; Ricketts & Newcomb, 1984; Rutherford et al., 2002; Thorp, Cummins, & Townsend, 1998; Townsend & Carter, 1983; Wingenbach, 1995). Because these elements of leadership are found in multiple studies it is concluded that these elements are most likely what agricultural science researchers believe are the social norms of secondary agricultural leadership, and as such, are generally the same for each instructor, being "reflected in the current condition of agricultural education" (Rudd & Hillison, 1995). Because they are similar for agricultural education instructors, they are considered a constant and can be excluded from the behavioral model.

Habits are defined as what a person had usually done (Triandis, 1971) and are based upon experiences, which are influenced by knowledge (Lee, 2000). Likewise, a person's past experiences are a function of their demographics (Taylor, Basen-Engquist, Shinn & Bodurka, 2004; Variyam, 1999). Therefore, a person's habits are a function of their knowledge and demographics. In this study, habits will be measured through high school agricultural science instructors' knowledge (Peasley & Henderson, 1992; Rudd & Hillison, 1995) of leadership concepts and high school agricultural science instructor demographics (Connors & Elliot, 1994).

Expectations are measured as expected benefits or outcomes of teaching leadership to students (Mischel & Mischel, 1977; Rudd & Hillison, 1995). The modified behavioral model is diagrammed below:

$$f\,\text{Behavior} = \text{Attitude} + \text{Knowledge} + \text{Demographics} + \text{Expectations}$$

Figure 1. *Theoretical Model of Behavior*

Purpose and Objectives

The purpose of this study was to explain why agriculture instructors taught leadership in their classroom. This study sought to address the following objectives:

1. Determine the demographic characteristics of high school agricultural science instructors.
2. Determine the extent to which leadership is being taught in high school agricultural science classrooms.
3. Based on National FFA LifeKnowledge leadership curriculum, determine high school agricultural science instructor leadership knowledge.
4. Determine high school agricultural science instructor attitude towards teaching leadership.
5. Determine the expectations that high school agricultural science instructors have of the agriculture students after leadership has been taught.

6. Explain the relationship between high school agricultural science instructor leadership knowledge, high school agricultural science instructor attitude towards teaching leadership, high school agricultural science instructor expectations of students, and high school agricultural science instructor demographics in light of high school agricultural science instructor leadership teaching behavior.

Methods and Procedures

The study was conducted using survey research, and a correlational, *ex post facto* design. The dependent variable measured was instructor leadership teaching behavior as determined by the extent to which leadership is being taught in the high school agricultural science classroom. Independent variables measured were instructor attitude towards teaching leadership, instructor leadership knowledge, instructor demographics, and instructor expectations after teaching leadership to students. The measures of instructor behavior, instructor knowledge, and instructor expectations were developed using lesson objectives from unit two of the LifeKnowledge curriculum (National FFA Organization, 2003). A survey instrument was developed in a paper format for mailings and as a web page for use on the Internet.

The population for the study was all FFA advisors at high school agricultural science programs (National FFA Organization, 2002) with the exception of FFA advisors in five states where the LifeKnowledge curriculum had been pilot tested: Kansas, Maine, Nebraska, New Jersey, and Pennsylvania. The programs were identified through the National FFA Organization.

Nationally, there are 7,193 high school agricultural science programs (National FFA Organization, 2002). A 95% confidence level with 5% sampling error was chosen for this study. Based on sample size information from Dillman (2000), a sample size of 367 was required. To account for incorrect addresses, inactive programs, etc. a sample size of 400 was chosen. Using a list of active FFA chapters provided by the National FFA Organization, 400 participants were selected by simple random sample selection.

Section I of the instrument measured instructor leadership teaching behavior based on content areas contained in unit two of the LifeKnowledge curriculum. Using a series of 30 statements high school agricultural science instructors were asked if they taught leadership by indicating either *yes* they taught the particular concept or *no* they did not teach the concept (Connors & Elliot, 1994; Rudd & Hillison, 1995). The greater the number of leadership concepts taught, the greater the level of instructor leadership teaching behavior.

Section II of the instrument measured high school agricultural science instructor expectations of the student for each of the leadership content areas in unit two of the LifeKnowledge curriculum. Twenty-two expectation statements were provided and a dichotomous scale was used to record the participant's responses, *yes* if they expected the student to perform the action, or *no* if they did not expect the student to perform the action (Rudd & Hillison, 1995).

Section III of the instrument measured the leadership knowledge of the instructors. Fifteen questions from the lesson objectives and evaluation tools found in unit two of the

LifeKnowledge curriculum were used (National FFA Organization, 2003). Questions were in the form of true-false and multiple-choice.

Section IV of the instrument measured the high school agricultural science instructor's attitude towards teaching leadership using a semantic differential technique consisting of 12 pairs of words. Word pairs were determined using established pairs of terms (Jenkins, Russell, & Suci, 1958; Rudd, 1994).

Section V of the instrument addressed demographic questions about the high school agricultural science instructor. Questions asked were school location, highest level of education, gender, if they had been certified through a university agriculture teacher certification program, was their bachelor degree in agricultural education, FFA membership in high school, FFA chapter officer in high school, FFA office above chapter level, age, years teaching agriculture, years teaching in current position, number of agriculture teachers at school, number of leadership courses taken in college, number of offices held in student leadership organizations other than FFA, offices held in college student organizations, offices held in professional education organizations, number of offices held in civic organizations, membership in professional development organizations, number of offices held in professional development organizations, participation on state or regional agricultural science committees, number of workshops or seminars conducted for agriculture teachers, number of workshops or seminars conducted for non-agriculture teachers, number of leadership positions held in local school or vocational department, number of times they attended the Advisors' Washington Leadership Conference, and if a leadership course was taught in their agricultural science program (Miller, Kahler & Rheault, 1989; Vaughn & Moore, 2000). The instrument was checked for validity by a panel of experts.

To pilot test the instrument, subjects (*n* =40) were selected at random from the Nebraska FFA chapters on the FFA Active Chapter List. A modified version of the Tailored Design Method (Dillman, 2000) was used for data collection. Twenty pilot instruments were returned for a pilot response rate of 50%. Pilot instrument reliability was analyzed to determine Coefficient alpha based on the three instrument constructs. From these results, the following changes were made to the instrument. Section I had a reliability of alpha=0.92. Two questions were removed to increase the reliability to alpha=0.93. Section II had a reliability of alpha=0.79. Eight questions were removed to increase the reliability to alpha=0.81. Section IV had a reliability of alpha=0.91. No changes were made to this portion of the instrument.

A modified version of the Tailored Design Method (Dillman, 2000) was used for data collection. The pre-notice letter provided instructions describing how the instrument could be accessed via the Internet and that a paper instrument would be mailed soon. The response rate for the study was 41.8% (*n*=167). Based on the sample size formula in Dillman (2000), the 167 responses of this study allow the results to have a 95% confidence level with 7.5% sampling error.

To control for non-response bias a t-test was used to compare the responses of early respondents (*n*=130) to late respondents (*n*=37) (Miller & Smith, 1983) and no significant differences were found. Likewise, a t-test was conducted to compare participants that responded using the paper instrument sent in via the mail (*n*=96) and the participants that responded using the Internet web-form (*n*=71) and no significant differences were found.

Post-hoc instrument reliability was analyzed to determine coefficient alpha based on the three instrument constructs. Section I had a reliability of alpha=0.95, section II had a reliability of alpha=0.84, and section IV had a reliability of alpha=0.92.

An alpha level of 0.05 was set *a priori* for the statistical analysis. The results of this study can only be extended to the population studied, which is high school agricultural science instructors in the United States during the 2003-2004 school year.

Results/Findings

Of the 167 participants, 114 were males and 53 were females. The age of the participants ranged from 23 to 61, with an average age of 39.37 years. The number of years teaching for participants ranged from one to 38, with an average of 14.85. The number of years teaching in their current position ranged from one to 34, with an average of 10.61.

The number of agriculture instructors at the school ranged from one to six, with an average of 1.56 instructors per department. Of the 156 participants that responded to this question, 59.0% (*n*=92) were located in one-instructor departments and 32.1% (*n*=50) were in two-instructor departments, 5.1% (*n*=8) were in three instructors departments and 3.8% (*n*=6) were in a four or more instructor department.

When participants were asked to describe the location of the community in which their school was located, 73.4% (*n*=113) indicated their school was in a rural community, (population <10,000), 16.2% (*n*=25) taught in a suburban community (population 10,000-49,000), and 10.4% (*n*=16) taught in an urban community (population >49,999) (Pennsylvania State University, 2004; U.S. Census Bureau, 2004; Wingenbach, 1995). For determining correlational relationships, the community locations were coded as dichotomous dummy variables.

When asked if a leadership course was taught in their agricultural science program, 52.6% (*n*=82) indicated this did occur. In terms of college leadership instruction, 73.1% (*n*=114) had taken one or more college leadership courses. Membership in one or more professional development organizations, such as Toastmasters, was held by 79.2% (*n*=126) of the participants, and 36.1% (*n*=57) held an office in a professional development organization.

Overall, 92.9% of the participants are teaching at least one of the surveyed leadership concepts in their classroom, with an average of 18.73 surveyed leadership concepts being taught in agriculture classrooms. When viewed as a percentage of the 28 leadership concepts surveyed, agriculture instructors are teaching 69.9% of the leadership concepts in the average program.

The construct of instructor attitude towards the teaching of leadership was moderate with a range of 25 to 72 and an average of 64.69 out of 72. In addition, of the 15 questions asked to assess instructor leadership knowledge, the average instructor answered 10.19 questions correctly, equating to 67.9% correct. If the knowledge scores are viewed as percentages it could be said that scores ranged from 27% correct to 100% correct.

Of the 22 questions used to determine instructors' expectations of students, the participant's responses ranged from 4 to 22, with an average of 17.45. If the mean is viewed as a percentage of the number of questions asked, then participants agreed with 80% of the expectations.

A Pearson's Product Moment Correlation table was constructed using the demographic variables, and the constructs of instructor leadership teaching behavior, instructor attitude towards teaching leadership, instructor leadership knowledge, and instructor expectations after leadership has been taught. The correlations for these variables in relation to instructor leadership teaching behavior are provided in Table 1.

Table 1. *Pearson's Product Moment Correlations Between Instructor Leadership Teaching Behavior and Selected Variables* (n=156)

Variable	Instructor Leadership Teaching Behavior
Leadership course taught in agricultural science program[1]	0.44*
Instructor attitude towards the teaching of leadership	0.38*
Gender[2]	0.23*
Number of leadership courses taken in college	0.22*
Instructor expectations of the students after leadership has been taught	0.21*
Membership in professional development organizations	0.20*
Number of offices held in professional development organizations	0.19*
Urban location of school[1]	0.19*
Three-instructor department[1]	0.18*
Years teaching	0.16*
Instructor leadership knowledge	-0.05

Note: *=p<0.05; [1]=Yes coded as 1, No coded as 0; [2]=Males coded as 1, Females coded as 0.

The variables with significant correlation to the construct of behavior were leadership course taught in agricultural science program (r=0.44), instructor attitude towards the teaching of leadership (r=0.38), gender (r=0.23), number of leadership courses taken in college (r=0.22), instructor expectations after leadership has been taught (r=0.21), number of offices held in professional development organizations (r=0.20), membership in professional development organizations (r=0.20), urban location of school (r=0.19), three-instructor department (r=0.18), and years teaching (r=0.16). These variables were then placed into SPSS® 12.0 for Windows to develop an explanatory regression model.

Backwards multiple linear regression was chosen because it is most appropriately used when the research goal is primarily exploratory (Gliem, 2003). Using this technique, a significant explanatory model was developed with a R-square value of 0.35 and an adjusted R-square value of 0.33, F(4,145)=19.15, p<0.05. This model used the explanatory variables leadership course taught in agricultural science program, urban location of school, gender, and instructor attitude towards the teaching of leadership, and significantly explained 33% of the variance in instructor leadership teaching behavior, the dependent variable (Table 2).

Table 2. *Backward Regression Explaining Instructor Leadership Teaching Behavior* (*n*=145)

	B	SE	Beta	*t*	Sig.
(Constant)	-11.79	5.64	--	-2.09	0.04
Leadership course taught in agricultural science program	6.12	1.16	0.37	5.28	0.00
Instructor attitude towards the teaching of leadership	0.38	0.09	0.30	4.39	0.00
Gender	3.37	1.29	0.18	2.62	0.01
Urban location of school	4.75	1.84	0.18	2.58	0.01

Note: $F(4,145)=19.15$, $p<0.00$, Adjusted $R^2=0.33$

Conclusions and Recommendations

The variable leadership course taught in agricultural science program had a significant, although not surprising, correlation with instructor leadership teaching behavior. The fact that a leadership course was being taught in the agricultural science program may lend itself to the teaching of the LifeKnowledge curriculum leadership concepts surveyed.

As mentioned previously, the modified Triandis model uses attitude as a predictor of behavior. This study validated that attitude is positively correlated with behavior and reinforces the importance attitude has on behavior. This finding supports Fishbein and Ajzen (1975), “attitude toward the behavior is often related to performance of the behavior” (p.382). This also reveals that high school agricultural science instructors with a positive attitude toward teaching leadership may be more inclined to teach leadership.

Gender also had a significant correlation with instructor leadership teaching behavior, revealing that males were more likely to teach leadership concepts than females. The findings of this study suggest that females teach less leadership than their male counterparts. Although it is possible that women prefer to teach less leadership, there are most likely other reasons for this finding.

A significant relationship was found with number of leadership courses taken in college. Taking a leadership course in college may provide sufficient leadership knowledge, and self-confidence of the subject matter, for the behavior of leadership instruction to occur.

Participant answers to the 22 questions used to determine instructors’ expectations of students were summated for statistical analysis. When this construct was correlated with instructor leadership teaching behavior the relationship was significant. This finding supports the modified Triandis model and the work of other researchers (Fishbein, Bandura, Triandis, Kanfer, Becker & Middlestadt, 1991), that a person’s expectations of the results of a behavior influence their performance of that behavior. In this case, instructors who expected students to benefit from leadership instruction were more likely to teach leadership in the classroom.

Instructors teaching in an urban school location had a significant relationship with instructor leadership teaching behavior. This may be due to the nature of the urban programs. Urban programs tend to focus on leadership, environmental science and biotechnology, while rural programs tend to focus on agribusiness, leadership and animal science (Foster, Bell, & Erskine, 1995; Trede & Russell, 1999). Many programs in urban locations have less emphasis on production agriculture skill areas and may be more likely to teach stand-alone courses on subject areas such as leadership (Trede & Russell, 1999).

One other variable studied in the modified Triandis behavioral model had a correlation worth noting. When instructor leadership knowledge was correlated with instructor leadership teaching behavior a non-significant relationship emerged. In the modified Triandis model, as knowledge increases so does the individual's behavior, yet the findings of this study did not support this theory. It appears that participants believe they have knowledge of leadership concepts because many teach leadership concepts in class, but when evaluated using leadership definitions from the National FFA's LifeKnowledge curriculum, leadership knowledge is moderate.

The reason for this digression from the behavioral model deserves additional investigation. Based on the modified Triandis behavioral model, and the findings of this study, a perceived high level of leadership knowledge may be sufficient to influence behavior, rather than possessing a high level of factual leadership knowledge. Some instructors may equate leadership and leadership education with parliamentary procedure and public speaking, while the LifeKnowledge curriculum views leadership as knowing one's own self so they can influence other people. It may also be that instructors have a general knowledge of leadership, but knowledge about the specific elements of leadership, as presented in the LifeKnowledge curriculum, are unfamiliar to agriculture instructors.

The variables leadership course taught in agricultural science program, instructor attitude towards the teaching of leadership, gender, and urban location of school were included in the model that best explained total variance in agricultural science instructor leadership teaching behavior. Regression analysis revealed this model significantly explained 33% of the variance in instructor leadership teaching behavior, the dependent variable. Although explaining 33% of the variance is laudable, 67% still remains unexplained, allowing room for additional research in this area.

Based on this information, the best predictor of instructor leadership teaching behavior is if a leadership course is currently being taught in the agricultural science program. This would appear to be an expected finding, except for two relevant facts. First, the social norm is leadership consists of activities such as teaching parliamentary procedure and attending the state FFA convention, yet these were not the items measured to determine instructor leadership teaching behavior. The behavior construct used in the questionnaire asked if instructors were teaching leadership concepts as defined by the LifeKnowledge curriculum, which does not include the social norms. This finding reveals that instructors teaching a leadership course in the agricultural science classroom were teaching leadership concepts similar to those found in the LifeKnowledge curriculum.

In this study, instructor attitude was an explanatory variable of leadership teaching behavior. This illustrates the importance of a positive attitude toward teaching leadership before leadership instruction will occur.

Gender was also an explanatory variable in this model, and revealed that male participants in this study were more likely to teach leadership than female participants.

Crosstabs was conducted to attempt to gain a further understanding of this relationship, but no additional information was revealed. There may be a number of explanations for this occurrence. It may be that female instructors in multiple instructor departments do not have the opportunity teach courses that allow leadership concepts to be taught. Perhaps the locations at which female participants teach do not allow the flexibility for the incorporation of leadership concepts into the courses. Based on the findings of the study only speculative answers can be gleaned. The finding of this relationship raises a number of questions that require further research to fully understand. One question to be addressed is what courses are these female agriculture instructors teaching, and how do these courses compare to their male counterparts.

Finally, urban location of school was an explanatory variable in this study, indicating that agriculture instructors in urban locations were more likely to teach leadership in the classroom. Based on the findings of this study we have gained some insight into the demographic differences between urban and rural agriculture instructors, but do not have sufficient information to fully understand why urban location has such explanatory power. More research should be undertaken to better understand this relationship.

Because enrollment in a college leadership course was positively related to leadership instruction, it is recommended that pre-service instructors be encouraged to take a leadership course so they will be better prepared to teach leadership concepts as an instructor. In addition, since instructors are teaching leadership with a moderate amount of leadership knowledge, leadership professional development programs should be offered to increase instructor leadership knowledge. The results of the knowledge component of the instrument used in this study may be beneficial for developing these programs.

Finally, teacher preparation institutions have the potential to influence the adoption of the LifeKnowledge curriculum and should provide pre-service instructors with LifeKnowledge curriculum training so they will be prepared to teach leadership in agricultural science classrooms. Approximately 85% of high school agricultural science instructors graduate from university agriculture teacher education programs (Morgan, 2004), indicating that university teacher preparation programs, through pre-service training, can influence a majority of the instructors in the profession. Doing this may help prepare future agriculture instructors to equip youth with leadership skills needed for the new century.

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A Comparison of Oklahoma Student Teachers' Perceptions of Important Elements of the Student Teaching Experience Before and After a 12-Week Field Experience

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Abstract

This study describes student teachers' perceptions of important elements of the student teaching experience. Selected characteristics of student teachers and their cooperating centers are also identified. The purposive sample (N = 25) included all student teachers who completed a 12-week field experience during the spring 2004 semester. Student teachers rated 34 elements of student teaching before and after the experience using a Likert-type scale: "5" = "High Importance . . ."1" = "No Importance" Questionnaire items also identified selected characteristics of participants. Cronbach's coefficient alpha reliability estimates for five core areas of the experience ranged from .60 to .84; the overall importance scale yielded an estimate of .91. The overall pretest and posttest means were 4.30 and 4.58, respectively, or about midway between "much" and "high importance." Results from both observations revealed student teachers perceived that the relationship with their cooperating teacher was the most important aspect of the student teaching experience. Perceptions related to students' SAEs held the lowest importance before and after student teaching. Findings provide some support for what other researchers posit about the role of concrete experience and modification of one's perceptions, especially viewpoints that may have been abstracted originally.

