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2008 Western Region AAAE Research Conference
Research Paper Review Process

Two thousand eight marks the 27th year for the Western Region AAAE Research Conference. A total of 30 paper proposals were submitted for the 2008 conference and were "blindly" peer-reviewed by a minimum of three agricultural and extension educators not located at the same institution as any of the authors. Each reviewer evaluated the papers on an eleven-point scale based upon an established criterion for both quantitative and qualitative papers. An online database was used distribute manuscripts and to collect scores from reviewers. After all of the papers were scored, the raw scores of reviewers were aggregated and *z* scores were computed. Once this process was complete, the 21 papers receiving the highest *z* scores were selected for presentation at Park City, Utah. This represents a 70.0% acceptance rate. After papers were reviewed and selected for presentation, reviewers' comments were returned to the authors for their use in improving the papers submitted ultimately for publication in these proceedings.

Appreciation is expressed to Dr. Michael Spiess at California State University, Chico for his development of the database used for paper submission and evaluation and for his many hours of patient technical assistance. We also express gratitude to previous conference chairs for their patience in answering questions. We very much appreciate the 33 reviewers, each of whom reviewed three papers, rated them, and provided feedback for the authors. We also thank the session chairs and facilitators of the six research sessions at the 2008 Western Region AAAE Conference. Most importantly, we thank the 109 authors who shared their research with the profession.

Western Region AAAE Research Conference History

Year	Location	Chair(s)	University
1982	Austin, TX	Gary E. Briers	Texas A&M University
1983	Rio Rico, AZ	Phillip A. Zubrick	University of Arizona
1984	Oklahoma City, OK	James P. Key David Cox	Oklahoma State University Cameron University
1985	Boise, ID	John W. Slocombe	University of Idaho
1986	Las Cruces, NM	Paul R. Vaughn	New Mexico State University
1987	Logan, UT	Gilbert Long	Utah State University
1988	Ft. Collins, CO	Ramsey Groves	Colorado State University
1989	Sparks, NV	Joseph G. Harper	University of Nevada – Reno
1990	Fresno, CA	James G. Leising	University of California – Davis
1991	Seattle, WA	Marvin D. Kleene	Washington State University
1992	Cody, WY	Carl L. Reynolds	University of Wyoming
1993	Bozeman, MT	Van Shelhamer	Montana State University
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2003	Portland, OR	Gregory W. Thompson Brian K. Warnick	Oregon State University Oregon State University
2004	Honolulu, HI	Michael K. Swan Martin J. Frick	Washington State University Montana State University
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Concurrent Research Session A

Theme: Strengthening Academic Learning Through Agricultural Education

Chair: Dr. Eddie Moore, Michigan State University

Facilitator: Dr. Carl Igo, Montana State University

Description of the Use of the Greenhouse Facilities by Secondary Agricultural Education Instructors in Arizona

Edward A. Franklin, University of Arizona

Abstract

The purpose of this study was to determine the status and use of greenhouse laboratory facilities by secondary agricultural education instructors in Arizona. Specific objectives were to determine the number of programs with operating greenhouses, types of operating systems, how the facilities are used in the local program, level of preparation of instructors to use greenhouses, use of greenhouse to meet science standards, and barriers to the use of greenhouses. Findings suggest that 75% of agricultural education programs in Arizona have a greenhouse. Teachers are more likely to use the greenhouse for classroom instruction, SAE, and fundraising and less for CDE training, and agriscience research. Teachers are likely to use a greenhouse to teach to state science standards. Most teachers have little or no postsecondary preparation or previous work experience in horticulture prior to entering teaching, and are not satisfied with quantity or quality of use of their greenhouse. Teachers are supportive of a university-level course to prepare pre-service teachers to use a greenhouse for education. Lack of funding and experience are perceived barriers to not having a greenhouse as part of the local agricultural education program.

Introduction/Theoretical Framework

The application-stage of teaching is where the student engages in the psychomotor task to reinforce the connection of what was learned in a cognitive domain (Newcomb, McCracken, Warmbrod, & Whittington, 2004). McCormick (1994) summarized the application of learning to assure a positive educational experience in the following: “Effective teachers stress the application of what was taught because they realize that application promotes learning effectiveness, and provides a more positive educational experience for the students” (p.171).