Introduction

Student teaching is a seminal "experience" in the professional development of future teachers, including those who aspire to be secondary agricultural education teachers. Other investigators (Briers & Byler, 1979; Byler & Byler, 1984; Harlin, Edwards, & Briers, 2002; Schumacher & Johnson, 1990) have suggested that experiences during student teaching influence the attitudes and perceptions of preservice agriculture teachers regarding their future careers as educators. Researchers (Barnes & Camp, 2002; Deeds, 1993; Deeds, Arrington, & Flowers, 1988; Garton & Cano, 1994; Martin & Yoder, 1985; Roberts & Dyer, 2004) also suggest that it is the cooperating teacher and cooperating center that impacts the student teaching experience in agricultural education the most.

To that end, Martin and Yoder (1985) asserted that in large measure, "the general supervisory climate in the department and . . . the educational leadership abilities of the cooperating teacher" (p. 21) determine how successful one's student teaching experience will be in agricultural education. According to DeMoulin (1993), a cooperating teacher should "foster unique teaching concepts and . . . give support and encouragement to preservice teachers" (p. 160). Further, Garton and Cano (1994) opined that "desired teaching behaviors expected of [agricultural education] student teachers" (p. 213) should be reflected in the teaching practices of their cooperating teachers. Moreover, perceptions held by a preservice teacher about teaching agricultural education are associated with the attitudes and morale exhibited by one's cooperating teacher regarding the profession (Byler & Byler, 1984; Deeds & Barrick, 1986). Accordingly, Harlin et al. (2002) reported changes in student teachers' perceptions about important elements of the student teaching experience in agricultural education in Texas following completion of an 11-week field experience.

Conceptual/Theoretical Framework

Willis (1991) opined that, "perceiving precedes making meaning or acting" (p. 175). However, Ajzen (1991) maintained that the construct of belief salience, i.e., "a relation between a person's salient beliefs about the behavior and his or her attitude toward that behavior" (p. 192) exists and thus influences how, and what, one perceives. Further, Kolb posited that as individuals experience the world their perceptions are transformed and thereafter guide the selection of new experiences (Miller, 1999, n. p. #). But how do humans integrate thought and action, and thus manifest deliberate human behaviors, including actions associated with teaching?

To that end, Argyris and Schön (1989) proffered that an individual's "espoused theory of action" (p. 6) is a "theoretical" explanation about how he or she would act in a particular circumstance or context. However, "the theory that actually governs his [or her] actions is his [or her] theory-in-use" (p. 6), i.e., one's actual behavior. Argyris and Schön stated further that, "skills are dimensions of the ability to behave effectively in situations of action" (p. 12), and that one's "theory of action has not been learned in the most important sense unless it can be put into practice" (p. 12). The most significant "practice" for a student teacher, i.e., a context in which to experience the act of teaching and its many nuances, should be student teaching in a secondary agricultural education program (cooperating center) under the supervision of a cooperating agriculture teacher. It is in this setting that context-rich perceiving could occur and, consequently, change to student teachers' perceptions emerges.

That kind of experiential learning, and its potential for creating new perceptions or "theories" as well as modifying pre-existing ones, is what Korthagen and Kessels (1999) concluded student teachers should experience during student teaching. Student teachers should gain "knowledge that is situation-specific and related to the context in which they meet a problem or develop a need or concern, knowledge that brings their already existing, subjective perception of personally relevant classroom situations one step further" (Korthagen & Kessels, p. 7). The researchers also emphasized the role of "level reduction" (pp. 10 & 12), i.e., *concrete experience*, as it relates to an individual creating valid Gestalts or cognitive schemas about the act of teaching. But what are the perceptions held by student teachers about important elements of student teaching in agricultural education prior to the experience, and did their views change following a 12-week field experience?

Purpose and Research Questions

The two-fold purpose of this study was to describe what student teachers perceived to be important elements of the student teaching experience before and after a 12-week field experience, and to identify selected characteristics of student teachers and their cooperating centers. The following research questions guided this study: 1) What did student teachers perceive to be important elements of the student teaching experience in agricultural education prior to a 12-week field experience? 2) What did student teachers perceive to be important elements of the student teaching experience in agricultural education following a 12-week field experience? 3) Were student teachers perceptions of the important elements different following a 12-week field experience compared to their perceptions before the field experience? 4) What were selected personal and professional characteristics of student teachers from the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University, during the spring 2004 semester? 5) What were selected characteristics of the cooperating student teaching centers used by the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University, during the spring 2004 semester?

Methods and Procedures

This descriptive study sought to identify characteristics of student teachers and their cooperating centers, and to describe student teachers' perceptions of important elements of the student teaching experience before and after a 12-week field experience. The study's sampling frame ($N = 25$) included all student teachers from the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University during the spring 2004 semester; thus, it was a purposive sample. Characteristics of cooperating centers were gathered from data provided by cooperating teachers who participated in an earlier study (Young & Edwards, in press) and reflects 19 of 24 cooperating centers used during the spring 2004 semester.

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

Part one of the instrument was divided into five "core" areas of the student teaching experience and included 34 "important elements": "Classroom and Laboratory Instruction" (5 items; $\alpha = .68$), "Supervised Agricultural Experience Programs (SAEPs)" (4 items; $\alpha = .60$), "Student Leadership Development (FFA)" (7 items; $\alpha = .82$), "School and Community Relationships" (9 items; $\alpha = .75$), and "Cooperating Teacher-Student Teacher Relationships" (9 items; $\alpha = .84$). Student teachers were asked to indicate their perceived "level of importance" for the elements using a Likert-type rating scale: "5" = "High Importance," "4" = "Much Importance," "3" = "Some Importance," "2" = "Low Importance," and "1" = "No Importance." Cronbach's coefficient alpha reliability estimates for the five core areas ranged from .60 to .84; the overall importance scale yielded an estimate of .91. Part two of the instrument included items identifying selected characteristics of student teachers. The instrument was modified slightly to reflect Oklahoma school setting characteristics and teachers.

Student teachers completed the instrument at the conclusion of four-week on-campus portion of student teaching and again at conclusion of the 12-week off-campus field experience. The *Statistical Package for the Social Sciences v. 11.0.* was used for data analysis. Research questions were analyzed descriptively with frequencies, percentages, means, and standard deviations. All student teachers from the Department of Agricultural Education, Communications and 4-H Youth Development, Oklahoma State University who student taught during the spring 2004 semester participated in the study.

Findings

As shown in Table 1, student teachers who participated in this study were mostly male; only two of the respondents were female. Four of the 25 respondents were earning master's degrees while the remaining student teachers were completing requirements for a baccalaureate degree. About two-thirds (15) planned to earn certification only in agricultural education and one-third (10) of the student teachers indicated that they intended to pursue teaching certification(s) in other areas. Over one-half (14) of the participants responded that they were "probably" or "definitely interested" in a graduate degree. Three-in-four respondents (19) expected to teach agriculture 11 or more years. Nearly all (24) of the student teachers wished to teach in a school with an enrollment of 618 or fewer students. All but one of the student teachers saw value in the Oklahoma Curriculum and Instructional Materials Center (CIMC) teaching resources; however, all but two perceived at least "some need" for new instructional materials.

Table 1. *Selected Characteristics of Student Teachers (N = 25)*

Characteristics	*Frequency*	*Percentage*
Gender		
Male	23	92
Female	2	8
Highest Degree Held		
Bachelor's	21	84
Master's	4	16
Teaching Certificates Planned in Other Areas		
No other teacher certification	15	60
Yes, in general science	3	12
Yes, in biology	4	16
Yes, in fields other than above	3	12
Interested in a Graduate Degree		
Definitely not	3	12
Probably not	4	16
Unsure	4	16
Probably yes	10	40
Definitely yes	4	16
Years expected to teach		
1-2 years	1	4
3-5 years	1	4
6-10 years	4	16
11 years or more	19	76
Size of School Where You Hope to Teach		
< 132 students	2	8
132 – 363 students	11	44
365 – 618 students	11	44
659 – 1229 students	1	4
Value of CIMC[a] Materials		
No Value	1	4
Limited value	4	16
Average value	9	36
Much value	8	32
Great Value	3	12
Need for New Instructional Materials		
Little need	2	16
Some need	7	28
Much need	9	36
Great need	7	28

Note. [a]Curriculum and Instructional Materials Center

Regarding selected characteristics of cooperating student teaching centers, 19 of the centers reported campus enrollments of 618 or fewer students (Table 2). Nearly one-half of centers (9) had two or more classrooms in their agricultural education departments. The most common laboratory facility was for teaching agricultural mechanics (19). Slightly more than one-half (11) of the cooperating centers had a greenhouse or some other facility for teaching horticulture. Thirteen schools had a project center/feeding facility to support students' livestock SAEs. About one-in-three centers (7) had a land laboratory but very few (2) had an aquaculture facility (Table 2).

Table 2. *Selected Characteristics of Cooperating Student Teaching Centers (N = 19[a])*

Characteristics	*Frequency*	*Percentage*
Size of School		
< 132 students	4	21
132 – 363 students	8	42
365 – 618	7	37
Number of Agricultural Education Classrooms		
1	10	53
2	9	47
Ag Mech Laboratory (Yes)	19	100
Greenhouse (Yes)	9	47
Other Hort. Facility (Yes)	2	11
Aquaculture Facility (Yes)	2	11
Land Laboratory (Yes)	7	37
Project Center/Feeding Facility (Yes)	13	68

Note. [a]Table represents data from 19 cooperating student teaching centers who hosted student teachers during the spring 2004 semester. Five cooperating teachers did not provide this information.

Student teachers' ratings of 34 "important elements" of the student teaching experience are shown in Table 3. Student teachers rated elements (items) of the student teaching experience on level of importance ("5" = "High Importance" . . . "1" = "No Importance"). The overall pretest and posttest means were 4.30 and 4.53, respectively, or approximately midway between "much" and "high importance" ($M \geq 4.00$).

The 34 elements were grouped conceptually into five "core" areas and a "composite" mean was computed for each area (Table 3). The core area "Cooperating Teacher-Student Teacher Relationships" was rated the highest area both pre and posttest (4.65 and 4.84, respectively). Pretest rankings for the remaining core areas resulted in "School and Community Relationships" (4.28) ranked second, "Student Leadership Development (FFA Activities)" (4.19) ranked third, "Classroom and Laboratory Instruction" (4.18) was fourth, and the core area "Supervised Agricultural Experience Programs" had the lowest composite mean (3.90). The posttest results ranked "Classroom and Laboratory Instruction" (4.59) second, "Student Leadership Development (FFA Activities)" (4.41) third, "School and Community Relationships" (4.40) fourth, and "Supervised Agricultural Experience Programs" (4.23) fifth.

The highest rated element before the field experience was "a cooperating teacher who has a positive attitude" (M = 4.84; SD = .37). "A cooperating teacher who is willing to be a mentor" (M = 4.80; SD = .41) tied for second with "a cooperating teacher who communicates clear expectations to the student teacher" (M = 4.80; SD = .41). The element "a student teacher who is willing to be mentored by the cooperating teacher" tied for fourth with "A cooperating teacher who is a "good" role model" (M = 4.76; SD = .44). All five of these elements belonged to the core area "Cooperating Teacher-Student Teacher Relationships." Of the remaining elements, 14 had mean importance ratings ranging from 4.60 to 4.32, while ten items had mean rating scores approaching "much importance" ($M < 4.25$). Only five of the elements rated below "much importance" (3.60 to 3.92).

Post-field experience ratings started with "a cooperating teacher who communicates clear expectations to the student teacher" ($M = 4.92$; $SD = .28$). "A student teacher who is willing to be mentored by the cooperating teacher," "a cooperating teacher who is a 'good' role model" and "a cooperating teacher who provides frequent evaluations and feedback to the student teacher" all tied for second ($M = 4.88$; $SD = .33$). "A well-rounded program emphasizing instruction, SAE's, and youth leadership activities" ($M = 4.88$; $SD = .44$) was rated the fifth most important element. Four of the five highest rated elements were derived from the core area "Cooperating Teacher-Student Teacher Relationships." Of the remaining elements, 22 had mean importance ratings ranging from 4.84 to 4.29, while six items had mean rating scores approaching "much importance" ($M < 4.25$). Only one of the elements was rated below "much importance": "all students meeting state SAE requirements, with accurate record books" ($M = 3.88$; $SD = .60$).

Table 3. *Student Teachers' Perceptions of Important Elements of the Student Teaching Experience Before and After a 12-Week Field Experience (N = 25)*

Elements[a]		*Pre* M^b	*Test* *SD*	*Post* M^b	*Test* *SD*
Classroom and Laboratory Instruction					
Daily (systematic) classroom and/or laboratory Instruction		4.00	.65	4.72	.54
A discipline management plan is used in a structured environment		4.16	.69	4.76	.52
Current technology used in instruction		4.12	.67	4.12	.88
Creative teaching methods as a basis for daily instruction, e.g., use of multimedia and varied teaching techniques		4.12	.73	4.48	.65
A well-rounded program emphasizing instruction, SAE's, and youth leadership activities		4.48	.71	4.88	.44
Composite Mean[c]	$\alpha = .68$	4.18	.46	4.59	.46
			d =	.75	
Supervised Agricultural Experience Programs					
All students meeting state SAE requirements, with accurate record books		4.04	.68	4.00	.78
Diversity within the students' SAEs		3.60	.58	3.88	.60
Project supervision and an explanation of this commitment to the student teacher		4.04	.68	4.60	.50
Student participation in advanced awards and degrees on district, state, and national levels		3.92	.70	4.44	.71
Composite Mean[c]	$\alpha = .60$	3.90	.44	4.23	.45
			d =	.49	

Table Continues

Table 3 (Continued)

<u>Student Leadership Development (FFA Activities)</u>					
Strong classroom instruction in student leadership Development		4.08	.80	4.40	.76
These activities as essential for a balanced program		4.12	.73	4.44	.65
A history of successful participation		4.04	.74	4.12	.83
Cooperating teachers who are familiar with current rules for participation in events (e.g., CDEs)		4.36	.70	4.52	.59
Cooperating teachers who delegate the training of at least one team to the student teacher		4.44	.58	4.68	.56
Resources available to train a competitive team		4.36	.49	4.56	.65
Opportunities for the student teacher to judge or monitor a district or state CDE		3.92	.70	4.12	.67
Composite Mean[c]	$\alpha = .82$	4.19	.47	4.41	.48
			d =	.45	
<u>School and Community Relationships</u>					
Recognized integrity of the cooperating teacher		4.56	.65	4.64	.49
Departmental support organization(s) (e.g. , advisory committees, booster clubs, and Alumni)		4.40	.71	4.48	.65
A cooperating teacher who supports other school activities (e.g., athletic events)		4.16	.75	4.08	.83
A cooperating teacher who supports activities in the community (e.g., service organizations)		4.32	.48	4.24	.78
A spirit of professional cooperation among fellow teachers		4.44	.51	4.52	.51
Use of local media		3.92	.70	4.29	.75
School administrators who are involved in program activities		4.32	.63	4.36	.75
Community service projects		3.84	.55	4.36	.64
Availability of facilities (e.g., computer lab, shops, horticultural lab, school farm)		4.56	.65	4.64	.64
Composite Mean[c]	$\alpha = .75$	4.28	.36	4.40	.49
			d =	.29	

Table Continues

Table 3 (Continued)

Cooperating Teacher-Student Teacher Relationships					
A cooperating teacher who is willing to be a mentor		4.80	.41	4.84	.37
A student teacher who is willing to be mentored by the cooperating teacher		4.76	.44	4.88	.33
A cooperating teacher who has a positive attitude		4.84	.37	4.84	.37
A cooperating teacher who is a "good" role model		4.76	.44	4.88	.33
A cooperating teacher who communicates clear expectations to the student teacher (e.g., role in classroom and calendar of events)		4.80	.41	4.92	.28
A cooperating teacher who provides frequent evaluations and feedback to the student teacher		4.52	.59	4.88	.33
Discipline policies that are in place and enforced		4.36	.70	4.80	.41
"Reinforcement" techniques in teaching (e.g., pace, re-teaching, retesting, and accommodation of various learning styles)		4.40	.58	4.76	.44
Assistance in job placement		4.60	.71	4.76	.52
Composite Mean[c]	$\alpha = .84$	4.65	.35	4.84	.30
			d =	.52	
Overall Mean	$\alpha = .91$	4.30	.32	4.53	.35
			d =	.66	

Note. [a]Important elements were derived from an earlier study (Harlin et al., 2002). Selected items were modified slightly to reflect the "language" of Oklahoma secondary agricultural education. [b]5 = High Importance . . . 1 = No Importance. [c]Composite mean of elements for that core area.

Conclusions, Recommendations, and Implications/Discussion

Student teachers participating in this study who student taught during the spring 2004 semester were primarily males who were completing requirements for a baccalaureate degree. Most expected to teach agriculture 11 or more years and over one-half were interested in pursuing a graduate degree. Nearly all participants wished to teach in a school with an enrollment of 618 or less. All but one student teacher saw value in Oklahoma CIMC materials but most recognized the need for new resources. All cooperating student teaching centers reported campus enrollments of 618 or fewer students. Nearly one-half of centers had two or more classrooms. The most common laboratory facility was for teaching agricultural mechanics.

The overall pre and posttest means for 34 elements of the student teaching experience were approximately midway between "much" and "high importance" (Table 3). Results from both observations revealed that student teachers perceived the relationship with their cooperating teacher to be the most important core area of the student teaching experience. Accordingly, that core area produced the five highest rated items prior to the 12-week field experience and four of the five highest rated items post experience. Harlin et al. (2002) reached a similar conclusion for student teachers in Texas. Moreover, a study examining the perceptions of agricultural education cooperating teachers in Oklahoma found that they too perceived "relationships" to be the most important dimension of the student teaching experience (Young & Edwards, in press).

The composite means of student teachers' perceptions for all five core areas of the student teaching experience increased following the 12-week field experience as did the overall mean. In the case of "classroom and laboratory instruction," the increase approached one-half of a point (Table 3). In contrast, Harlin et al., using a very similar questionnaire administered in the same fashion, found that student teachers' perceptions actually declined in four of the five core areas and overall. Notably, effect sizes for mean differences in students' perceptions pre and post field experience for four of the importance constructs as well as the overall means were approaching "medium" or larger (Green, Salkind, & Akey, 1997). The effect size for the remaining construct, "school and community relationships," was "small."

Recommendations for Future Practice

1) Teacher educators should continue to address and reinforce importance of the cooperating teacher-student relationship through preservice preparation for student teachers and inservice professional development for current and future cooperating teachers. For example, strategies for communicating effectively and characteristics of successful mentor/mentee relationships should be stressed with both groups (Byler & Byler, 1984; Deeds & Barrick, 1986; Edwards & Briers, 2001; Harlin et al., 2002; Martin & Yoder, 1985). Beginning cooperators, in particular, should receive professional development before supervising their first student teacher. 2) Teacher educators should expend additional effort toward identifying and then using cooperating centers that offer a diverse range of curriculum offerings and have the facilities needed to support such courses. Centers lacking a variety of curricula should be encouraged to diversify. 3) Preservice course work supporting the role of SAEs in augmenting the comprehensive secondary agricultural education model should be examined. In particular, course content related to diversity of students' SAEs may need revision.

Recommendations for Future Research

1) Student teachers' and cooperating teachers' perceptions of important elements of the student teaching experience in Oklahoma should be compared in an attempt to better understand differences as well as similarities that may exist between these groups (Edwards & Briers, 2001; Harlin et al., 2002; Young & Edwards, in press). 2) To further "triangulate" our understanding of this phenomenon, the perceptions of other significant groups should be sought, e.g., members of the Oklahoma state staff for secondary agricultural education and selected teacher educators. Findings may generate additional research questions about important elements of the student teaching experience. 3) In this study, the core area of SAE contained three of the six lowest rated importance items prior to the 12-week field experience, the lowest rated element following student teaching, and it earned the lowest composite mean score of the five areas both pre and post experience (Table 3). These findings may support the work of other investigators (Dyer & Osborne, 1995; Camp, Fallon, & Clarke, 1999) who have identified a "sense of uncertainty" or lack of philosophical imperative regarding how students' SAEs are conceptualized and implemented by many agricultural education teachers. So, further inquiry related to SAEs and the student teaching experience may be warranted. 4) Researchers should use a similar instrument to collect perceptions of future student teachers about important elements of the student teaching experience. However, investigators should consider modifying core areas that may consistently yield less than desirable reliability estimates (e.g., $\alpha < .70$).

Implications/Discussion

The level of importance perceived by student teachers regarding 31 of 34 elements of the student teaching experience either increased (29) or remained constant (2) following student teaching. For example, student teachers' pretest perceptions of importance of the core area "classroom and laboratory instruction" were slightly higher than "much importance" ($M = 4.18$). But their posttest perceptions exceeded the midway point between "much" and "high importance" ($M = 4.59$). In particular, student teachers' perceptions regarding the importance of systematic instruction increased by seven-tenths of a point (Table 3).

Does this finding and similar results suggest that more could (or should) be done through preservice preparation to further "sensitize" student teachers about the importance of selected student teaching experiences? Or, does it support portions of the theoretical frame undergirding this study, i.e., "concrete experiences" or opportunities for "practice," are critical to, and will modify, one's subjective theories (Argyris & Schön, 1989; Kolb as cited in Miller, 1999; Korthagen & Kessels, 1999), including views held by student teachers about student teaching and by extension their future careers as agricultural educators? What is more, does a "perceptual ceiling" exist regarding the effects of preservice preparation prior to extended field experience because by its very nature on-campus preparation is "theoretical" (Argyris & Schön, 1989) or primarily abstract? Some theorists (e.g., Korthagen & Kessels, 1999) suggest it is only by participating in the experience of student teaching that perceptions about the theoretical versus the practical *may be* reconciled. To that end, Kagan (as cited in Henry & Beasley, 1996) opined that during their field experiences student teachers should become more cognizant of their "initial and changing knowledge and beliefs about pupils and classrooms" (p. 21) and reconstruct "idealized and inaccurate images of students and . . . of early images of self as teacher" (p. 21). Accordingly, understanding better how to facilitate an effective student teaching experience should continue to attract sustained interest from the profession.

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Challenges Expressed by Cooperating Teacher Mentors When Working With Agricultural Education Student Teachers: A Delphi Study

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Abstract

The purpose of this study was to develop a prioritized list of cooperating teacher mentor challenges when working with student teachers. The objective was to identify challenges of cooperating teacher mentors when working with agricultural education student teachers and use the data to improve our teacher education program at the University of Tennessee.

Cooperating teacher mentors (N=20) who participated in the study were from Tennessee and were utilized as a panel of experts to identify challenges that cooperating teacher mentors face when working with agricultural education student teachers. Results of the study were obtained by utilizing a modified Delphi technique to reach group consensus (Helmer, 1983). Based on the cooperating teacher mentors responses, consensus was reached on eight challenges. Some of those challenges included student teachers' discipline procedures, work ethic, time management skills, lack of knowledge in some curriculum areas, and preparing student teachers to take full responsibility of the classroom.

Introduction

The National Standards for Teaching Education in Agriculture outlined a clear pathway for agricultural teacher education programs to follow (AAAE, 2001). Clearly, standard one stated the conceptual framework must be in alignment with processes, expected outcomes, and realities of teaching agricultural education. In addition, a clear linkage between the conceptual framework and contemporary issues in the field (problems of practice) need to be analyzed (e.g., needs assessment) and implemented to revitalize a program. Therefore, needs assessments must be a priority for teacher education programs to conduct and establish the areas of improvement for the future preparation of student teachers in agriculture. However, what supervisory stakeholder has the most influence on the student teacher?

Supervision, founded on the basis of leadership, occurs at all levels. For example, there are teacher educators, superintendents, principals, mentor teachers, and cooperating teachers who supervise teachers in an educational system. Cooperating teachers serve as one of the most influential individuals to student teachers (Norris, Larke, & Briers, 1990; Roberts & Dyer, 2004). In addition, cooperating teachers serve as mentors, supervisors, friends, and colleagues. Additionally, Schumacher and Johnson (1990) suggested that the influence of the cooperating teacher can be a direct reflection on the student teacher's success. In addition to a cooperating teacher's influence, Martin and Yoder (1985) also identified the importance of a good working relationship with student teachers. Furthermore, Glickman, Gordon, and Ross-Gordon (2001), Glatthorn (1997), and Ralph (1998) recommended tailoring the supervisor-teacher relationship to meet the needs of the teacher.

Cooperating teacher mentors take on several responsibilities while supervising student teachers and those responsibilities can create many challenges and/or concerns. Previous research has revealed some concerns that cooperating teacher mentors face. Some major concerns of cooperating teacher mentors previously identified regarding student teachers are classroom management and student discipline (DelGesso & Smith, 1993; Sandholtz & Wasserman, 2001). Other areas of concern are communication between the university supervisor and cooperating teacher, time commitment, and insufficient input on student teaching expectations. (Lelle & Kotrlik, 1987; Deeds, Flowers, & Arrington, 1991). Furthermore, cooperating teachers expressed the need for teacher education programs to devote more time to addressing student teaching issues (DelGesso et al., 1993; Sandholtz et al., 2001). Deeds et al. (1991) emphasized that the student teaching experience should be a concern of the profession. Furthermore, Kuehl (1984) articulated that careful supervision of student teachers and the environment to which the student teacher is exposed is imperative to professional development.

The cooperating teacher mentor, however, is the major component in the development of student teachers. Identifying the challenges associated with supervision of the student teacher is of critical value in designing teacher education programs.

Purpose and Objectives

The purpose of this study was to develop a prioritized list of cooperating teacher mentor challenges when working with student teachers. The objective was to identify the challenges of cooperating teacher mentors and use the data to improve our teacher education program at the University of Tennessee.

Methods and Procedures

This descriptive study utilized a modified Delphi Technique (Helmer, 1983) to identify challenges that cooperating teacher mentors were faced with while working with student teachers in agricultural education. Helmer (1983) stated that the object of the Delphi Technique is to "obtain the most reliable consensus of opinion of a group of experts" (p. 135). Moore (1987) defined an expert in a Delphi Technique as a person who is knowledgeable about the area being studied. One purpose of the Delphi technique is to gather information to help improve programs (Moore, 1987); therefore, a group of experts was selected to identify potential problems of working with student teachers.

Cooperating teacher mentors (n=24) were selected from Tennessee by three university teacher educators (one teacher educator representative from each university: University of Tennessee, Martin; Middle Tennessee State University; and the University of Tennessee, Knoxville) and identified as outstanding. The cooperating teacher mentors were identified as outstanding based on feedback obtained from student teachers, commitment to the profession, overall success of their program, and years of experience. Face validity (Ary, Jacobs, and Razavieh, 1996) of instruments was determined by teacher educators in agricultural education and graduate students majoring in agriculture economics (studying statistics) at the University of Tennessee. Reliability or trustworthiness of statements on the second and third questionnaires was greater than .80, according to Dalkey (1969), because the group size was greater than 13.

A series of three questionnaires were mailed. Each mailing consisted of a cover letter, a questionnaire, and a stamped return envelope. The first questionnaire consisted of one open-ended question: "What challenges do cooperating teacher mentors face when working with student teachers?" The open-ended question was used to produce a wide array of responses relating to challenges cooperating teacher mentors faced when working with agricultural education student teachers. There were a total of 46 responses obtained from 20 panel members, for a response rate of 83.33%. Similar statements were condensed to form one statement by researchers; therefore, 31 statements were utilized in the second questionnaire.

The purpose of the second questionnaire was to prioritize statements. The 20 panel members who responded to the first questionnaire were sent the second questionnaire. Panel members were instructed to circle the number that best represents their level of agreement to the 31 statements obtained from the first questionnaire. The 31 responses were quantified using a Likert-type scale consisting of the following choices: 1=Strongly Disagree, 2=Disagree, 3=Uncertain, 4=Agree, 5=Strongly Agree. Twenty returned the second questionnaire for a response rate of 100.00%. Once participants returned the questionnaire, mean and standard deviation (Ary, Jacobs, and Razavieh, 1996) were calculated for each response. Responses were arranged in order from highest (strongly agree) to lowest (strongly disagree) and listed on the third questionnaire. In addition, statements with standard deviation scores lower than 1.0 were identified by researchers as consensus statements among the group but were not identified as such on the questionnaire.

The third questionnaire was administered to 20 panel members that returned the second questionnaire for the purpose of establishing consensus. During the third round, panel members were given the group rating and overall rating of each question. Participants were asked to agree or disagree with ranking of the 31 comments. If they agreed, participants returned the questionnaire unmarked. Furthermore, if a participant disagreed with consensus, he/she explained the reason for disagreeing and returned the questionnaire. A total of 13 questionnaires were returned for a response rate of 65%. However, panel members (n=7) who did not return the questionnaire were contacted by phone and asked if they agreed/disagreed with consensus. No panel member, contacted by phone, disagreed with the ranking of statements. Data were analyzed using descriptive statistics. Nominal data were reported using frequencies and interval data were reported as means and standard deviations (Ary, Jacobs, and Razavieh, 1996).

Findings

This study developed a prioritized list of challenges that cooperating teacher mentors face when working with student teachers with the goal of improving a teacher education program at the University of Tennessee. Table 1 outlines specific challenges that were identified and the number of responses for each challenge.

Table 1. *Delphi Study Round One: Challenges as Identified by Cooperating Teacher Mentors (n=20)*

Challenges Identified in First Questionnaire	Number of Responses
Student teachers not taking the student teaching experience seriously.	4
Student teachers that don’t devote time to extracurricular activities (ex: contests, training teams, supervised agricultural experience (SAE) visits, chapter events).	4
Student teachers trying to be the high school students “buddy.”	3
Getting student teachers to prepare lessons.	3
Teaching student teachers about the day-to-day procedures of teaching.	3
Getting student teachers to find a balance in their curriculum (not too easy and not too hard).	3
Preparing student teachers to take full responsibility of the classroom.	3
Student teachers” discipline procedures.	3
Getting student teachers to understand school policy.	3
Having personality conflicts with the student teacher.	2
Student teachers’ leadership abilities.	2
Getting comfortable with supervising student teachers.	2

Table 1 (Continued)

Challenges Identified in First Questionnaire	Number of Responses
Getting student teachers to understand diverse learning abilities.	2
Exposing student teachers to activities that occurred the prior semester because it is on their student teaching checklist.	2
Student teachers' lack of knowledge of different teaching styles (rely too much on lecture).	2
Attitude of the student teacher.	1
Student teachers' lack of professionalism.	1
Student teachers' lack of maturity.	1
Student teachers thinking they can teach like someone who has taught for years but lack experience and good judgment.	1
Working off-campus visits into the student teaching time frame.	1
Student teachers' time management skills.	1
Developing a good communication system with the student teacher.	1
Aiding the student teacher in curriculum development.	1
Student teachers' work ethic.	1
Providing valuable feedback to the student teacher.	1
Student teachers need more training on the importance of professional organizations.	1
Student teachers' lack of knowledge in some curriculum areas.	1
Getting student teachers to prepare lesson plans.	1
Providing the real-classroom environment to the student teacher that will allow him/her to use the teacher training for its purpose.	1
Ensuring that high school students don't suffer academically from the student teacher.	1
Student teachers' misuse of planning time.	1

Note. The first round questionnaire sought responses to the question "What challenges do cooperating teacher mentors face when working with student teachers?"

As documented in Table 2, respondents agreed on 13 cooperating teacher challenges; however, only eight challenges faced by cooperating teacher mentors had a strong consensus (SD $\leq$ 1.0) among the group. Some of those challenges included student teachers' discipline procedures, work ethic, time management skills, preparing student teachers to take full responsibility of the classroom, and lack of knowledge in some curriculum areas. However, a challenge that cooperating teacher mentors did not face with student teachers was having personality conflicts.

Table 2. *Delphi Study Round Two: Prioritized List of Challenges Identified by Cooperating Teacher Mentors (n=20)*

	Overall	
Challenges	M	SD
Student teachers' discipline procedures.	4.20	0.89
Student teachers' work ethic.	4.15	0.75
Student teachers' lack of knowledge of different teaching styles (rely too much on lecture).	3.75	1.21
Student teachers' time management skills.	3.70	0.73
Student teachers trying to be the high school students "buddy."	3.70	1.08
Preparing student teachers to take full responsibility of the classroom.	3.65	0.93
Teaching student teachers about the day to day procedures of teaching.	3.60	1.10
Exposing student teachers to activities that occurred the prior semester because it is on their student teaching checklist.	3.60	0.94
Student teachers' lack of knowledge in some curriculum areas.	3.60	0.82
Student teachers thinking they can teach like someone who has taught for years but lack experience and good judgment.	3.55	1.15
Getting student teachers to understand diverse learning abilities.	3.55	0.95
Working off-campus visits into the student teaching time frame.	3.55	0.89
Student teachers that don't devote time to extracurricular activities (e.g., contests, training teams, SAE visits, chapter events).	3.50	1.00
Student teachers need more training on the importance of professional organizations.	3.45	1.28

Table 2 (Continued)

	Overall	
Challenges	M	SD
Getting student teachers to find a balance in their curriculum (not too easy and not too hard).	3.40	0.94
Attitude of the student teacher.	3.25	0.97
Developing a good communication system with the student teacher.	3.25	1.07
Student teachers' lack of confidence.	3.25	1.01
Providing valuable feedback to the student teacher.	3.20	1.06
Aiding the student teacher in curriculum development.	3.20	1.28
Student teachers' misuse of planning time.	3.20	1.15
Student teachers' lack of professionalism.	3.20	1.10
Student teachers' lack of maturity.	3.10	0.91
Getting student teachers to prepare lesson plans.	3.05	1.05
Student teachers' leadership abilities.	3.05	0.95
Getting student teachers to understand school policy.	3.00	1.03
Providing the real-classroom environment to the student teacher that will allow him/her to use the teacher training for its purpose.	2.85	1.14
Getting comfortable with supervising student teachers.	2.85	1.22
Student teachers not taking the student teaching experience seriously.	2.70	1.08
Having personality conflicts with the student teacher.	2.20	0.89

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

In round three, respondents were sent their individual and panel results. Respondents were asked to provide comments if they disagreed with a particular statement. Some cooperating teacher mentors believed challenges such as not devoting enough time to extracurricular activities (e.g., contests, training teams, supervised agricultural experience (SAE) visits, chapter events), attitude of the student teacher, developing a good communication system with the student teacher, student teachers' lack of professionalism, and getting comfortable with supervising student teachers should have been ranked higher. However, the major challenge for all cooperating teacher mentors who responded to round three was student agricultural education teachers not devoting enough time to extracurricular activities. For example, one cooperating teacher mentor wrote, "Student teachers think their day ends at 3:15 p.m. and are not dedicated to staying late, etc."

Conclusions

The data from this study were utilized to improve an agricultural teacher education program. These findings can not be generalizable to all cooperating teacher mentors but only to the 20 cooperating teacher mentors who agreed to participate in this study.

There were several challenges expressed by cooperating teacher mentors. Some overarching challenges expressed and agreed upon by cooperating teacher mentors were: student teachers' discipline procedures, work ethic, time management skills, preparing student teachers to take full responsibility of the classroom, and lack of knowledge in some curriculum areas. Two of the challenges expressed, taking full responsibility of the classroom and student discipline, were congruent with studies by DelGesso et al. (1993) and Sandholtz et al. (2001).

DelGesso et al. (1993) and Sandholtz et. al (2001) stated cooperating teachers expressed the need for teacher education programs to devote more time to addressing student teaching issues. Addressing these student teaching issues, the purpose of this study, became a priority for our teacher education program at the University of Tennessee. One tactic to address these issues was to restructure the nature of the undergraduate agricultural education program. The restructured undergraduate program has incorporated lab-based experiences into the program planning and teaching methods courses; therefore, agricultural education student teachers will conduct an early field based experience (observation of other agricultural education teachers), assist high school agricultural education teachers with the overall planning of their program, teach one or two classes over a semester in a high school classroom, and complete the student teaching experience. This opportunity will provide student teachers more applicable experiences to connect their college coursework to real-world experiences. In addition, agricultural education student teachers will have the opportunity to be exposed to a high school classroom three times prior to student teaching and address several challenges expressed by cooperating teacher mentors in this study.

Additionally, the data revealed challenges that could be topics for professional development workshops provided for cooperating teacher mentors. Providing workshops related to mentoring student teachers would be helpful to cooperating teacher mentors because they could address some of these challenges and obtain feedback from other colleagues.

Implications from this study are relative to all teacher education programs, particularly the other three universities that prepare agricultural education teachers in our state. Asking cooperating teacher mentors to describe challenges they face when working with student teachers could reveal several areas of improvement for the undergraduate agricultural education program. Overall, cooperating teacher mentors are individuals who have a great deal of responsibility in the development of student teachers (Norris, Larke, & Briers, 1990; Roberts & Dyer, 2004; Schumacher and Johnson, 1990)); therefore, their input should be critical in the development of the undergraduate agricultural education program.

Future research is still needed to answer questions that surfaced from this study. Research should strive to answer the following:

1. After infusing more lab-based experiences into our agricultural teacher education program, will cooperating teacher challenges decrease or stay the same?
2. What challenges are cooperating teacher mentors faced with in other states that prepare agriculture educators?
3. By increasing the number of lab-based experiences, will teacher educators observe a difference in the overall preparation of agricultural education student teachers?

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How do Pre-Service Teachers Distribute Their Time While Student Teaching?

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Abstract

This study sought to investigate how student teachers distribute their time in selected areas (observation, planning, teaching, teaching-related activities, and administrative-related activities). The subjects consisted of student teachers who participated in an internship experience in agricultural education during the spring semester for the years 1999 through 2003. Document analyses were used to obtain information guided by the research objectives. The study found that student teachers spent the majority of their time observing, planning, and teaching. Slight differences in how time was distributed over the internship experience were found between males and females, where females spent more time on planning and on teaching-related activities. Student teacher learning styles also exposed differences in how time was distributed over the internship experience. Field-dependent learners spent more time on planning, whereas field-independent learners spent more time on teaching-related activities. Other differences in distribution of time were found by final performance grade for the student teaching internship. While slight differences existed in all the selected areas, the largest differences occurred in administrative-related activities where students who received an A grade spent more time than did the A- and below group.

Introduction – Theoretical Framework

"The experiences obtained during student teaching are probably the most crucial activities involved in the development of prospective vocational agriculture teachers" (Schumann, 1969, p 156). Although stated 35 years ago, this statement is as applicable today as it was then. The student teaching internship experience is a culminating learning experience that brings together the university experience and the public school classroom. Specifically, the experience provides prospective teachers opportunities to apply pedagogical knowledge and skills of teaching in a real-life setting under the supervision of an experienced teacher. For most, the student teaching internship is the final segment in the professional education sequence in formal teacher education programs.