Successful student performance requires the appropriate learning environment. In agricultural education, this environment may be a specialized laboratory such as an agricultural mechanics shop, a school farm, a biotechnology laboratory, computer technology center, or a greenhouse laboratory facility. The purpose of laboratories is to provide organized and systematic instruction of two types: individualized instruction and group instruction (Newcomb et al, 2004). Newcomb et al write “Laboratories are a crucial component of the teaching-learning program for education in agriculture” (p.214). The authors posit that much of the effectiveness of agricultural education instruction is lost without the use of a laboratory. Talbert, Vaughn and Croom (2005) define an agriscience laboratory as “a facility used in teaching the science and math principles and concepts associated with agriculture” (p.182). The use of a specialized laboratory can make a difference in student achievement and promote a positive attitude toward science (Rothenberger & Stewart, 1995). The theoretical framework for this study is tied to cognitive apprenticeship (Brown, Collins, & Duguid, 1989). “Cognitive apprenticeship supports learning in a domain by enabling students to acquire, develop, and use cognitive tools in authentic domain activity ” (p.30). The teacher verbalizes the activity while they are modeling (demonstrating) it and coach the student during the completion of the task or activity. The theory suggests that instructors teaching a skill often fail to take into account the "implicit processes" involved in carrying out complex skills when they are teaching novices. According to Duncan (1996), "The most appropriate instructional method is one that incorporates both (a) realistic presentation of the knowledge, procedures, and skills and (b) opportunities for students to apply the knowledge and practice the procedures and skills in a realistic context." (p.67) Brown et al. (1989) found that when authentic situations are created during learning that are similar to the situations in which the knowledge will ultimately be applied, the closer the match between the learning situation and the ultimate workplace situation, the easier the transfer of learning will be. In this study, the presence and use of a greenhouse by teachers to teach the hands-on activities related to concepts introduced in lecture is how teachers make use of contextualized learning and cognitive apprenticeship when effective demonstrations take place.

Laboratories in agricultural education programs serve as a means to provide the application of the instruction taught in the classroom (McCormick, 1994). Several researchers in agricultural education have reported findings that support the theory that students learn best when an application experience follows lecture and instruction (Rothenberger & Stewart, 1995; Enderlin & Osborne, 1991; Oen & Sweany, 1971).

With the exception of Rothenberger and Stewart's (1995) study of a greenhouse laboratory experience, few researchers have discussed the greenhouse facility as an effective teaching laboratory in agricultural education. In their 1995 study, Rothenburger and Stewart sought to determine the effectiveness of instruction in horticulture using a greenhouse combined with traditional classroom instruction. They found that students with a greenhouse laboratory experience scored significantly higher on a knowledge exam than students who were taught the same lessons, but had no greenhouse laboratory experience.

In agricultural education, the use of specialized facilities is to provide students with necessary skills to prepare for specialized careers (McCormick, 1994). An understanding of the local and state economy is important to determine the viability of teaching technical skills related to specific job titles.

Ornamental horticulture has emerged as one of the rapidly growing areas of production agriculture across the nation. In 2005, there were 10,563 growers in the United States utilizing a total of 550 million square feet of greenhouse space (USDA, 2002). According to the USDA, wholesale receipts of greenhouse and nursery crop producers edged up less than 1 percent to $15.7 billion in 2004, boosted by the 2-percent gain in floriculture sales from 2003. The total wholesale crop value of growers (with $10,000 or more in sales) was $5.36 billion.

Horticulture is one of the agriculture career areas with the greatest opportunity for jobs and future importance as perceived by students, stakeholders, and school administrators (White, Stewart, & Linhardt, 1991; Foster, Bell, & Erskine, 1995). According to the Arizona Nursery Association (2006), sales of nursery products topped $1.2 billion. The number of jobs related to horticulture in Arizona exceeded 24,000. The number of commercial growers in Arizona with a reported gross value of sales between $50,000 and $99,999 increased from 3 in 2004 to 9 in 2005 (Arizona Nursery Association, 2005). According to the Arizona Nursery Association (2005) in

2002, nursery, greenhouse, floriculture and sod rank 6th in the state among agricultural commodities in total market value (Arizona Nursery Association, 2005)

In the teacher preparation program at the land-grant university in Arizona, a course in the Department of Agricultural Education is offered which prepares students to teach psychomotor skills in laboratory sciences. Though the discussion of preparing effective demonstrations applies to all areas of agricultural education, the main emphasis of the course is on preparing students to teach in agriculture mechanics laboratories. Little emphasis is placed on other instructional laboratory facilities (i.e. greenhouses, nurseries, aquaculture, and biotechnology) which are likely be found at the local agricultural education program.