The student teaching experiences and associated elements have been the focus of some research. For example, Beck and Kosnik (2002) studied the components of a good student teaching placement by interviewing student teachers. They found student teachers valued emotional support and peer relations from their cooperating teacher, a degree of collaboration with their cooperating teacher, a degree of flexibility in teaching content and method, feedback on performance, a sound approach to teaching and learning in the placement classroom, and a heavy but not excessive workload. Student teaching experiences in agricultural education were found to average 9.4 weeks (Borne & Moss, 1990).

Valuing elements of the student teaching experiences can be influenced by where student teachers are placed, thus making placement a critical step in the student teaching process. Edwards and Briers (2001) investigated cooperating teachers' perception of the important elements of a cooperating center. The elements found to be most important were classroom and laboratory instruction. According to Harlin, Edwards, and Briers (2002), student teachers also felt this element to be most important in the student teaching experience. Other elements perceived to be important by cooperating teachers include cooperating teacher-student teacher relations, school and community relations, student leadership development activities, and school and community relations (Edwards & Briers, 2001).

Within each teacher preparation program, there are expectations for student teachers while in student teaching. In a multi-state study, Deeds, Flowers and Arrington (1991) found cooperating teachers generally agreed with expectations for student teachers. Expectations pertained to appropriate dress, participation in selected activities, and having written lesson plans for classroom and laboratory instruction. Less in agreement was the expectation for student teachers to live in the community in which they student teach.

As a theoretical framework for this study, Wentz (2001) identified three phases of student teaching: 1) orientation and observation, 2) assisting, and 3) assuming responsibility in the total school program. According to Wentz, student teachers should spend at least the first week observing their own classroom as well as other classes within and outside their discipline. Wentz noted, "After observing for at least a week, student teachers should begin assisting students on an individual or small-group basis. Some level of assistance should begin the first day so that the student teacher can feel at ease in the classroom" (p. 73). Assisting in the classroom prior to teaching gives the student teacher a feel for the environment. Greater responsibilities should be assumed after progressing through the first two phases. According to Wentz, student teachers should begin by teaching a subject with which they have experience. Some student teachers may be able to reach the third phase more quickly if they have previous experience in the classroom. Based on student teacher initiative, enthusiasm, and adequate preparation, Wentz suggested that they may increase their workloads as the cooperating teachers relinquish more and more responsibilities to them. During the latter part of student teaching experience, the student teacher should be in full charge of the classroom.

While Wentz (2001) identified a “phase-in” period, when student teachers initially observe the classes of their cooperating teacher(s), assisting, then are gradually given more responsibility, her three-phase sequence fails to identify a "phase-out" period, where student teaching assignments can again be acclimated to the cooperating teacher. Within the phases of student teaching, the amount of time spent observing and teaching was investigated. Burstein (1987) found, over a twelve-week student teaching session, the transition for student teachers from observing to teaching was similar. However, the amount of time spent observing and teaching varied among individuals, particularly during the first and second measured time periods (of three) during the student teaching experience. Burstein attributed the time of transition from observation to teaching to the guidance of the cooperating teacher. While teaching, Burstein found that student teachers spent their time in individual, small group, and whole group instruction, of which 20% to 80% of the time was spent in whole group instruction.

Documenting and understanding how student teachers allocate and spent their time can assist teacher educators in calibrating or refining expectations for student teachers. Furthermore, revealing how time is being spent can raise discussion as to appropriate levels of time distribution. In agricultural education, however, a void exists in documenting the distribution of time while student teaching.

Purpose and Objectives

The purpose of this study was to describe the distribution of time of pre-service teachers while student teaching. The focus of the study investigated the distribution of time in five areas: observation, planning, teaching, teaching-related activities, and administrative-related activities. The following research objectives were used to address this purpose:

1. To describe the distribution of time in selected areas (observation, planning, teaching, teaching-related activities, and administrative-related activities) while student teaching.
2. To describe the changes in distribution of time in selected areas by weeks of student teaching.
3. To describe the differences in distribution of time in selected areas by gender, learning style, and performance on a selected academic pre-service course score.

Methods and Procedures

The study was descriptive in nature. The target population was student teaching interns at the University of Missouri-Columbia. The accessible population (N = 55) comprised student interns who participated in a spring semester student teaching experience in agricultural education between the years of 1999 through 2003. Descriptive document analysis was used to retrieve information pertaining to the research objectives. According to Scott (1990), written documents may be classified in terms of their authorship and access. Archived student teacher files served as existing written records of the variables of interest. In terms of access to these documents, Scott (1990) suggested that documents of this nature are considered to be “closed”; meaning the access is restricted to a limited group of people. Specifically, student journal submissions were analyzed by the researchers for self-reported content. In addition to reflective weekly journal entries, students recorded the number of hours spent in five selected student teaching areas: 1) observation, 2) planning, 3) teaching, 4) teaching-related activities, and 5) administrative-related activities.

Observation, as a selected area, was intended to capture time spent in class watching and learning from the cooperating teacher as he/she delivered instruction to students. Planning, as a selected area, was intended to capture the time spent by student teachers preparing and organizing instructional materials for the purpose of teaching. Teaching, as an area, was intended to capture the time spent by a student teacher instructing students in a formal class setting. The remaining two areas were teaching-related and administrative-related activities. Teaching-related activities included, for example, assisting the cooperating teacher’s instruction, participating in teacher-student conferences, participating in supervised agricultural experience visits, FFA-related meetings, and/or coaching career development event teams. Examples of administrative-related activities included participating in student teacher seminars, attending faculty meetings, school assemblies, meetings with cooperating teachers (i.e., feedback conferences) and administrators, and/or completing departmental forms/reports.

For each of the five years of student teacher data, a consistent protocol of submitting journals by student teachers to the university faculty supervisor was observed. Using an electronic word processing template, students submitted weekly journal entries to their faculty supervisor via e-mail. Electronic journal submission contained student teachers’ self-reported allocation of time (in units of hours) in the five selected areas. In addition, a reflective journal entry for each day of the week citing illustrations and examples of how time was spent and what was learned was included with each journal submission. Journal submissions were printed and filed in the student teachers’ file folder, then archived at the conclusion of the student teaching internship experience. For each week of the 15-week student teaching experience, the researchers reviewed each journal submission of all students and recorded the number of hours spent in each of the five selected student teaching areas.

Other student records tapped for data included students’ final grade for Agricultural Education 399 (Student Teaching Internship). Gender was obtained from existing records available in student academic files. Students’ preferred learning style was retrieved from pre-existing Group Embedded Figures Test (GEFT) scores (Witkin, Oltman, Raskin, & Karp, 1971). GEFT scores allowed students to be dichotomized into a field-dependent or field-independent learning style. Students who scored zero to 11 were labeled as field-dependent learners while students who scored from 12 to 18 were labeled field-independent learners. According to Witkin, Moore, Goodenough, and Cox (1977), students with a field-dependent learning style are considered global consumers of information. These students are said to have highly developed social skills and to be influenced by authority figures as well as by peer groups. In addition, field-dependent learners have difficulty in “breaking down” tasks into smaller components. In contrast, Witkin, Moore, Goodenough, and Cox (1977) suggested that students with a field-independent learning style are more analytical in their consumption of information and said to be goal-oriented, view tasks in discrete parts, are more self-directed, and have an impersonal orientation. In terms of motivation, field-dependent learners tend to be extrinsically motivated, whereas field-independent learners tend to be intrinsically motivated.

Data (number of hours) reported in the five selected areas for each student teacher over the 15-week student teaching internship were entered into SPSS 11.5 for analysis. Also entered into SPSS were data pertaining to gender, learning style, and grades received in Agricultural Education 399 (Student Teaching Internship). Data reduction was conducted in two ways. Omnibus hour totals were calculated for each of the five areas of allocated time. From the omnibus totals, an average percentage of time for each category was calculated. The 15-week student teaching internship experience was reduced by calculating three-week totals for each area of time distribution, creating five time intervals. The time intervals were used to identify changes in average distribution of time over student teaching internship experience.

Three student characteristics (gender, learning style, and performance in Agricultural Education 399) were used to investigate differences in average distribution of time by groups. For the Student Teaching Internship course (Ag Ed 399), students were dichotomized into two performance groups; students scoring A+ or A and students scoring A- or below because of a restriction in range. Descriptive statistics such as percentage, frequency, measure of central tendency, and variability were used to summarize the data.

Findings

For each of the five areas (observation, planning, teaching, teaching-related activities, and administrative-related activities) student teachers' time (expressed in hours) was totaled for all student teachers for the 15-week internship experience. The totaled hours were averaged for all students to illustrate the distribution of time spent in each area. Over the 15-week student teaching period, student teachers spent 8.47% (M = 61.44, SD = 29.31) of their time observing teachers deliver instruction (Figure 1). The proportion of time spent in planning and teaching were relatively equal and accounted for 26.19% (M = 189.93, SD = 76.01) and 25.43% (M = 184.42, SD = 38.44) of time, respectively. Time spent in activities related to teaching occupied the largest proportion (33.51%; M = 243.04, SD = 71.20) of time, whereas administrative-related activities comprised the smallest proportion (6.40%; M = 46.40, SD = 48.29) of student teachers' time over the 15-week student teaching experience.

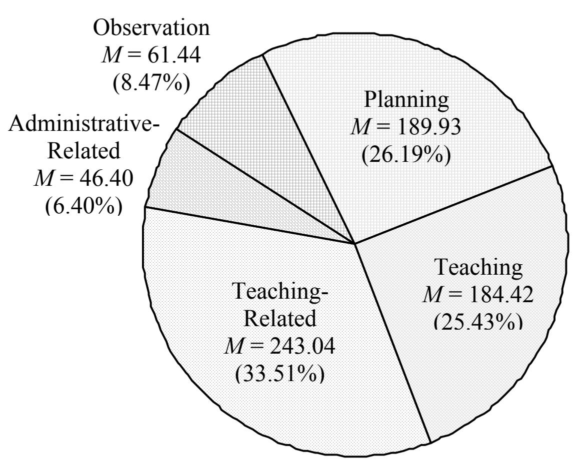

Figure 1. Average percentage of hours allocated to activities while student teaching for 15-weeks (N=55).

The 15 weeks were collapsed into five 3-week time intervals to detect the change in average number of hours spent on selected student teacher activities (observation, planning, teaching, teaching-related activities, and administrative-related activities). Figure 2 graphically represents the change in the average number of hours student teachers spent on selected activities over the 15 weeks of the student teaching internship experience. Two areas with the highest average number of hours during the first interval of time were observation (*M* = 11.22, *SD* = 4.75) and planning (*M* = 13.63, *SD* = 5.64). The average number of hours student teachers spent observing decreased rapidly from the first interval of time (*M* = 11.22, *SD* = 4.75) to the fifth (*M* = 1.02, *SD* = 1.31). In contrast, as the average number of hours student teachers spent observing decreased, and the average number of hours spent on teaching increased from the first time interval (*M* = 6.91, *SD* = 3.38) through the fourth time interval (*M* = 15.55, *SD* = 4.12) before declining at the fifth interval (*M* = 10.90, *SD* = 3.76). Additionally, the average number of hours spent in planning by student teachers increased at the second time interval (*M* = 16.09, *SD* = 6.78) before declining in the third (*M* = 13.46, *SD* = 6.77), fourth (*M* = 12.07, *SD* = 5.47), and fifth (*M* = 8.06, *SD* = 4.91) time intervals of the experience, representing a curvilinear relationship with the five intervals of time.

During the 15-week student teaching internship experience, time spent on teaching-related activities increased at a steady rate from the first interval of time (*M* = 10.81, *SD* = 5.09) to the last (*M* = 21.95, *SD* = 8.19). In addition, the average number of hours spent on administrative-related activities remained relatively steady throughout the 15-week period. A change in distribution in the average number of hours student teachers spent teaching, observing, and preparing occurred during the second time interval of the 15-week period. Further, for time spent planning, teaching, and on teaching-related activities, a change in the average number of hours occurred at the fourth interval of time, where the average number of hours spent on teaching-related activities continued to increase, while the other areas decreased.

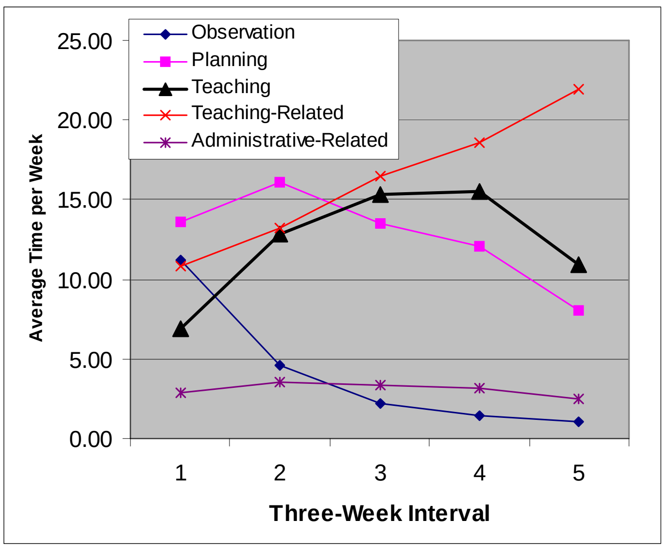

Figure 2. Change in distribution of time among selected student teaching activities during the 15-week internship experience (*N*=55).

The change in distribution of time among selected student teaching activities by gender is presented in Table 1. The change in time over the student teaching internship experience for observation and teaching activities was found to be similar for males and females. At any given time interval, the difference was, at maximum, about one hour. In terms of teaching, a noticeable change in distribution of time for both males and females was found at the fourth time interval when the number of hours spent teaching ceased to increase and dropped significantly. Additionally, at the first interval of time, females spent slightly more time planning (*M* = 14.21, *SD* = 6.48) than did males (*M* = 13.06, *SD* = 4.62). At the second time interval, the average number of hours increased at a higher rate for females than for males by approximately an average of two hours. The second time interval was also a point where the number of hours spent planning peaked for both genders, followed by a steady decline of time spent planning.

Regarding teaching-related activities, males and females began and concluded the student teaching internship experience with similar average number of hours spent, but differ between time intervals. Both genders increased in the average number of hours spent on teaching-related activities at each subsequent time interval. However, females increased in the time spent on these activities at higher rate than did males until the fourth time interval, where males exceeded females. While the number of hours spent on teaching-related activities steadily increased throughout the internship experience, the time spent on administrative-related activities remained relatively stable over time for both genders. However, males spent slightly more time on administrative-related activities than did females. Both males and females began and concluded the internship experience with similar average number of hours spent on administrative-related activities.

Table 1. *Change in Distribution of Time among Selected Student Teaching Activities by Gender*

	Three-Week Interval									
	1st		2nd		3rd		4th		5th	
Activity	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Observation										
Female	11.58	5.01	5.14	2.52	2.53	2.64	1.33	1.60	1.01	1.01
Male	10.86	4.45	4.09	3.17	1.93	1.98	1.49	2.30	1.04	1.54
Teaching										
Female	6.90	3.49	12.59	2.69	15.30	4.01	16.19	3.52	10.80	4.23
Male	6.92	3.27	13.07	3.24	15.26	3.97	14.93	4.53	10.99	3.25
Planning										
Female	14.21	6.48	17.12	7.42	13.57	6.98	12.89	6.29	7.74	5.22
Male	13.06	4.62	15.10	5.94	13.35	6.56	11.28	4.40	8.38	4.56
Teaching-Related										
Female	10.93	5.24	14.22	5.01	17.67	6.61	17.70	6.77	22.02	8.54
Male	10.69	4.95	12.21	5.53	15.30	5.40	19.44	6.33	21.88	7.83
Admin.-Related										
Female	2.42	2.14	3.02	4.83	2.69	3.93	3.08	5.22	2.32	2.85
Male	3.31	3.36	4.07	3.64	4.02	4.02	3.21	3.33	2.72	3.16

Note. Females (n=27); Males (n=28)

Table 2 displays the change in distribution of time among the selected student teaching activities by learning style. Based on GEFT scores, student teachers were dichotomized into field-dependent (n = 12) or field-independent (n = 34) learners to compare the distribution of time for each area. Field-dependent learners tend to spend more time observing during the first time interval (M = 12.75, SD = 6.73) of student teaching than did field-independent learners (M = 11.33, SD = 3.90). However, both groups of students concluded the internship experience with similar observation times. With regards to planning as an area of time distribution, field-dependent learners spent approximately four hours more in planning during the first time interval than did field-independent learners. Both groups increased in the average number of hours spent planning at an equal rate at the second time interval before tapering off in time intervals three and four. However, independent learners spent approximately one hour more planning in the fifth time interval.

In reference to time spent teaching, both groups of students spent a similar amount of time during the first time interval (field-dependent, *M* = 6.57, *SD* = 2.43; field-independent, *M* = 6.69, *SD* = 3.22), then progressively increased at an equal pace to the third interval of time. After the third interval of time, both groups spent a less average number of hours at the fourth and firth time intervals. However, field-independent learners consistently spent more time teaching than did field-dependent learners through the conclusion of the internship experience. The average number of hours spent teaching for both groups decreased from the fourth time interval to the fifth. During the fourth and fifth time intervals of the internship experience, field-independent learners averaged approximately one and a half hours more of teaching than did field-dependent learners.

Table 2. *Change in Distribution of Time among Selected Student Teaching Activities by Learning Style*

	Three-Week Interval									
	1st		2nd		3rd		4th		5th	
Activity	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Observation										
Dependent	12.75	6.73	5.64	3.63	2.13	2.55	1.39	1.58	1.04	1.32
Independent	11.33	3.90	4.66	2.65	2.54	2.30	1.58	2.19	1.03	1.30
Planning										
Dependent	16.53	9.21	19.31	10.53	15.09	7.25	12.44	6.84	7.39	4.65
Independent	12.37	3.75	15.20	5.05	13.76	6.89	12.16	4.90	8.56	4.59
Teaching										
Dependent	6.57	2.43	12.96	3.48	14.95	4.36	14.41	3.47	10.14	2.86
Independent	6.69	3.22	12.59	2.90	15.03	4.06	16.03	3.85	11.37	3.51
Teaching-Related										
Dependent	8.96	5.24	11.29	3.93	15.80	5.14	18.03	6.67	20.46	8.81
Independent	11.33	4.87	13.79	5.20	16.50	6.62	18.81	6.44	23.20	8.32
Admin.-Related										
Dependent	1.94	1.81	3.46	6.11	2.94	5.48	2.57	5.04	2.78	3.60
Independent	3.07	2.72	3.32	3.15	3.54	3.66	3.48	4.57	2.79	2.96

Note. Field-dependent (*n*=12); Field-independent (*n*=34)

Field-independent learners consistently spent more time on teaching-related activities during the student teaching internship experience than did field-dependent learners. The widest discrepancies in the distribution of time spent on teaching-related activities occurred during the first interval of time and the last. However, both groups of students steadily increased in the average number of hours spent on teaching-related activities throughout the student teaching internship experience. In the area of administrative-related activities, little difference was noted between the two groups of students in the average number of hours spent. The widest discrepancy between the two groups of students was a difference of approximately one hour occurring specifically at the first time interval and the fourth.

Table 3 presents the change in distribution of time among selected student teaching activities by performance in Agricultural Education 399. Students were also dichotomized into students who earn an A (n = 39) and students who received an A- or below (n = 14) in the student teaching internship course or Agricultural Education 399.