Purpose and Objectives

The purpose of this study was to describe the status of use of greenhouse facilities by high school agricultural education programs in Arizona. This study provided information that facilitated the direction of horticulture content knowledge and skills of preservice student teachers prepared by the land-grant institution responsible for preparing agricultural education teachers. Specific objectives of the study were to:

1. Determine the status of greenhouse facilities by agricultural education programs in Arizona.

2. Describe how teachers use greenhouse facilities in relation to their agricultural education program.

3. Determine the horticulture backgrounds and level of preparation of agricultural education teachers to teach with a greenhouse.

4. Determine barriers to the effective operation of greenhouses by agricultural education teachers.

Methods and Procedures

This research was descriptive in design and sought to establish baseline data for identifying how high school agriculture programs use their greenhouse laboratories. Due to limited funding, the focus of this study concentrated on agricultural education programs in Arizona.

Population

The target population for this study consisted of all agricultural education teachers currently working in 2005-2006 (N_T=90) representing all Arizona high school agricultural education programs (N_P=70). The names of teachers, their schools, and electronic mail addresses were obtained from the *2005-06 Arizona Agricultural Education Directory.* As the size of the total population was manageable with available resources, a census of the population was taken. At the time of the study, five teachers retired or left their teaching position (N_T=85) which left four of the high school teaching positions vacant, so accessible information from these schools was not available. Therefore, data was to be collected from the accessible population of agricultural education programs of (N_P=66).

Instrument

The author developed a survey questionnaire based on a review of the literature, and informal discussions with horticulture faculty from multiple universities. A web-based survey instrument was developed and reviewed for face and content validity by a committee of community college and university faculty with expertise in teaching courses in plant science, controlled environmental agriculture, ornamental horticulture, and greenhouse operation and management. The instrument consisted of yes/no categorical questions, fixed-response, and Likert-type scale questions. The constructs measured using a greenhouse to teach state standards, confidence in managing greenhouse components, use of greenhouse in the total agriculture program, and perceived barriers. The instrument was piloted with 13 agricultural education teachers from a neighboring state known to manage greenhouse facilities. Instrument reliability was established using Cronbach's Coefficient Alpha. Reliability coefficients ranged from .72 to .96. Notes of clarification were returned on the questionnaire to the researcher. Noted problems were corrected by the researcher prior to administration to the target population.

Data Collection

An electronic cover letter explaining the purpose of the study with an active link to the on-line survey was e-mailed to 85 teachers on June 1. The first question requested the respondent to check off the name of their school from a drop-down list. This information would be used to track respondents by programs and responses by programs with multiple teachers. By the end of the first week, a total of 45 teachers representing 38 schools completed the survey instrument for a response rate of 53%. A second e-mail letter was sent out one week later. Ten additional electronic questionnaires were completed by teachers representing four additional schools for a response rate of 65%. A third e-mail follow-up yielded 14 additional responses for a response rate of 69 of 85 (81.1%) teachers representing 48 of 66 agricultural education programs. After two weeks, a paper and pencil version of the instrument with a self-addressed stamped return envelop was mailed out to 19 teachers not responding to the e-mail invitation. Eight complete and usable surveys were returned and were coded as "late responding".

Threat to external validity is common to survey researchers when less than 100% response rate is obtained. To correct for non-response error, non-responding teachers (11) were contacted by telephone and requested to complete the instrument with the aid of an interviewer. A total of 75 teachers representing 55 (83.3%) agricultural education programs completed the survey for a final response rate of 88.2 percent. According to Wiersma and Jurs (2005), "when surveying a professional population, 70 percent is considered a minimum response rate" (p.175). As both teacher response rate and program response rate exceeded 70%, the acquired response rate for this study was deemed acceptable.

As late respondents are similar to non-respondents, according to Ary, Jacobs, and Razavieh (1996) , "If no significant differences are found between early and late respondents, and late respondents are believed typical of nonrespondents, then the researcher can assume that the respondents are an unbiased sample of the recipients and can thus generalize to the total group" (p. 461). A comparison of early to late respondents was conducted to determine if statistically significant differences occur between the two groups. Summated Likert-scale scores for three constructs were examined using t-tests. No statistically significant differences were found, suggesting that late respondents were no different than early respondents (Linder, Murphy & Briers, 2001).

Analysis

To analyze data pertaining to the purpose, descriptive survey methods were used. Data was downloaded to an excel spreadsheet and inspected. Responses were recorded and entered into SPSS (v.14) for statistical analysis. Descriptive statistics were used to summarize and organize the data. Frequencies, percentages, and measures of central tendency were used to describe the data.

Findings

Objective 1: Determine the status of greenhouse facilities by agricultural education programs in Arizona.

For completing the first objective, respondents were asked to answer a series of yes/no categorical questions and closed response questions describing greenhouse facility use. Questions included the presence of a greenhouse, a plant nursery, duration of use, use of greenhouse in the total agricultural education program, use of greenhouse to teach curriculum, the size of the greenhouse, and type of environmental systems and control systems found in their greenhouse. Of the 75 (100%) teachers responding to the question "*Does your agricultural education program have a greenhouse facility?*" 57 (76%) replied in the affirmative and 18 (24%) indicated negatively. Teachers responding "*no*" to the question where directed to complete the section of the questionnaire regarding perceived barriers to having a greenhouse facility as part of their local program. As a follow-up to the positive responders of the first question, a similar inquiry was made of the local agriculture program having a plant nursery facility. Fewer teachers responded in the affirmative. Only 17 teachers (28.8%) said a plant nursery was present, while 42 (71.2%) said their program did not have a plant nursery facility. Teachers were asked to provide the square footage of their greenhouse. Responses ranged from 240 square feet to 3,600 square feet. The reported mean size was 1,300 square feet. The median response was 1,128 square feet.. Teachers were asked to report the duration of use of their greenhouse. Choices provided ranged from *"All year long*" to "*Only when I/we teach a specific unit*". Twenty (35.1%) teachers reported their greenhouse was used all year long, while two teachers (3.5%) indicated using their facility only for specific units. Teachers were given an opportunity to check "*other*", and provide additional information. This is presented in Table 1.

Table 1

Duration of Use of Greenhouses as Reported by Agriculture Teachers (n=57)

Duration	*f*	%
All year long	20	35.1
Only when school is in session	18	31.6
Not in use at present time	6	10.5
Only during selective growing seasons	2	3.5
Only when I/we teach specific units	2	3.5
Other:	9	15.8
"Not in use because it was not maintained"; "The greenhouse is being built right now and has not been is use at this time." "Being overhauled not in use at this time"; "All year long(a) lack in summer to lack of extended contract"		

For agricultural education teacher education faculty to better understand the greenhouse facility needs of the secondary agriculture teachers, it was important to know what the typical greenhouse in the local agriculture program has in terms of equipment and operating systems. To determine the complexity of the typical greenhouse found in the agricultural education programs, teachers were asked to check which operating systems were found in their greenhouse. The majority of the teachers reporting their greenhouses are equipped with fans (94%), cooling systems (93%), ventilation (89%), heating (86%), and irrigation (68%). Over half of the respondents indicate having misters (58%), sensor controls (55%), lighting (54%), and a fertilizer injection system (51%). Less than a quarter of the teachers said their greenhouses are equipped with retractable shade (24%) or bottom heat (20%). Figure 1 illustrates the findings.