Students who earned an A spent two and a half hours more observing other teachers at the first time interval than did students who earned an A- or below (Table 3). During subsequent time intervals, both performance groups spent an equal average number of hours observing. Students who earned A- or below consistently spent more time planning at each of the five time intervals than did students who earned an A. Regarding the average number of hours spent teaching, students earning an A in Ag Ed 399 taught less than students earning an A- or below during the first four time intervals. At the fifth time interval, students earning an A taught approximately one and a half hours more than their counterparts. Overall, time spent teaching for both performance groups increased until the fourth time interval, at which point both groups decreased in the average number of hours teaching.

Table 3. *Change in Distribution of Time among Selected Student Teaching Activities by Performance in Agricultural Education 399*

	Three-Week Interval									
	1st		2nd		3rd		4th		5th	
Activity	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Observation										
A in 399	11.94	4.90	4.83	3.15	2.28	2.38	1.56	2.19	0.88	1.05
A- or Below	9.20	4.02	3.98	2.30	2.07	2.41	0.99	1.41	1.43	1.85
Planning										
A in 399	13.20	5.62	15.71	6.15	13.30	6.50	11.79	5.52	8.04	4.99
A- or Below	14.83	5.92	17.17	8.60	13.90	7.88	12.85	5.63	8.14	5.03
Teaching										
A in 399	6.57	2.88	12.68	2.97	15.26	3.32	15.46	3.90	11.31	3.22
A- or Below	7.85	4.52	13.25	3.22	15.34	5.64	15.80	4.90	9.74	4.99
Teaching-Related										
A in 399	10.49	4.95	13.64	5.69	16.92	6.38	18.47	7.03	22.42	9.35
A- or Below	11.67	5.72	11.96	4.62	15.20	5.95	18.92	5.79	20.65	4.21
Admin.-Related										
A in 399	3.16	3.16	3.67	4.57	3.65	4.48	3.52	4.93	2.80	3.42
A- or Below	2.08	1.85	3.24	3.77	2.59	2.68	2.09	2.42	1.77	1.68

Note A in 399 (n=39); A- or Below in 399 (n=14)

Students who earned an A- or below spent a higher average number of hours on teaching-related activities at the first time interval than did A students. During the second, third, and fifth time intervals, A students spent more time on teaching related activities, while A- or below spent slightly more hours on teaching-related activities during the fourth time interval. For both performance groups, the average number of hours spent on teaching-related activities increased at each time interval. Regarding the average number of hours spent on administrative-related activities, A students consistently spent slightly more time on these duties than did A- or below students.

Conclusions and Recommendations

During the internship experience, student teachers spent the majority of their time planning for instruction, teaching and on teaching-related activities. The large proportion of time spent teaching is consistent with previous research (Edwards & Briers, 2001; Harlin, Edwards, & Briers, 2002) that found that classroom and laboratory instruction was perceived as the most important part of student teaching. As a single area, student teachers spent the largest proportion of time on teaching-related activities. Conversely, the smallest proportion of time was spent on administrative-related activities. It is recommended that teacher educators review the appropriateness of the distribution of time in the selected internship activities. Dialog should occur to explore whether the distributions of time are within level of expectations. Further, it is recommended that research be conducted to investigate the types of teaching-related activities and administrative-related activities on which student teachers are spending time.

Overall, time spent on observation appears to be consistent with most student teacher internship expectations, where the number of hours spent on observation is high initially, then quickly reduced; with minimal time spent observing at the conclusion of the student teaching internship experience. This conclusion is consistent with Wentz's (2001) initial phase of student teaching. Regarding the amount of time spent planning, it is concluded that the number of hours are high early in the internship experience, but then rapidly decrease toward the end of the internship experience. While time was spent on planning for instruction by student teachers, the rate at which planning occurs was not consistent over time. This pattern raises questions as to the appropriate levels of planning late in the internship experience. Arguably, planning for instruction should be at a consistent rate throughout the student teaching experience. However, some might argue that student teachers may have become more efficient in their ability to plan, thus spending less time with more practice.

An inverse trend existed between the distribution of time spent observing and time spent teaching. This trend is consistent with Wentz's (2001) three phases of student teaching. As the number of hours spent observing decreased, the number of hours spent teaching increased. However, the distribution of time spent teaching did cease to increase at the 12th week then rapidly decreased during the last three weeks of the student teaching experience. Wentz (2001) identified three phases of student teaching: 1) orientation and observation, 2) assisting, and 3) assuming responsibility in the total school program. These phases are consistent with this study with the exception of the end of the 15-week student teaching experience. At the end of the student teaching internship experience, time spent planning and teaching declines. The exception was time spent on teaching-related activities, which continued to increase. This is, perhaps, due to career development events and FFA banquets, which frequently occur during the spring season. It is recommended that a fourth phase be considered in relation to Wentz's framework for student teaching phases to reflect the need for student teachers to relinquish classroom related activities slowly back to the cooperating teacher.

Overall, students' learning style had minimal interaction in how student teachers distributed their time over the internship experience on the five selected areas. Notable, however, is that field-dependent learners spent more hours planning during the first half of the student teaching experience than did field-independent learners. This could be attributed to Witkin, Moore, Goodenough, and Cox's (1977) proposition that field-dependent learners have a harder time “breaking down” components into smaller parts thus they need more time in the planning process. Additionally, field-independent learners consistently spent more time on teaching-related activities than did field-dependent learners. Witkin, Moore, Goodenough, and Cox (1977) suggested that field-independent learners are intrinsically motivated and seek less social environments. Field-independent learners increased time in teaching-related activities may be attributed to smaller social groups and student success. Further research should be conducted to determine in the activities both field-dependent and -independent learners are involved with that were categorized as teaching-related.

The distribution of time data in the selected areas failed to have much predictability of student teachers’ performance grade. Marginal differences in how student teachers distribute their time while student teaching existed by performance grade in the student teaching internship experience overall. However, students who received an A spent consistently more time on observation and administrative-related activities. In contrast, students who received an A- or below spent consistently slightly more hours on planning.

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2005
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A Preliminary Examination of Students' Thoughts During Lecture

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Introduction/ Need for Idea or Innovation

One of the most important aspects of higher education is being able to teach the students to think critically. The component of critical thinking that was studied in this research was that of "higher order of thinking" as defined by Bloom (1956). Accomplishing this higher order of thinking requires analysis and understanding of the new situation by the student, a background of knowledge of methods, which can be readily utilized, and some facility in discerning the appropriate relations between previous experiences and the new situation (Bloom, 1956).

Much research has shown that the need for critical thinking is realized among higher education institutions but the debate comes into whether that is actually being accomplished. The American higher education system has been accused of failing to encourage students to think. At times, educators have been accused of being "bankers of knowledge"-simply depositing information to be withdrawn when needed (Freire, 1970).

So how is higher education performing? According to research done in a study of college professors, Miller (1989) found that oral presentations required by teachers typically reflected thinking at the lower levels of cognition. Fisher and Grant (1983) found that subject matter in college courses was predominantly at the lowest levels of cognition, regardless of the kind of institution, course level, subject area, or length of topic or session.

During the 1950's, the cognitive revolution sparked a new era of thinking by addressing fundamental questions about the human mind and creating tools to answer these questions. Think-aloud protocols, the verbal reports produced by subjects who share their thoughts while engaged in an activity, has been one such tool that has allowed researchers to explore domains of cognition that were previously inaccessible (Kucan and Beck, 1997).

The power to think and solve problems should be the student outcome desired by professors. Many educators agree with Myers (1986) who stated, "it is increasingly important that students master the thinking and reasoning skills they need to process and use the wealthy of information that is readily at hand…" (p. xii). This outcome will depend on the ability of professors to reach a higher level of cognition in their classroom.

How it works/methodology/ program/phases/steps

Eight professors' classes from across the College of Food, Agricultural, and Environmental Sciences, were videotaped twice. For each recorded lecture, one student was randomly selected to participate in the study immediately following the lecture session. Students completed a demographic survey. Students then watched the videotape of the lecture and, using a think-aloud protocol, were asked to speak their exact thoughts into a hand-held audio recorder. The tapes were transcribed and then interpreted for frequency of thoughts and cognitive level of thoughts.

Results to date/implications/ recommendations

Students' thoughts in this study were categorized into the following descriptors:

a. Thoughts or observations about the professor
b. Nonsense or unrelated thoughts
c. Thoughts connected to previous learning
d. Thoughts about past experiences prompted by class subject matter
e. Deeper learning/questioning thoughts
f. Thoughts about behavior that got/maintained attention

Students thought primarily "random nonsense thoughts" and "deeper learning/questioning thoughts" during lectures.

Student's thoughts (that were deemed "engaged") were primarily at the knowledge level of Bloom's hierarchy of cognitive thoughts.

A Recommendation is to make students aware of their engagement or lack of engagement during class sessions.

Future plans/advice to others

Analysis of teaching techniques will continue as well as analysis of academic challenges assigned by professors.

Costs/resources needed

Costs are approximately $500.00 for printing, transcribing tapes, Ice cream coupons for students, videotapes, audiotapes, tape recorder, file folders, batteries and miscellaneous supplies.

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Agricultural Science Education Assessment Proposal at the Secondary Level

Jennifer E. Rivera, Donna M. Moore, William G. Camp - *Cornell University*

Introduction

In the late 1990s both the number of "academic" credits needed for graduation and the number of Regent's exams a student has to take for graduation were increased in New York State. These increases resulted in reduced student access to career and technical education programs, including agricultural education. In February 2001, the Board of Regents passed the Career and Technical Education Policy (NYSED, 2000). Career and technical education programs approved (accredited) under this policy are eligible to award a maximum of up to one credit each in science, math, English, and social studies through specialized courses, integrated courses, or a combination of both specialized and integrated courses. Students completing an approved career and technical education program also receive recognition through an insignia on their Regents diploma. The career and technical education program accreditation approval requires a detailed internal and external review of the program including administration of a technical assessment of students completing the program. No existing industry-based technical assessment could be found to align with the general agricultural science curriculum in New York State (NYS). Thus, it became necessary to develop a technical assessment specific to the agricultural science curriculum, as allowed by the State Education Department's guidelines (SED, 2004). A task force consisting of a regional consortium of New York agricultural education teachers, Agricultural Education Outreach (essentially the NYS state staff for agricultural education), and Cornell University undertook the effort to develop a technical assessment that would be both representative of the NYS agricultural science education curriculum and be acceptable under SED guidelines.

The generally accepted programmatic model for Agricultural Education consists of three basic components: classroom and laboratory instruction, Supervised Agricultural Experiences (SAE), and The National FFA Organization. The technical assessment was designed to measure student achievement in all three components of the program. The written evaluation tool (examination) provides 60% of the total assessment score. The examination includes multiple-choice questions based on a consortium approved agricultural science content framework. The student SAE projects provide 20% of the assessment score and are evaluated based on the students' completion of three documents: the New York State FFA Empire Degree using the American FFA Degree format, a National FFA Proficiency Award application, and a consortium developed youth leadership record of achievement. The final component of the assessment, worth 20%, is a record of student participation in four state or nationally sponsored career development events (CDE). Participation in both the Prepared Public Speaking and Employment Interview CDE are required; the student may choose the other two state or nationally sponsored CDEs in which to participate to complete the technical skills component of the assessment. Student scores in the FFA portion of the assessment are based on National FFA Organization scoring rubrics.

Results to Date

The written examination was developed and piloted tested at agricultural education programs statewide during 2003-4. The examination portion of the full three-part technical assessment system was administered for record in spring 2004 at two secondary agricultural education programs that are actually in the process of applying for program accreditation. The SAE component will be administered in the spring of 2005 using the national criteria for the three documents that the students will submit. The FFA component will be implemented throughout the 2004-2005 school year using the national score sheets for the CDEs in which the students will be participating.

Future Plans

For those schools applying for accreditation in agricultural education, the technical assessment is readily available at no-cost. We anticipate that all NYS schools applying for agricultural education accreditation will use the assessment as a matter of routine. Since program accreditation is voluntary, we anticipate that many other NYS agricultural education programs will use the technical assessment for other purposes, including program evaluation.

Resources Needed

Seven NYS agricultural science education teachers made up the regional consortium. Those seven teachers continue to play an active part in the development and fielding of the technical assessment. An additional six teachers, six extension associates from Cornell Cooperative Extension, 4 staff members of Cornell University, two graduate students in Agricultural Science Education at Cornell, and 3 staff members of the Agricultural Education Outreach program were involved in developing the test item bank. The travel cost for bringing them together was covered through the Agricultural Tech Prep Program. A number of agricultural education programs across NYS were involved in the field test of the written examination.

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Share it on the Web – State FFA Website Competition

Clark R. Harris and Steven R. Harbstreit - *Kansas State University*

Introduction

The Internet has become an important marketing tool for businesses and organizations at all levels. The local FFA chapters should utilize this great and inexpensive tool to market the local programs. This tool was not being taken advantage of in the state. Very few chapters had websites and the quality and level of development was fairly elementary.

The Agricultural Education Club at the State University decided that there were two ways to encourage change. One was to create a model site, which the Agricultural Education Department had done. The other way to encourage the chapters and schools to create new, and improve established sites was to create a website competition.

Objectives to Develop the Website Competition

The University Agricultural Education Club formed a committee and established objectives to enable them to create the website competition. The objectives were:

- Research on the Internet for any FFA or other organizations that were hosting website competitions and to develop an initial proposal about the Website Competition.
- Get approval from the State FFA Executive Committee to conduct the competition.
- Establish detailed guidelines, applications, and scoring rubrics for the competition.
- Conduct the first FFA Website Competition prior to the 2003 State FFA Convention.
- Review and revise the guidelines, applications, and scoring rubrics, after the first competition.

Process of Developing the Website Competition

The Students and the advisor searched the Internet and only found significant information with one similar organization. It was the national FBLA student organization. The students took the information and adapted and expanded it to fit their goals for the competition. The students and advisor developed an initial single page proposal of the competition to present to the State FFA Executive Committee to gain permission to conduct the event. The proposal was presented and approval was secured.

The students then developed an application, guidelines for the competition, and a score sheet; that addressed page layout and design, site navigation, FFA/Agricultural Education program content, and application information and quality for a total of 250 points. They then contacted all schools that had email addresses to inform them of the competition. All of the documents were emailed to the schools and were also placed on the University Agricultural Education website.

The guidelines contained the objectives for the event, as well as eligibility requirements, the procedure for submitting a website, and the judging guidelines.

The objectives of the website competition that were listed on the guidelines were:

- The creation of FFA chapter websites will highlight chapter activities, the agricultural programs, strengths of members, and inform the public of chapter news.
- The development of quality FFA chapter websites will help promote the chapter, the agricultural education program and FFA in the State.
- Chapter websites will give students an opportunity to develop valuable job skills in web design.
- Chapters with the top web sites will be recognized with plaques at the State FFA Convention.

Outcome of the Website Competition

Five schools responded the first year to compete in the competition. Only four were able to complete the competition. The fifth website did not function properly. The schools were given a ten-day window in which they were not allowed to make any changes to the websites, enabling the judges to review the sites. The websites were first screened to determine if chapters had met all regulations. Then, using the score sheets a panel of website professionals judged the following: page layout and design, and site navigation; and a panel of individuals with FFA and agricultural education knowledge judged the content section of the websites, and they reviewed the applications as part of the process.

The website professionals that judged the websites were very pleased with the quality and a summary of general comments was written and distributed to all schools. It was also put on the University Agricultural Education website, along with links to the websites of the schools that competed. The three top schools were recognized on the stage of the State FFA Convention.

The guidelines and other documents were reviewed after the competition and needed revisions were made. The competition was offered again in 2004 and nine schools competed in the event. The number of schools that have developed websites has also increased. In the year 2001, only two or three chapter websites could be found. That number has risen to 21 chapters with fairly current websites, of average to above average design.

The number of chapter websites continues to grow and the ability to spread the news about the local FFA chapters, Agricultural Education programs, and FFA in general grows with the new websites. The competition has created an interest in developing websites and it has provided feedback about creating quality websites.

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Articulation in Agriculture:
A Seamless Program for Success in Agricultural Education

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Introduction

Articulation agreements between universities have been very important to the life of many universities, but never before have they been so important as articulation agreements between rural high schools and rural community colleges in agriculture. The articulation agreement in the field of agriculture, as designed by Jackson State Community College (JSCC) in Jackson, TN, is a very unique program for high school agriculture students to gain free college credit while they are still attending high school.

The focus of the program is to provide students with a seamless transition from high school to postsecondary education/training, and ultimately to the workforce (Spence, 2004). This is achieved by an academic agreement that allows students to receive community college credit for eligible career/technical/vocational coursework completed while in high school. This process of articulation saves the student both time and money while working toward their educational and career goals, particularly among those individuals disadvantaged by distance from higher education, economic resources, or as first generation college bound students.

Objectives of the Program

- Create efficient and common course requirements for both high school and the community college agriculture courses.
- Create opportunities to pursue additional grants and scholarships.
- Increase future enrollment in the community college and universities in the field of agricultural and natural resources.
- Create a "head start" mentality among students who are usually not University bound and serve as an incentive to continue on with community college.
- Create an opportunity for new faculty positions in Agricultural Education/Career and Technical Education.
- Involve all high school agriculture departments in West Tennessee.

Program Phases

Jackson State Community College in Jackson, TN initiated a plan that made the concept a reality for agriculture students who are studying the technologies of agriculture in the 21st century. The plan, a national pilot project, utilized two high school agriculture departments in West Tennessee: McNairy Central High School and Adamsville High School.

The agriculture educators at both schools used Jackson State Community College course material. Power Point notes (both electronic presentations and notebook bound handouts) were made available to the students. The material matched the college courses with the high school courses to ensure that 100% of the Tennessee State Department of Education competencies for the high school courses were met, as well as ensuring the college course objectives were followed.

Pilot Project Results

The pilot project was conducted during the 2003-2004 school year. At the end of the fall semester in 2003, there were four students who completed the course work and received the articulated credit in agriculture from Jackson State Community College. Adamsville High School had two students and McNairy Central High School had two students who finished their requirements with a "B" average or better to complete the articulation agreements. At the end of the spring semester in 2004, McNairy Central High School had (20) students taking AGR-140, Introduction to Plant and Soil Science course with (5) students successfully completing articulation agreements. Adamsville High School had (10) students in a combination of classes: AGR-250, Greenhouse Management: AGR-140, Introduction to Plant and Soil Science: AGR-280, Lawn and Turf Management. A total of seven of these students completed the requirements for articulation for college credit.

Future Plans

Jackson State Community College in partnership with Murray State University will continue to promote Agriculture Education/ Natural Resources Technology to encourage and assist students in preparing for careers as they complete their course requirements for bachelor's degree or in pursuing a higher education degree. An articulation agreement is being established for an ease of transition between JSCC and MSU for out of state students.

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Ethanol 85 (E-85) Versus Unleaded Gasoline: Comparison of Power and Efficiency in Single Cylinder, Air-Cooled Engines

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Introduction

With a rise in fuel prices and a decreasing stock of non-renewable resources there is a need to seek alternative fuels. Ethanol 85 (E- 85) is an alternative fuel that contains 85 percent ethanol and 15 percent unleaded gasoline. A benefit of burning E-85 over gasoline is reduced emissions of carbon monoxide, total hydrocarbons, and nitrogen oxides (Sheehan, et al. 2004). Ethanol-powered vehicles reduce greenhouse gases by up to 37.1 percent and lower carbon monoxide levels by 25 to 30 percent over similar gasoline vehicles (Canadian Renewable Fuels Association, 2004). Although emissions are lower, the key drawback of ethanol is reduced fuel economy (Yacobucci, 2004). In a study on automobiles on E-85 and gasoline it was found that fuel efficiency was reduced 27 percent with ethanol (Sheehan, et al. 2004).