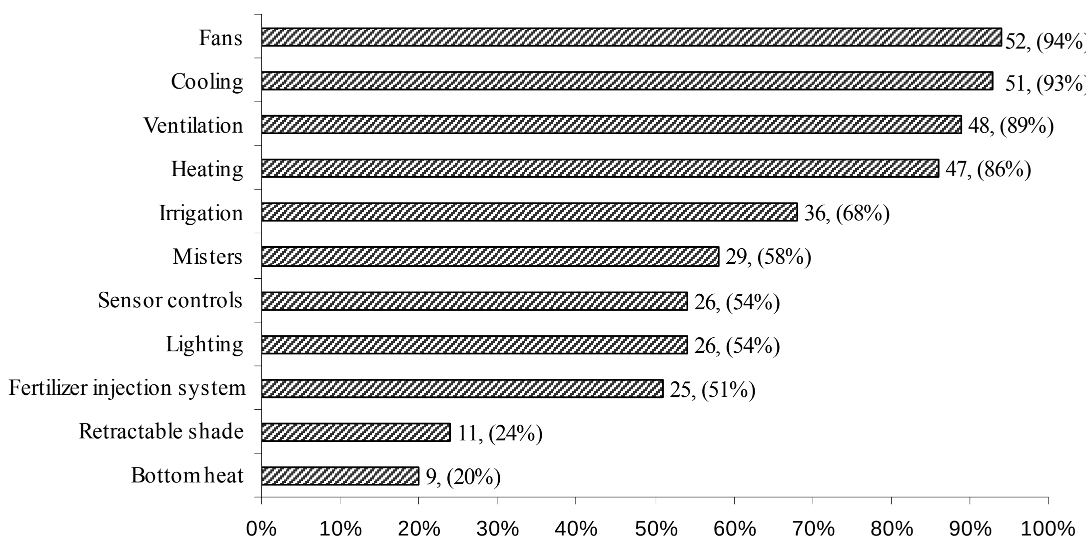

Figure 1. *Percent of greenhouses equipped with specific operating systems*

Objective 2: Describe how teachers use greenhouse facilities in relation to their agricultural education program.

A set of questions focused directly on recently adopted plant science standards for agricultural education in Arizona was developed. Teachers were asked their perception of their ability to teach specific plant science standards using a greenhouse. The question was phrased as "*I feel I am well prepared to teach the following curriculum standards using a greenhouse or nursery"* followed by a list of 12 curriculum standards related to plant sciences. A five-point rating scale with descriptors of "*Strongly agree"* (5) to *"Strongly disagree"* (1) was provided. The highest mean response was 4.41 (SD = 0.57), Agree, and the lowest was 3.33 (SD = 0.97), Undecided. All responses fell in the "*Agree*" category (Table 2).

Table 2

Statistics of Likert Scale Questions of Teacher's Perceptions of Use of Greenhouses to Teach Plant Science Standards

Curriculum Standard	M	SD
Demonstrate laboratory procedures and safety practices	4.41	0.57
Describe basic principles of nutrition	4.04	0.68
Describe principles of plant growth production	4.21	0.68
Analyze the relationships within living systems	3.85	0.88
Examine the interaction of biological systems within the environment	3.81	0.86
Apply fundamentals of production and harvesting to produce plants	3.80	0.90
Investigate approved nutritional practices	3.74	0.89
Analyze interaction among environmental and natural resource sciences	3.62	0.93
Address taxonomic or other classifications to explain basic plant anatomy and physiology	3.62	0.84
Apply principles of anatomy and physiology to produce and manage plants in both a domesticated and a natural environment	3.60	1.00
Investigate environmental and economical impacts of integrated pest management options	3.59	0.99
Investigate approved practices of disease control	3.33	0.97

Note: *1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree*

Another series of questions sought to determine the teachers' perception of use of their greenhouse in teaching horticulture and plant sciences. Teachers were in strong agreement to the statement that "*A specific college course in greenhouse use for education should be developed*" (M=4.60, SD=0.67). Teachers disagreed to statements that they could teach plant science standards without a greenhouse (M=2.40, SD=1.27). Teachers also disagreed that instruction in the use of greenhouses to teach plant sciences and horticulture was included in their teacher preparation program (M=2.40, SD=1.22). Teachers agreed that a greenhouse could be effective for teaching math and science, and they would receive administrative support for using a greenhouse for teaching hands-on instruction. These findings are presented in Table 3.

Table 3.

Perception of Use of Greenhouses in Teaching Horticulture and Plant Science Concepts.

Statement	M	SD
A specific college course in greenhouse use for education should be developed.	4.60	0.67
A greenhouse can be an effective tool in teaching math and science concepts to students.	4.57	0.61
My administration supports the use of a greenhouse as a tool for teaching hands-on instruction.	4.45	0.68
The greenhouse is an effective teaching tool used in my/our agricultural education program.	4.42	1.03
I need assistance in using a greenhouse to teach the state framework for horticulture and plant science.	3.75	0.97
I am able to effectively teach plant science without the use of a greenhouse.	2.68	1.30
I can teach the horticulture and plant science standards of the Arizona CTE curriculum framework without a greenhouse.	2.40	1.27
My teacher preparation program included instruction in the use of greenhouses to teach horticulture and plant science.	2.40	1.22

Note: *1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree*

A series of questions were developed and aimed at describing how teachers use the greenhouse laboratory in their agricultural education program. According to the National FFA Organization (2006) the complete or total agricultural education program includes classroom instruction, student leadership development activities (FFA), and experiential learning activities (Supervised Agriculture Experience). Other areas may include Career Development Event (CDE) training, Fundraising, Recruitment/Public Relations, and Agriscience Fair/Research activities. Respondents were asked to check from a list all that apply. Most cited use of a greenhouse was for classroom instruction (n = 53, 95%), with student SAE ranking second (n = 44, 81%) and fundraising (n= 33, 73%) was third. According to teachers, greenhouses are less likely to be used for FFA activities, CDE training, and agriscience fair student projects/research (n = 17, 33%). Findings are presented in Figure 2.