The purpose of this project was to compare the fuel consumption and power output of small gas engines using unleaded gasoline and Ethanol 85 (E-85) to determine if there was a difference in fuel efficiency or horsepower production. This was an undergraduate research project.

Methodology

The engines used were four identical, new Honda GX 110 2.61 kilowatt (3.5 horsepower) engines. Each was tested using a Land and Sea DYNOmite Kart Engine Dynamometer. Each engine was subjected to a thorough and identical "motor break in" process. Then, each engine was labeled and two were randomly selected to run on E-85 and two were randomly selected to run on unleaded gasoline. Ten dynamometer runs were done on each engine to determine peak horsepower. The stock carburetor jets were not capable of making the E-85 engines run so replacement jets were ordered. One of the E-85 engines was tested on the dynamometer with various jet sizes (.060, .070, .075, .080, .085) to determine which jet produced the most horsepower. The .075 jet was thus used in both E-85 engines on the fuel consumption test.

To test the fuel consumption of each motor, the engines were connected to a graduated cylinder. Each engine was hooked to the dynamometer, accelerated to full throttle, and brought to a normal operating temperature. At full throttle a load was then placed on the engine to bring the revolutions per minute (rpms) down to 3000. The rpm was chosen *a priori* using the manufacturer's recommended speed for operation. Each engine was then held at approximately 3000 rpms for exactly 15 minutes using the manually controlled load valve on the dynamometer. The fuel consumption was measured using the graduated cylinder and a valve controlling fuel flow from the graduated cylinder. This allowed all fuel that was used in the fuel consumption tests to be measured.

Results

The first null hypothesis posited that there would be no significant ($p \leq .05$) difference between E-85 and gasoline in horsepower produced. This null hypothesis was rejected based on the results of an independent t-test, $t\ (10) = 3.08; \leq .019$. Engines run on E-85 produced more horsepower. The second null hypothesis posited that there would be no significant ($p \leq .05$) difference between E-85 and gasoline in specific fuel consumption measured by pounds per horsepower-hour. This null hypothesis was rejected based on the results of an independent t-test, $t(10) = 10.95$; $p < .009$. As shown in Table 1, engines run on unleaded gasoline were significantly more efficient than engines run on E-85.

Table 1
Fuel Efficiency and Horsepower by Fuel Type

		Fuel Efficiency		Horsepower	
Fuel Type	n	M	SD	M	SD
E-85	6	1.11	0.09	2.14	0.07
Unleaded Gasoline	6	0.50	0.10	1.90	0.18

Implications/Future Plans

The data indicated that E-85 has more horsepower generating potential than 87 octane unleaded gasoline, but has a higher consumption rate. On November 2, 2004 the price of E-85 was $1.81 and the price of 87 octane unleaded gasoline was $1.88 at the Petro Plus Station in Garnett, Kansas. At these fuel prices the cost to produce one horsepower per hour with E-85 is $0.31 and is $0.15with 87 octane unleaded gasoline. Thus, 87 octane unleaded gasoline is more efficient in small gas engines. For E-85 to be more efficient the price per gallon of E-85 would have to be nearly 50 percent of the price per gallon of unleaded gasoline. Future plans include running engines for extended periods of time then disassembling the engines and measuring the internal parts to compare them for any differences in wear. This project will serve as a model for future undergraduate research.

Costs/Resources Needed

Qty.	Resource	Cost
1	Land and Sea Kart Engine Dynamometer	$5,995.00
4	Honda GX 110 Engines	$175.00 each
5	Gallons Ethanol-85 Blend	$1.81 per gallon
5	Gallons Unleaded Gasoline	$1.88 per gallon

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Using Role-Playing to Teach Risk and Crisis Communication Skills

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Introduction

Whether it's a BSE (Mad Cow disease) scare or an accident on a construction site, crises can and do affect every industry. The ability to communicate effectively and appropriately during a crisis situation is an invaluable skill (Seeger, Sellnow, & Ulmer, 2001). Risk and crisis communication is a topic that needs more emphasis in the agricultural communications curriculum. At the University of Arkansas, Agricultural Communications, which is a service course for the Dale Bumpers College of Agricultural, Food and Life Sciences, uses a role-playing exercise to demonstrate the complexity of dealing with a crisis situation and the importance of planning ahead.

Role-playing is an appropriate teaching method to mimic real-life situations or events in a learning environment. It helps students develop speaking skills and the ability to create a professional response to the problem at hand. Role-playing is the best teaching method to teach skills such as human relations and leadership (Newcomb, McCracken, Warmbrod, & Whittington, 2004).

Risk communication involves communicating, often through mass media, about an organization's products or technology that may have the potential to affect others. A crisis can be defined as a specific event, during a limited time frame, that causes threat or surprise and requires a quick response to control and limit damage (Seeger et al., 2001). Considering these definitions, agriculture faces many risk and crisis communication situations and agriculture students need to be aware of the steps to take to correct or improve risk and crisis situations.

The ability for business leaders to handle situations with constantly changing information, perspectives, and alterations like those in a crisis situation is critical (Seeger et al., 2001). This exercise provides an excellent opportunity to practice and improve the important leadership and communications skills of being flexible and responding quickly to changes or updates in information.

Methodology

The role-playing exercise is preceded by two lectures: Media Relations and Crisis and Risk Communication. This exercise was adapted from a workshop presented by professionals at Fleishman-Hillard at the 2003 National ACT Convention. For the role-playing activity, students are divided into groups of 6 or 7 and asked to appoint a County Fair Manager and a Public Relations Officer. The other group members serve as fair board members on the crisis communication team. The groups are then read a scenario concerning a report of *E. coli* poisoning at the fairgrounds. The group members are given approximately 20 minutes to discuss how they will respond to the situation. During this time, three updates are given to group members that may change the fair board's position. At the end of this discussion time, one representative from each group is asked to come to the front of the room to be "interviewed" by a local news reporter. A live video broadcast of the interview is projected onto a large screen in the classroom for all the students to see. This is where the lessons discussed in the previous lectures are reinforced through application.

Results to date

This activity has been used for three consecutive semesters to provide students with a practical exercise to apply the risk and crisis communication lessons. Students seem very receptive to the exercise as illustrated in the following comments:

- The crisis communication role-playing exercise was really fun, but at the same time, it really made you feel nervous and responsible for a company, which I think is beneficial to us before a career in any field.
- Role playing can be a positive way to learn new things; I like the way you can visualize a situation when you role-play.
- I really liked the project. I can really see something like that happening. The change of scenario made it exciting like when we kept getting changing information I think in the future, most of us will at sometime be in a situation like that.
- I really enjoyed working on the crisis situation. I enjoyed being in a situation where you have to think about what you are going to say and why it is important. It will help me to know how to say things properly when under pressure and when to stop if you don't know the answers to a question.

Future plans/Advice to others

This activity will continue to be utilized in the future. Students have commented they enjoy doing a team activity in lecture class. The most common complaint of this exercise is not having enough time to develop a more comprehensive communication strategy. However, others have mentioned that this taught them the importance of planning ahead and they now understand the role of media in communicating to the public.

Having a situation the students can relate to with no research is necessary. The students are not given enough time to do background research so in order to develop an effective communication strategy the students must be able to relate to the topic.

Costs/Resources

The exercise requires a video camera, tripod, and LCD projector to project the student interviews to the entire class. This exercise is fairly inexpensive to incorporate as it uses many pieces of technology common in college classrooms. If these items must be purchased, a video camera can range from $230 to $800; a LCD projector can range from $600 to $900; and a tripod can range from $30 to $100. If a microphone is wanted, they range in price from $100 to $150.

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A Poster Presenting Dilemma! Let's Stand up for our posters

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Introduction

During my short time in the profession I have been witness to several poster sessions and have watched presenters and chairpersons struggle with the display of our collective creativity. Much effort is placed into posters and the sessions in which they are presented and the cooperative exchange of ideas is well worth the effort. Nevertheless, one must understand the "poster session subculture" that exists, we have all experienced this phenomena. Colleagues mingling and talking about their work, the hustle and bustle of setup and the always intimidating interview with the poster session judges. Graduate students cringe when they see duct tape applied to their intellectual masterpieces, colleagues and observers scatter when displays fall in domino fashion. What a predicament! What drama!

During the 2004 Western Region Agricultural Education Research Conference in Hawaii, the story was the same, except a new twist was added, how to get the traditional rigid foam sheets to the land of aloha! Fortunately, a plan was devised by Ed Franklin to purchase the poster props at a Home Depot, but what to do with the building materials after the sunburned academics were finished with them? This "poster-presenting dilemma" has led the authors to develop this proposal.

Objectives/Rationale

It is the objective of this project to develop a prototype poster display stand that can be constructed or purchased by faculty in agricultural education. Currently the authors are actively developing and testing several prototypes that will present a maximum of two posters back-to-back. The stand itself must be lightweight, collapsible and fit into a standard poster tube, which can be carried on or checked at the airport. Ideally, the proposed stand would fold and be inserted into the center of a poster tube after the posters have been placed inside. Current plans are for a tabletop version of the stand only; therefore, poster session chairpersons would still make arrangements for tables.

Plan of Work

The project is being developed through the utilization of eighteen product development steps borrowed from ImagineeringE-Zine.com. The steps include; 1) Product idea description, 2) Product idea evaluation and market analysis, 3) Preliminary design and engineering specifications, 4) Product development cost estimates, 5) Preliminary development financing, 6) Design of a first working prototype, 7) Construction of a first working prototype, 8) Prototype testing, 9) Obtaining additional financing, 10) Design and construct second revised prototype,

11) Testing of second prototype, 12) Design a pre-production model, 13) Construct the pre-production model, 14) Test the pre-production model, 15) Design the production model, 16) Construct the production model, 17) Test the production model, 18) System documentation, (ImagineeringE-Zine.com, 2005). During the "Preliminary design and engineering specifications" phase the authors utilized problem solving and analysis steps to identify the project's needs and to provide direction and focus for the authors, (Newcomb, McCracken, Warmbrod & Whittington, 2004). The authors have scheduled to be in steps seven and eight during late April 2005.

Results

Currently, the authors are in the fourth and fifth stages of product development. The current challenges with the project focus on efforts to make the stand easy to develop with common pre-existing materials or an inexpensive to purchase pre-developed stand. Research on possible construction materials is complete and has yielded a preference for polyethylene, aluminum or fiberglass. The authors are also researching the options for collapsibility, connective hardware, and locking extensions.

Impact

The potential for this project to have a profound impact on the way researchers conduct poster presentations is very feasible. If design and construction challenges are overcome the profession stands to be some of the first to benefit from the convenience offered by this innovation. Finally, a solution to the poster presentation dilemma! Stay tuned poster session chairmen, last minute trips to home improvement mega marts may be a thing of the past!

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Commodity Curriculum: Dairy in the 21st Century

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Leanna Shores - *Mineral Wells High School*

Introduction

Current events related to dairying in Texas coupled with numerous conversations involving producers and association leaders have led to grass-roots efforts in order to support the Texas dairy industry with imaging and educational efforts. Many believe that the industry is in a reactionary posture due to environmental concerns in the region surrounding the North Bosque and Leon Rivers. Dairy producers in Erath County, Texas' leading Dairy County, have been inundated with allegations, rumors, and litigation relating to concerns over surface and ground water contamination. Although much research has concluded that dairies are not the sole source of pollution, many producers are considered guilty until proven innocent by their neighbors downstream.

Numerous business owners, community members and educators in Erath, County are well aware of the economic impact provided by the local dairy industry and are developing proactive efforts to assist local dairy producers. Also, the regional community, which is primarily agrarian in nature, understands the environmental stewardship efforts, which are undertaken by most dairy producers. Therefore, large amounts of support exist for the industry in rural areas, while less support is offered in an urban area approximately 100 miles to the southeast. Much misinformation exists on both sides of the debate. One of the purposes of this project was to educate both sides in an effort to bring an understanding of what has been done to and for the environment, and where we should go from this point forward.

Objectives/Rationale

It was the objective of this project to assist the dairy industry in Texas with educational and imaging issues through the creation and dissemination of an educational curriculum delivered to high school agriscience students. Influencing change through youth is not a new concept in agriculture. The 1862 Morill Land Grant act established universities in each state for the purpose of education in the agricultural and mechanical arts. Later, in 1887 the Hatch Act would establish Experiment Stations that were designed to deliver current researched-based practices to the public and land grant institutions. In 1914, the development of the Cooperative Extension Service through the Smith-Lever Act would "extend" current research and practical methods into communities. Finally, in 1917, the Smith-Hughes Act established funding for the development of agricultural courses in high schools, (Talbert, Vaughn & Croom; 2005). This legislation would prove to be able to influence change because of the unique relationship and influence an educator could have on youth in their classrooms. These ideals are still utilized today in agriscience departments in schools across the nation, and it is this phenomenon that has the potential to bring an imaging change to the Texas dairy industry.

Plan of Work

The overall project began in January 2004 and is under development in multiple stages. The first stage involved the development of a classroom-ready curriculum, which was delivered to every agricultural science department in the State of Texas. Delivery took place at the Vocational Agricultural Teacher's Association of Texas' Professional Development Conference in August of 2004, and in the form of a mail out in December of 2004. The electronic curriculum was packaged in the form of a CD-ROM, which houses eleven lesson plans, Power Point® presentations and associated quizzes. Also included on the CD are eleven video segments, which include a tour of a modern dairy, and links to industry resources on the Internet. The curriculum may also be accessed online at:
http://www.tarleton.edu/~mcgregor/Extras/Dairy%20Webpage/Index.htm .

The Phase I curriculum was developed by the authors of this proposal. Dairy producers, association members, and other industry stakeholders served as an advisory committee and offered topics and up-to-date perspectives on issues and trends in the industry. Phase II of the project will consist of a perceptual impact study focusing on the end users of the curriculum and will be conducted in the spring of 2005. Phase III of the project will involve the modification and second release of the curriculum for a national audience, this phase will be completed during the summer of 2005. Phases I - III, which include production costs and graduate assistant salary, have been funded through industry check-off dollars.

Impact

Potential benefits of the initial program will offer the dairy industry contact with 897 school districts, 1,176 campuses, 1,815 teachers, and 93,934 agriscience students (unduplicated) across the Sate of Texas, (Texas Education Agency, 2003). More contacts can be made if the curriculum is made available to the Cooperative Extension Service, Family Consumer Sciences, and General Science educational units at all grade levels in the State of Texas. Further evaluatory efforts will be made following the national release of the program.

Agricultural education units across the nation have the potential to serve as powerful allies to commodity groups. Education of the public and traditional agriscience students through industry contacts and expertise has the potential to offer significant dividends to all involved.

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Seven Steps to Enhancing Mathematics in the Agricultural Education Curriculum

Greg Thompson, Dan Jansen & Larry Enochs - *Oregon State University*

Introduction

The workplace is demanding higher levels of academics and problem solving skills in its workers. Likewise, data show that many students entering post secondary institutions require remediation in math. Many of the academic skills, such as algebra, are required for entry into higher education and the workplace are taught in late middle school or early high school (Rosenbaum, 1992). The problem lies in the fact that many students are not taking math in their junior or senior year of high school and therefore missing the reinforcement or follow-up needed after graduation.

Agriculture teachers can play a major role in helping students make connections between what they are learning in the agricultural education curriculum and ways to apply that knowledge in the real world and to similar problems. Agriculture is a rich context to teach higher order thinking skills and apply many academic skills such as mathematics.

As a part of a project of the National Research Center for Career and Technical Education, Oregon State University coordinated twenty horticulture and twenty mathematics teacher teams to develop curriculum that would enhance mathematics skills in horticulture. The teacher teams met in two 1 ½ day professional development workshops to determine how mathematics could be enhanced in a horticulture curriculum. The teams developed ten horticulture lessons that enhanced mathematics skills. The lessons were pilot tested and adopted by the agriculture teachers to use in a semester horticulture class. Agriculture teachers taught the lessons with guidance from the mathematics teacher. Through an experimental design study, students took pre and post tests that indicated significant increase in their ability to apply mathematical concepts.

Enhancing Mathematics in the Curriculum

Research studies showed that contextual mathematical teaching and learning increased students' conceptual understanding that provided them with advantages in a range of assessments and situations. A Contextual mathematics approach to teaching and learning produces enhanced thinking about and use of mathematic concepts that leads to greater transfer of learning. Learning strategies that can be applied to enhance the learning of mathematics (Bickmore-Brand (1993) include:

- Creating a meaningful and relevant context for knowledge, skills, and values of mathematics.
- Realizing the starting point of interest in mathematics is the knowledgebase of the student.
- Providing opportunities for the learner to see the skills, process and values of mathematics by the teacher's modeling.
- Continuing to build on the knowledgebase and challenging the students.
- Facilitating the metacognition of the student by helping by identifying the learning processes.
- Assisting the learner to accept the responsibility for the construction of knowledge.

- Building a community of learners in a risk-free learning environment.

The Seven Steps to Enhancing Mathematics were designed from the elements of the pedagogy and classroom learning strategies identified by Bickmore-Brand (1993). Teachers indicated that the Seven Step Enhancement process was an effective teaching method to help students understand and apply mathematical concepts in agriculture as well as in applying those concepts in other contexts.

Seven Steps to Enhancing Math in Your Curriculum

1. Teacher recognizes math with the class by "pulling out" and point out the math.
    - When teacher comes to the part of the lesson where predetermined math exists, verbally recognize the math…show students by "pulling out" and "pointing out in the lesson, activity, and/or project of the day.
2. Teacher assesses students' math awareness.
    - Teacher asks questions to find out what the students already know. What can you tell me about? Why does this work? What would happen if___? Does____mean anything to you? Where have you used this before?
3. Teacher demonstrates how steps/processes needed to complete the example.
    - Walk students through the steps/processes needed to complete the example. Depending on level of understanding, ask students to take the lead.
4. Teacher enhances mathematics in the lesson
    - Explain mathematical concepts(s)/principle(s), and show the students how it applies using the terminology of math. Use math language.
5. Teacher reinforces by having students try similar examples.
    - Demonstrate similar math examples from similar agriculture scenario and generic math examples similar to those they might see in math class or on a math test.
6. Teacher checks for understanding
    - Students explain or demonstrate understanding. Ask them to: Explain the math steps or concepts that we used today. How would you explain these math steps/concepts to someone else?
7. Expand the Enhancement
    - Students create new agriculture and math examples or provide students with another agricultural scenario which addresses the same math concept.

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And They're Off! Preparing Kentucky Agriculture Teachers for the Classroom

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Introduction/Need for the Program

Agricultural Education teachers face numerous demands in today's classroom. These include planning effective lessons, managing student behavior, evaluation of student learning and increased accountability for their teaching. With the *No Child Left Behind* legislation, it has become more difficult for teachers to create interactive lessons that integrate state standards. Agriculture teachers must focus more on their curriculum and implement new ways of integrating academic skills. Luft (2004) stated agriculture teachers must "show how the content, skills, and behaviors taught in our programs contribute to students' ability to meet academic standards and subsequently pass the required tests" (p.5).

The lack of administrative support is the top reason secondary agriculture teachers give for leaving their teaching profession (Walker, Garton, & Kitchel, 2004). Often administrators may not see how academics are integrated into specific agriculture courses. The demand for agriculture teachers to document and prove their curriculum worth increases as high stakes accountability becomes more prevalent. Wilhelm (2004) reported that "agriculture standards must tie to academic standards" (p. 11). She further reported "it provides credibility to agricultural education by showing how the context of agriculture is a viable tool to address academic measures" (Wilhelm 2004, p. 11).

As we face increased accountability measures in our public schools, it is crucial that agricultural education take action. An additional item of concern is the issue of retention; therefore teacher educators must work with pre-service teachers to meet the increased number of retirements occurring in the near future. Coffey & Peiter (2004) posed the question, "Has teacher education in agriculture incorporated this major educational change in its pre-service program?" (p. 18). Therefore the purpose of this program was to equip agriculture teachers with a curriculum tool which meets Kentucky academic standards.

How it Works

After this significant need was identified, Kentucky TEAM AG ED discussed possible solutions. Leadership from the Kentucky Vocational Agriculture Teachers Association and the State Director of Agricultural Education secured a grant with the Kentucky Agriculture Development Board. This funded the hiring of Center for Agricultural and Environmental Research and Training, Inc. (CAERT) to construct the Kentucky Agricultural Education Lesson Plan Library CD with approximately 1,000 lessons, with over 650 specifically aligned with Kentucky state standards and core content. Lessons were created for the 33 classes offered in the Kentucky program of studies and were categorized into six lesson plan libraries correlating to the Kentucky Agriculture Career Majors. Teachers may access through CD or an online program. Each CD contains lesson plans, transparencies, and assessments. The on-line program has added features such as PowerPoint and on-line assessments. It also includes the ability for teachers to select a specific class based on the academic expectations and state standards. With this capability, teachers can search lessons to enhance educational areas needed for their classroom. In order to receive this CD and on-line password teachers were required to attend a training session held by CAERT.

Results to Date

In July 2004, 225 teachers attended a training session at the summer KVATA conference. A second session was held in September where 15 additional teachers were trained. A total of 240 Kentucky teachers, residing in 116 of the 120 counties, received the 1,000 lesson curriculum which was aligned with Kentucky state standards and core content. Experienced teachers embraced the curriculum through comments and shared enthusiasm. Beginning and pre-service teachers rely on this curriculum as a vital tool to establish lessons for student learning.

Future Plans/Advice

To meet the accountability needs in Kentucky, a new high school career major in Agriscience has been implemented and this curriculum paved the way. Future plans include training teachers to utilize the in-class on-line assessment. Teacher educators must continue to provide this curriculum resource to pre-service teachers. It is hoped this project will help in the area of retention as pre-service teachers will replenish retirement vacancies. Other Kentucky CTE programs, such as Business Education and Family and Consumer Sciences Education have expressed interest in developing a similar tool for their programs.

Costs/Resources Needed

A $250,000 grant funded this curriculum project. CAERT was hired as curriculum development experts to achieve this goal. KVATA officers and Kentucky Agricultural Education staff members' time and resources were also tapped to make this project a reality.

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Application/Reflection Model for Teacher Education

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Introduction

Whereas, the role of the teacher educator has changed over the past several years, the preparation of individuals for teaching agriculture still remains the focal point of most agricultural education programs (Anderson, Barrick, & Hughes, 1992). Whether an accurate depiction or not, teacher education programs are often depicted as overly dated and marginal in their approach to producing an adequate supply of highly qualified and skilled teachers (Lytle, 2000). If true, teacher educators should frequently reflect on strategies to modify their programs to identify the most effective ways to prepare teachers to be successful in the ever-changing field of agriculture.

Just as the role of the teacher educator has changed, so has the structure of agricultural education in the public schools. Policy and societal changes, standardized testing, content integration, a changing student population, graduation requirements, and agricultural literacy needs, are just a few of the changes that have necessitated a change in the model that is used to prepare teachers (Hughes & Barrick, 1993; National Research Council, 1988). However, the primary focus of teacher education programs must continue to be on the process of teaching and learning (Barrick, 1993).

If the goal of preservice teacher education is to make the most effective use of the time available to prepare future educators for the task awaiting them, using the current model of preservice teacher education may no longer be practical. It is unrealistic to believe that preservice teacher education programs can prepare preservice teachers for all of the tasks awaiting them as teachers (Lytle, 2000). A new model of teacher education needs to be identified. This project sought to explore such a model.

Methodology

A fundamental principle of teaching and learning is that students learn what they practice. It is both how and when students practice that may be key to the development of desirable behaviors and cognitive gains. In the teacher education program model espoused by this project, timely practice and reflection are utilized to enhance learning.

A program of study was developed in which students first complete courses in philosophy of agricultural education, program planning, and curriculum development. Early field experiences consisting of approximately 30 hours in each of these areas are completed by each student. In the second phase of the program, students complete a basic teaching methods course, complete with five applications of learned subject matter. For example, in the first application, students first study the theory behind successfully generating interest. Then, each student demonstrates an application of the theory to other students in the class. The second area of learning involves the use of demonstrations. After studying the theory behind the successful use of demonstrations, students develop a demonstration and deliver it to students in a middle or secondary school class. Presentations are video taped, self-analyzed and reflected upon, then critiqued by an instructor. A third application follows the teaching of how to focus instruction around framing devices such as objectives, questions, or competencies. Again, an application of the learned material is completed in a classroom setting much like the one the student will have in his/her student teaching internship. The same format is followed as with the previous applications – video taping, reflection, self-analysis, and critique. A fourth and fifth application of theory are made in the same manner, each time with reflection and self-analysis serving as key components.

The third phase of the model occurs during student teaching. After students have interned for a minimum of three weeks, interns return to campus for a full day of debriefing and problem solution. Again, students are asked to reflect upon the application of theories learned in class, self-analyze, but with the added component of analyzing problems experienced by other classmates and suggesting remedies for problems encountered by other students. This step is repeated after the sixth week of the internship. At the conclusion of the internship experience, students return to campus for a three-day seminar in which they again repeat the process from the previous two debriefings, with the addition of a formative component – delineating and planning for problems anticipated in their first teaching job.

Results

Since the reflection/application model was put into place three years ago, 100% of the program completers have accepted teaching jobs. Prior to the implementation of the model, the program was averaging just under 50% placement. In addition, 100% of the students completing the program since the model was adopted have been retained in teaching positions. Prior to the implementation of the model, only 80% of those students entering teaching (which was just under 50% of the graduates) remained in teaching three years after graduation. In addition, student satisfaction evaluation scores have increased from means of 3.9 prior to the model's implementation, to means of 4.8 (5-point scale) since the model was adopted.

Future Plans

Due to the success of the model, its utilization will continue with possible expansion into other internship areas. Likewise, the model will be shared with other teacher education programs that wish to boost their completion and retention rates.

Costs/Resources Needed

Costs involve transportation to cooperating agriculture programs that host the application opportunities. The major resources needed are teaching assistants to assist with the video taping and critiques and the added time needed to apply the subject matter.

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Beyond Information Technology: Exposing Pre-Service Teachers to Diverse Technology Tools

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Introduction/Need for Idea

Technology plays a central role in much of today's agriculture. Agricultural education teachers need to be aware of a variety of different forms of technology and be prepared to apply them in the classroom. National and State standards for agricultural education include this expectation. The National Standards for Teacher Education in Agriculture state that teacher candidates need professional and pedagogical understanding including "Instructional uses of technology" (American Association for Agricultural Education, 2001, p. 3). The Wisconsin Content Guidelines for Agriculture Education state that teachers must demonstrate knowledge of "The technology used to gather information and produce products within the food, fiber, and natural resource industries in our global marketplace" (Wisconsin Department of Public Instruction, n.d., p. 1).

Information technology, mainly computers, have become the focus of efforts to improve teachers use of technology. The Department of Education commissioned report on the effectiveness of educational technology acknowledges the use of a wide range of technology in schools, but focused only on computers (Agodini, Dynarski, Honey, & Levin, 2003). While computers are a key to many types of technology used in agriculture, there are many others. To fully meet the expectations set forth in the standards students need exposure to more than computer based information technology.

The purpose of this project was to provide undergraduate and graduate pre-service teachers with an exposure to a variety of technology. The focus was on classroom activities that demonstrated principles readily applied to the food, fiber, and natural resource systems.

How it Works

These activities were integrated into the senior level teaching methods course, Teacher Education 440: Techniques of Middle/Secondary Agriculture. This course consisted of two 55-minute lecture periods and one 2-hour lab period each week. Three lab sessions were devoted to this activity. Two sessions involved student groups rotating among the stations while the final session consisted of a whole-class discussion of the various tools, costs, and additional applications in the food, fiber, and natural resource systems. Groups of 2-3 students rotated among 5 different stations. Each station focused on a specific process or piece of equipment. Written instructions guided the groups at each station.

The stations consisted of:

- Handheld GPS Receiver. Students had to find the locations of 5 pre-set waypoints on campus using a Garmin eTrex Legend GPS receiver.
- Data collection. Students used a Vernier LabPro interface, TI 83 graphing calculator, and a temperature probe to explore the cooling of water.
- Digital Microscope. Students used an Intel QX3 Computer Microscope to examine various samples, capture digital images, and edit the images.
- Robotics. Students used a LEGO Mindstorms Robot kit to construct a robot, run a pre-set program, and determine the program components based on the robot's behavior.

- GPS/GIS background. Students used a classroom computer station to review several websites on the principles behind Global Positioning Systems (GPS) and Geographic Information Systems (GIS).

Results to Date

Student response to this portion of the class was positive. In the end of course evaluation this activity received almost all positive comments. Students said that the activities "opened our eyes to new and innovative instructional approaches" and "gave me new perspectives on the use of technology in the classroom". A couple of students did question the relevance or how to relate it to teaching agricultural education.

Future Plans

These activities will be included in the course again next year. There will be some fine tuning of the specific steps and instructions and more emphasis put on how each activity connects with food, fiber, or natural resource systems, but the stations will likely remain the same. The activities will be moved earlier in the semester so that the GPS groups will be able to have daylight when working outside. A workshop at the Wisconsin Association of Agricultural Educators Summer Conference is planned to provide similar experiences to in-service teachers. The focus will be on how these hands-on activities can help students learn science and technology principles used in agriculture.

Resources Needed

Item	Source	Cost
Lab Pro Interface	Vernier Software and Technology www.vernier.com	$220
Stainless Steel Temperature Sensor	Vernier Software and Technology www.vernier.com	$29
LEGO Mindstorms Team Challenge Set w/ ROBOLAB software	Pitsco LEGO Educational Division www.legoeducation.com	$226
eTrex Legend	Garmin www.garmin.com	$183
Intel QX3 Computer Microscope	Intel no longer manufactures this item, but it can be purchased online from a variety of sources.	???

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Establishing an International Student Teaching Program in Agriculture

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Introduction

Faculty in the Department of Agricultural Education and Studies at Iowa State University were interested in identifying a suitable international student teaching center. International student teaching was believed to be an effective means of accomplishing departmental, college and university outcomes related to diversity and international perspectives. Furthermore, we believed that agriculture teachers with substantive international experiences could more effectively relate the global nature of the agricultural industry to their high school students. Our beliefs had support in the literature (Stachowski & Mahan, 1995).

The possibility of partnering with existing international centers that were established by the College of Education was investigated. However, none of these international centers offered programs that would provide a satisfactory agricultural student teaching experience. Our criteria for an international student teaching center include: (1) instruction is delivered in English; (2) curriculum is reasonably similar to Iowa's secondary level (Grades 7-12) agricultural education curriculum; (3) students are the same age as secondary level students in the U.S.; and (4) supervision and support for the student teacher are readily available on-site.

Purpose

The purpose of this poster is to share our experiences in developing and implementing an international student teaching program in agriculture.

Procedures

- Oatridge College located near Edinburgh was identified as a potential international student teaching center through contacts made during a two week group study abroad program focused on Scottish agriculture.
- A five-day initial site visit was conducted to determine if Oatridge College met our criteria.
- Materials used to recruit participants included a formal presentation, an application form, and a new $1500 international student teaching scholarship.
- An application was submitted to the University's Study Abroad and Exchange Advisory Committee in order to obtain university approval, tuition reimbursement benefits, and student financial aid benefits.
- An itinerary was established that included travel arrangements, teaching activities, and supervision responsibilities.

Results

- Our first student teacher in Scotland reported having a more rewarding professional experience during the six week international program than her six week Iowa experience.
- The student teacher reported that this experience has made her more receptive to different ideas and has resulted in greater self confidence.
- The program could be improved by enhancing communication with instructors at Oatridge College and timing the program to better match their academic calendar.
- The program has resulted in an ongoing relationship that has included a ten day visit to Iowa State University by two instructors from Oatridge College.

Future Plans/Advice

- We plan to maintain our relationship with Oatridge College and place student teachers there when opportunities arise.
- We plan to pursue additional opportunities to establish international student teaching centers.
- The University of Tennessee, Iowa State University, Fort Valley State University, and Charles Sturt University in Australia are working on a proposal to establish a faculty and student teacher exchange program.
- Excellent opportunities exist for agricultural teacher educators to form collaborative international relationships. On the surface it appeared that no such opportunity existed in Scotland. It was only through networking and probing communications that the opportunity became clear.

Costs/Resources Needed

- A proposal was written to obtain resources for a faculty and staff member to conduct a site visit to Oatridge College. This proposal was supported by Global Agriculture Programs ($1100), The College of Education Field Experiences Office ($500), The College of Education Dean's Office ($500), The Department of Curriculum and Instruction ($200), and The Department of Agricultural Education and Studies ($500).
- Oatridge College provided room and board for the student teacher at no cost. In exchange lodging was provided for two of their faculty members during their visit to Iowa.
- The primary costs to the student teacher included a program fee ($500) to support supervision, transportation ($1000), and incidentals ($500). To offset a significant portion of the costs, the student teacher was awarded a $1500 international student teaching scholarship by the Department of Agricultural Education and Studies. In addition, the student received a refund of 90% of the tuition costs for student teaching credits earn in Scotland.

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Math and Science: The Middle School Perspective

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The continuing poor performance of American students in math and science compared to international students has drawn increased attention from political and public arenas. Effective methods to reform education in order to create positive, context-rich educational experiences for students has gained increased importance in the effort to boost student achievement (Harris, Marcus, McLaren, & Fey, 2001). Utilizing a problem-solving approach in curriculum is gaining increased attention as an educational reform tool. Students who are taught with this inquiry approach possess better higher-order thinking skills and increased positive attitudes toward the subject matter than those students taught using traditional methods (Harris, Marcus, McLaren, & Fey, 2001). Integrating curricula provides students increased opportunities in applying scientific principles and reasoning to everyday problems, increasing the relevancy of subject matter for students (Thompson, 1998; Balschweid, 2002; & Trexler & Suvedi, 1998).

In an effort to increase rural middle school students' interest and understanding in the STEM (Science, Technology, Engineering, and Mathematics) areas and make those areas relevant to everyday life, Texas A&M University developed the Partnership for Environmental Education and Rural Health (PEER) GK-12 integrated curriculum project, funded by a grant from the National Science Foundation (NSF). The PEER project uses an interdisciplinary partnership between rural Texas public middle school teachers in the STEM areas and faculty and graduate fellows from Texas A&M University. "The long-term goal of this three year GK-12 project is to develop a focused model for rural middle schools (grades 6-8) that: (1) integrates research and education; (2) enriches educational opportunity for under-represented, geographically isolated students; (3) is transportable; (4) is engaging and relevant for public school students; and (5) will improve interest, advance knowledge, and enhance understanding of STEM subject areas" (PEER, 2004).

Methodology

The graduate fellows, termed "resident scientists," in this project serve as resource and content specialists in rural middle schools. The resident scientists are assigned "lead teachers" whom they work with in rural school settings to provide content-rich, in-depth, and inquiry-based learning activities for students that the teachers may not otherwise have had the knowledge, time, or resources to conduct. In the classroom, resident scientists serve as role models, correct student misconceptions about scientists and science, increase student awareness of the importance of science and scientific methods in everyday life, and help students develop positive attitudes toward math and science. The resident scientists also help teachers develop an appreciation for teaching by inquiry methods, and increasing teachers' abilities and comfort levels with inquiry teaching methods.

Middle school students' interests in and beliefs about the STEM areas were obtained at the beginning of the school year before the resident scientists' involvement in the classroom using an interest and belief survey (using a Likert-type scale and open-ended responses) developed by the evaluation team. The Likert type scale measured students' agreement levels (1=disagree strongly, 2=disagree, 3=neither agree nor disagree, 4=agree, and 5=agree strongly) with 20 statements. Attitudinal data collected generated five broad categories: (1) students perception and interest in STEM areas; (2) preference for hands-on learning; (3) relevance of STEM areas; (4) beliefs about a career in a STEM area; and (5) difficulty and personal motivation in STEM areas.

Results to Date

Data were collected from 1,934 middle school students. Lead teachers administered the surveys prior to resident scientists' contact with students. Students agreed that they enjoyed math and science, while disagreeing that the activities were boring; they were neutral in their desire to take more math and science classes. Students agreed that they preferred to work in small groups, do actual experiments, and use equipment and computers to learn math and science, but were neutral in their response to reading to learn math and science. Middle school students agreed that math and science are useful in everyday life and help make our lives better. They disagreed that math and science were only important in school. Students disagreed that being a mathematician or scientist would be a lonely job, but were neutral in their belief that it would be an exciting job or that they would make good mathematicians or scientists. Students were neutral in their belief that math and science tests made them nervous. The students disagreed that studying in math and science was not socially acceptable, they didn't try their best in class, or that science was difficult for them.

Future Plans

The pretest/posttest design will be used to collect middle school students' attitudinal data about math and science. This data will be analyzed to determine if a significant change in students' interests and beliefs about STEM areas has occurred. The Reformed Teaching Observation Protocol (RTOP) will be utilized to evaluate the level of inquiry teaching used by the resident scientist in the classroom. The RTOP is an observational, criterion referenced instrument that utilizes a Likert-type scale and observational data. The data gathered from the attitudinal surveys and RTOP will be analyzed to determine if a correlation exists between the resident scientist and the level of inquiry teaching in the classroom and the attitudes and beliefs of the middle school students toward STEM areas.

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Perceptions of Agriculture by the 2004 Class of the Virginia Governor's School for Agriculture

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Introduction

The Virginia Summer Governor's School for Agriculture (VGSA) has been developed as an agricultural literacy tool by the Virginia Department of Education, Virginia Farm Bureau, Virginia Agri-Business Council, and Virginia Tech College of Agriculture and Life Sciences. Each July between 90 and 100 rising juniors and seniors from throughout Virginia attend the four week program on the Virginia Tech campus. Students who have been identified as gifted and talented by local school divisions are eligible to apply for admission to the school. Students who attend private or home schools are also eligible.

The primary purpose of the school is agricultural literacy. Organizations such as the Farm Bureau and Agri-Business Council support the program as a tool to provide instruction about the agricultural industry to gifted students who are not enrolled in traditional agricultural education programs. As the National Research Council challenged, "Agriculture is too important of a topic to be taught only to the relatively small percentage of students considering careers in agriculture and pursuing vocational agriculture studies"(National Research Council, p. 1, 1988). The authors of this report recommended that all students receive some instruction in agriculture (NRC, 1988). The VGSA Program is meeting this challenge, and it is also being used to recruit gifted and talented students for future study and careers in agriculture.

The mission of the school is to provide hands-on, cutting-edge scientific and academic instruction to future leaders and scientists to develop their understanding of the scope, opportunities, challenges, and both academic and scientific rigor of the broad fields of agriculture and natural resources. Each student who attends VGSA is required to select a "major". The majors include agricultural economics, animal science, food science and nutrition, natural resources, plant science, and veterinary medicine. All students take a core course in each of the majors. Students in a chosen major will receive one in-major course, and each student will have two elective courses. Students will also be divided into research groups in each major.

The purpose of this study was to determine the impact of the VGSA on the knowledge and perception of agriculture held by students of the 2004 school.

Methodology

This study replicated earlier research on the knowledge and perception of agriculture by the 2003 class of the VGSA (Duncan & Broyles, 2004). The population for the study were the students of the 2004 VGSA (N=92). A three part questionnaire was given to the students at the start of the VGSA. The students were given the same questionnaire as a post test at the conclusion of the VGSA. Part I consisted of 21 true-false questions designed to test the knowledge of the students. Part II consisted of 19 Likert-type scale questions designed to determine student perceptions of agriculture. Part III consisted of 15 questions designed to generate demographic information and open ended evaluation questions. Student responses were entered into the SPSS 13.0 computer analysis program.

Results

No significant difference exists between the frequencies of the pre-test and post-test results for agricultural knowledge. However, three items were incorrectly identified by the students. Those items related to the amount of money a producer receives per dollar spent by the consumers, soil erosion, and the US agricultural job market.

Student perceptions of agriculture increased for all items, ranging from a 1 to 22 percent increase depending on the item. Items that significantly increased included animal rights, pollution, employment, and control of food prices. The demographic profile of the VGSA students is in Table 1.

Table 1: Demographic Profile

Gender	Female 57.6% Males 42.4%
Age	15 3.3% 16 38% 17 55.4% 18 3.3%
Home	Farm 22.8% Rural 12.0% Town or City 21.7% Suburb 43.5%
Relatives that Farm	Yes 52.2 % No 47.8%
Relatives in Agricultural Industry	Yes 41.3% No 58.7%
Agricultural Education Courses	Yes 27.2 % No 72.8%
FFA Membership	Yes 23.9% No 76.1%
4-H Membership	Yes 22.8 % No 77.2 %
Interest in Agricultural Career	Yes 56.8% No 42 % (5 unmarked)

Recommendations

It is recommended that other states through their departments of education, land-grant institutions, and agricultural organizations develop and implement similar programs to expand the knowledge and perceptions of agriculture for gifted and talented students. Further research is needed to determine the influence of demographics on student knowledge and perception of agriculture.

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Taking Action for Ag Ed Advocacy

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Introduction/Need for Innovation

The need for advocacy for agricultural education is becoming increasingly apparent with the passage of each state and federal education budget. A continual concern with any marketing or advocacy effort on behalf of agricultural education is finding the "torch-bearers" who can lead such an effort. Who better to serve as advocates for agricultural education than those who spend each day educating students about the importance of agriculture? Too often, agriculture teachers devote themselves to preparing student leaders and do not feel they have time to take advantage of the leadership development opportunities in their own profession. The result in many states is an annual struggle to fill leadership roles in agricultural education's professional organizations. As a result, state staff members and teacher educators frequently work to fill the role of promoting agricultural education across the state. This has been the case for the last several years in the Florida agricultural education community. In response to this dilemma, the Florida Agriscience and Natural Resources State Technical Committee recommended the creation of the Florida Agriscience Education Leadership Program. Currently in its third year, the program has empowered a growing group of teachers to take charge of promoting their profession.

Purpose/Objectives

The Florida Agriscience Education Leadership Program serves to further develop and refine the leadership capabilities of teachers and administrators who are responsible for preparing students to meet challenges posed at the local, state, national, and international levels. Consequently, program participants develop into strong advocates of the agriscience teaching profession and role models for agriscience teachers around the state.

Program Phases/Steps

When developing the program, the first step was to secure financial and programmatic support. The Commissioner of Agriculture, Charles Bronson, was a proponent of the program which encouraged the involvement of key supporters from the agriculture industry. In addition to the Department of Agriculture and Consumer Services and the Department of Education, support was provided by Florida Ag in the Classroom, Florida Farm Bureau, Central Florida Farm Credit, and numerous additional associations and businesses. After receipt of the necessary support, the program's structure was developed and the nomination, application, and selection procedures were established.

Annually, district superintendents are asked to nominate an agriscience teacher as a possible candidate for the program. The teacher must have at least five years experience in the classroom and must complete an application to be considered for admittance into the program. The applications are evaluated using the following criteria:

- membership and involvement in professional organizations;
- evidence of demonstrated leadership qualities;
- position statement on the teaching profession and agriscience education; and
- commitment to continued involvement within the agriscience education profession.

Each year, 20 teachers are selected for the leadership program. These teachers participate in six study/travel seminars that are planned over the course of the year. Seminars include:

- an orientation session and overview of the Department of Agriculture and Consumer Services and the Department of Education;
- agricultural industry visits in the Panhandle, South Florida, and Central Florida;
- leadership development and team building training provided by teacher educators at the University of Florida; and
- involvement in a legislative session at the state capitol.

These seminars allow educators to gain a comprehensive understanding of important issues faced by decision-makers in education and the agriculture industry. Participants identify and complete a project that is intended to enhance the performance or visibility of agricultural education in the state and that serves as a "deliverable" component of the experience. The culminating experience for the group is the presentation of this project to their colleagues at the annual state agriscience teacher's conference in July.

Results to Date/ Implications/Recommendations

To date, 47 teachers and 9 administrators have been involved in the leadership program. After participation in the program, 14 teachers have assumed leadership positions in the FAAE. The projects initiated by each group have proven to be valuable to teachers state-wide. The first team surveyed guidance counselors to identify their perceptions about agricultural education. The second team developed a lesson plan library on CD-ROM for use by agriculture teachers. Currently, the third team is creating public relations materials to assist teachers in marketing their programs to the state's agricultural organizations to help industry representatives better understand how the agricultural education curriculum has evolved over time.

Future Plans/Advice to Others

The Leadership Program has exceeded the initial expectations of organizers and sponsors. As a result, they would like to see every agriscience teacher have the opportunity to participate. However, a dedicated funding source is imperative to ensure continuation of the program. It has been helpful to have one individual who serves as the program coordinator and is responsible for facilitating the selection process and coordinating events. Fortunately in Florida, the Commissioner of Agriculture has assigned a staff member to serve in this coordination role.

Costs/Resources Needed

To operate the program, the per participant expense is approximately \$3,000. These expenses include lodging, meals, transportation, and project development supplies. Due to the generosity of numerous supporters, team members have no financial responsibility for their participation.

Technology on Wheels…I'll Take Mine to Go!

Holly J. Kasperbauer, T. Grady Roberts
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Introduction

In 2001, 99% of public schools had Internet access, which included 85% of all instructional rooms (NCES, 2002). By 2001, student computer usage at school had increased to 84% of all students. This increased access to technology, particularly in classrooms, has implications on teaching effectiveness. Roberts and Dyer (2004) reported that effective agricultural science teachers utilize computers and other innovative technologies in their classrooms. However, Kotrlik, Redmann, and Douglas (2002) studied over 200 agriscience teachers in the state of Louisiana and found that moderate barriers exist preventing them from utilizing technology into their teaching. A similar study conducted of 300 Texas agriscience teachers found time followed closely by knowledge and availability as barriers (Fraze et al., 2002). When preparing future agricultural science teachers, how can these barriers be overcome and allow pre-service teachers to gain confidence in their own abilities to use these educational technologies?

The objective of this project was to effectively model the usage of computers and the Internet in agricultural education courses, thus improving student self-efficacy about using computers as an educational tool. This premise is consistent with the *National Standards for Teacher Education in Agriculture* (AAAE, 2001), which asserts that "Faculty model appropriate technologies in a variety of instructional settings." The long-term goal of the project is to increase the *effective* use of computers by agricultural science teachers.

Methodology/How it Works

The objective of this project will be met through the innovative use of a mobile computer laboratory, consisting of 30 wireless laptop computers in a secure cart which can be moved in to any classroom. The successful implementation of this project has four phases: 1) secure funds and purchase equipment, 2) model effective computer usage in the classroom, 3) provide a safe learning environment for students to practice using computers in their teaching, and 4) graduates implement strategies learned in their own classrooms.

Results and Recommendations

Currently, this project is in phase three. To date, the mobile computer lab has been used extensively in one agricultural education course to determine the most effective strategies. Students reported this resource as being a valuable teaching tool, have become more comfortable using the technology, and are able to see the benefits of having the technology available. By having the laptop computers available, the instructors are able model a variety of teaching techniques and have many tools at their fingertips. An additional benefit was the ability to avoid scheduling problems with other on-campus computer labs. Although not yet ascertained, anecdotal evidence suggests that students involved in this project are more comfortable using technology as a teaching tool in their classrooms. Future plans are to incorporate this valuable teaching tool into other agricultural education courses.

Initial analysis of this project has produced several conclusions. First, the first time the lab was used, students were initially distracted by having a new “toy” to play with. Adequate time should be allowed for students to become familiar with the computers and their operation. Second, cues should be incorporated in to a lesson of when to use the computer and when to pay attention to the instructor. Initially, several students were inclined to check email or surf the Internet instead of contributing to class. Third, the reliability of the wireless network is dependent on the university and cannot always be counted on. Finally, access to the network can be difficult, as all students need valid individual university-controlled usernames and passwords.

Future Plans

Future plans include adding software and a mobile printer that would make it easier for students to work on assignments during class and turn in a printed copy to their instructor. With the addition of new software, the lab would be usable by more instructors.

Costs/Resources

Costs for this project included computer hardware and related software. The hardware costs of this project totaled $42,000 and the software costs totaled approximately $2500. An additional resource needed was a wireless network, provided by the university.

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Using Hand Held Electronic Responders to Induce Active Learning in the Classroom

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Introduction

John Fitzgerald Kennedy once said, “Our progress as a nation can be no swifter than our progress in education." Over the past twenty years or so, education has taken several giant leaps forward and is starting to take advantage of new technologies that can greatly enhance traditional classroom learning. Teachers are moving away from the lecture only style of teaching, and are using multiple activities to split up the monotony of the classroom. Technology has aided the process by allowing teachers to incorporate flashy and exciting games, activities, and hands-on learning to keep students engaged and interested in the learning material. Possibly one of the most exciting current pieces of technology are handheld electronic responders. These are small devices, similar to remotes, which allow students to select an answer to a multiple-choice question and allow the results to show up instantly on the display. By instantly seeing the results the instructor can see if the material is being understood and can allow student to become more involved in the learning process. By using hand held electronic responders we can take learning that extra step forward and utilize a tool that will assist in asking questions, taking tests and providing immediate feedback.

How it works

These systems are primarily used for allowing teachers to ask questions of students during class, allowing the teacher and students to receive instant feedback. Some systems can also be used to take and grade tests, record attendance, and generate reports and statistics. Once the system is purchased, the proper software will need to be downloaded on to the teacher’s computer before the system will work. Each student will receive their own personal keypad either directly on loan from the teacher, or by purchasing their own. The system will keep track of individual responses to questions based off the students’ keypads. The teacher can enter questions directly in to the system or the teacher can verbally read the question and let the students answer via their responders. The information is sent to a wireless hub to allow the teacher to see who has answered and what they have answered. The teacher can decide if the answers will be shown or hidden in the case of a test. Some responders allow the information to be sent back to the computer to allow the information to be converted in to charts and graphs and then recorded in to grade books and attendance sheets.

Results to date

The Department of Agricultural Education at North Carolina State University is currently in an exploratory mode with this technology. In order to gain an understanding of the technology and its capacity to increase student learning and favorable classroom attitudes, several formal efforts to experimentally evaluate the system are being conducted this year. All of the informal feedback received to this point has been positive. This past fall in an “Introduction to Occupational Education” class, one section of the course used the CPS system while the other section served as a control group. A similar study involved three sections of a high school "Introduction to Agriscience" class. During the spring semester, the CPS system is currently being used in nine different classes throughout the College of Agriculture and Life Sciences.

School systems and colleges have started using this technology in the classroom. According to www.e-instruction.com since their CPS system became available in 2000, over 800,000 response pads have been sold and the technology is being used in all 50 states and over 10 countries worldwide.

Advice to others

By implementing electronic responders in to the classroom, numerous new opportunities for learning are open to the students. Multiple learning styles can be reached through group work, individual work, and the ability for teachers to use instant feedback to more thoroughly explain difficult and less understood concepts. Teachers can immediately check for understanding of the material and adjust the lesson accordingly. In addition to inducing active learning, some systems come with a bonus. These systems can save time for teachers by accomplishing the mundane tasks of the class such as attendance, test grading, and compiling reports and statistics that can be used for checking test validity, student achievement, and reporting statistical analysis that can be sent to administration.

Costs

The CPS 24-pad system costs $3,000 and the CPS 32-pad system costs $4,000. Additional receivers and pads can be priced based on quantity. E-Instruction has an introductory special allowing you to buy one or more systems and get one or more systems free.

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Websites Made Easy

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Introduction

As the popularity of the Internet/World Wide Web (WWW) increases, its use as a means of delivering instruction and information is also growing (Chun-Shih & Gamon, 2004). While many agriculturalists recognize the need for utilizing web sites as communication tools there are relatively few people who possess the competencies needed to create and maintain the sites. The result is web sites that are ineffective as communication tools due to out dated information.

Buford and Lindner (2002) define competencies as a group of related knowledge, skills, and abilities that affect a major part of an activity; in this case the activity is maintaining web sites. The traditional approach to resolve this issue is to offer training to the group in order to increase their competency level so that they can complete the activity. This project approaches the problem from another angle by lowering the competency level needed to complete the activity.

The [State] Young Farmers Association ([_]YFA) web site had become so outdated that no one utilized the site, but the executive director of the [_]YFA recognized that an up-to-date website with current news and information could greatly help the communication within their organization. The executive director of [_]YFA identified two issues which were preventing them from keeping their web site up-to-date:

1. The website is housed on a server at The University of [State] and they do not have access to that server.
2. No one in their office posses the technology competencies needed to update the web site.

This led to the development of a new type of web site that can be accessed from any computer with an Internet connection and can be updated by anyone with very basic technology competencies.

How it Works

There are basically two web sites; the first site (public) which the public sees and the second site (private) which only the site administrator can access. These two sites are dependent on each other as they are connected to the same database where information is stored. However, while the private site and the public site are both connected to the same database, they serve very different functions.

The public site has links, information, and an address like any other site; to the end user it is a "regular" site. What is different about the public site is that all of the information being displayed on each of the pages is stored in a database that the user cannot see.

The private site is password protected and can only be accessed by the site administrator. After logging into the private web site the site administrator is given a choice of which page on the public site they would like to update. After selecting the page they would like to update they are given the choice of whether they would like to “add new information”, “edit information”, or “delete information”. After making their choice they are given a simple text box that allows them to add, edit, or delete information from the database. Since both web sites are connected to the same database once changes are made on the private site those changes are instantly reflected on the public site.

The private site can add, edit, and delete information from the database and the public site displays that information from the database. This is accomplished by using ASP server side technology and the programming language Visual Basic Script in conjunction with HTML.

Implications

The implications of this type of web site for Agricultural Education is evident when considering how many agriculturalists lack the competencies needed to maintain a web site. This allows the site administrator to keep the web site up-to-date regardless of their level of access to the server and without any additional technology competencies. Updating web sites is as simple as typing in a text box and clicking the “submit” button.

Future Plans

Currently the site is being maintained by the executive director of The [State] Young Farmers Association and updates can be achieved quickly and with minimal effort. News of this project has circulated among the agriculture education state staff and a second site is currently in development that is a posting board for all state FFA career development events (CDE). The attraction to this type of system is that CDE news and information can be updated immediately from any location.

Cost

Since most educational institutions have existing web servers, the cost of this type of website resides in site development which takes approximately twenty hours. Total cost is estimated at $500.00. This is a one time expense since additional changes to the site are the responsibility of the site administrator.

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Your Road to A Graduate Program!
AEC Distance Delivered Master of Science Degree Program

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Introduction

In the fast-paced and high-expectation lives of today's agriscience and extension education professionals, service to others often demands so much time that commitment to one's own professional development is often relegated to the proverbial "back burner." Unfortunately however, the result is that many agriscience teachers fail to fulfill personal goals of achieving a master's degree and never renew their commitment to continuing their formal education. For extension educators, delaying the goal of earning a master's degree is not an option as Florida's extension system mandates that every extension professional earn a master's degree. Obviously this sort of pressure to earn a degree to maintain employment creates anxiety for extension professionals. Service to these two important and unique groups of educators was the impetus for creation of the University of Florida's Distance Delivered Master of Science Degree program for agriscience and extension educators through the Department of Agricultural Education and Communication (AEC).

The program is specifically designed to meet the needs and expectations of extension county faculty and middle/high school agriscience teachers. Course sequencing and content emphasizes a steady commitment from it's participants by admitting a cohort each fall for a spring semester start and cohort graduation 2 ½ years later. While this may seem like an aggressive schedule, the emphasis on a cohort effort and quick completion takes advantage of peer to peer encouragement and enables students to maintain focus on "the light at the end of the tunnel."

Students are required to travel to the Gainesville campus only twice during the 2 ½ year program. A mandatory orientation meeting is held for all cohort members several weeks priot to beginning their first course. During this session students are able to meet the AEC faculty and access the various resources they will be required to use throughout the program.

Individuals who successfully complete this 32 credit hour program earn a Master of Science degree. All participants complete a project in lieu of a thesis. Students work individually with their advisor on the development of this project. All present a summary of their project at the AEC Distance Master Degree Program culminating activity held at the conclusion of the program. In addition to the academic rigor provided by the coursework, students also complete a comprehensive written exam during the final semester of the program.

How it Works

The main delivery method for all courses is the WebCT system. Each course is eight weeks in length. During most academic semesters, students will enroll in two courses with one course taught the first eight and the second course taught the final eight weeks of the semester. This method of timing courses was designed to enable students to see their progress as they quickly complete each class and to help them avoid feeling overwhelmed by managing more than one course at any given time. Faculty members are encouraged to offer all courses following an asynchronous format which allows students flexibility in when and where they complete their coursework. Courses are broken into various lessons or modules. In most cases students have one week to complete the requisite readings and assignments contained in a lesson.

Membership in each cohort is restricted to individuals who are either an extension agent or a middle/high school agriscience teacher at the time of application. Cohort membership is limited to 20 individuals. For Florida residents, this program follows the same tuition and fee schedule as other graduate courses at the University of Florida. Out-of-state student tuition has been initially set at $300 per credit hour.

Courses are offered on a two-year rotation. The only exception is a one credit, introductory statistics course that is offered every spring. If, for some reason a student is unable to enroll in a course during their cohort's scheduled time, they must wait until that course is scheduled again unless other arrangements can be made with the course instructor. Students may enroll in courses to satisfy their elective requirements at any time during the program with approval from their advisor.

Each student works independently with his or her advisor to develop the final project. Students are encouraged to complete projects having regional or statewide impact. Examples include: curriculum development, regional/state professional development program development and delivery, or conducting an action research project. Students are encouraged to begin discussing project ideas with their advisor no later than the fall prior to their final semester.

Program participants complete a final written exam during the final semester of the program. Working in cooperation with their advisor, each student is responsible to secure a date and location for this exam. The exam must be completed at least two weeks prior to the program culminating activity. Flexibility is provided for the student and advisor to devise the most optimal exam delivery method and location, either online or at a location agreeable to both student and advisor.

Results to Date

Through the cooperation of AEC faculty, IFAS Communication Services personnel, and the Office of the Dean for the College of Agricultural and Life Sciences, a total of 18 individuals are currently enrolled in the program. Initial response from both university and extension administration as well as from first cohort members has been quite positive and indicative of the long term sustainability of the program.

Future plans

AEC faculty members continue to develop and refine distance delivered courses. Currently one student in the program is from out of state. Future plans are to market this program to extension agents and agriscience teachers in other states to serve educators who do not have local access to a graduate program in this field of study.