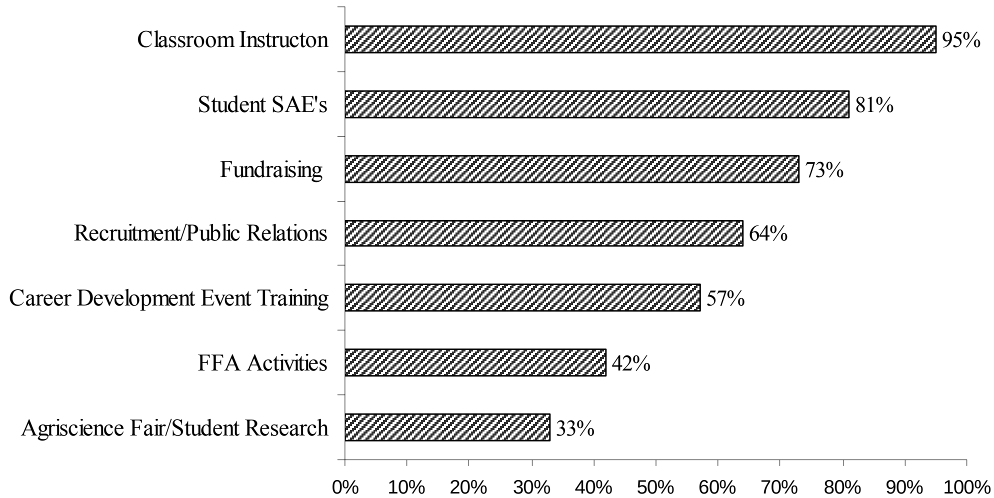

Figure 2. Percentage of use of greenhouse in total agricultural education program (n=57)

Lastly, teachers were asked of their level of satisfaction with the quantity and quality of use of their greenhouse in relation to their total agriculture program. "Quantity of use" was defined as the number of days of instruction using the facility, or the number of students served. Over one-third of respondents state they were "not satisfied" with the quantity of use of their greenhouse (see figure 3), as opposed to 10 percent who cited they were "Very Satisfied" with quantity of use.

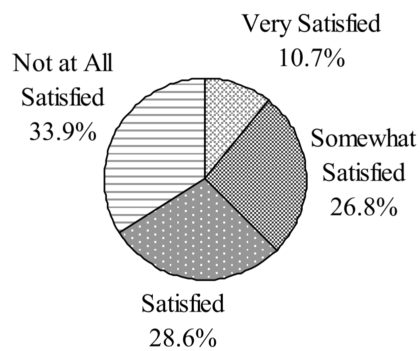

Figure 3. *Level of satisfaction of quantity of use of greenhouse in agriculture program*

Quality of use was defined as the number of plants produced, amount of money raised, or the number of classes using the facility. Over 40 percent of teachers expressed their level of dissatisfaction with the quality of use of their greenhouse, while less than 5 percent were very satisfied with the quality of use (figure 4).

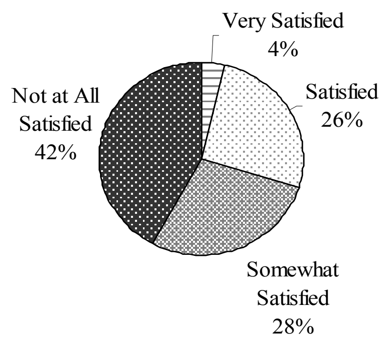

Figure 4. *Level of satisfaction of quality of use of greenhouse in agriculture program*

Objective 3: Determine the horticulture backgrounds and level of preparation of agricultural education teachers.

Two questions were posed to measure the horticulture background and level of preparation of agricultural education teachers. These questions would serve to assist the researcher in determining the level of confidence teachers would have in working with greenhouses. Teachers were asked to indicate the number of hours/units in horticulture they completed in college (either community college or university-level). Over half (57.9%) of the teachers completed 6 or fewer hours of horticulture. Nearly 30% of responding teachers said they completed "0" hours of horticulture in college. Less than a quarter (22.8%) of the teachers reported completing 7-12 hours. Approximately 10% completed 13-18 hours, 8% completed 19 or more hours, and two teachers reported having completed more than 25 hours/units (see figure 5).

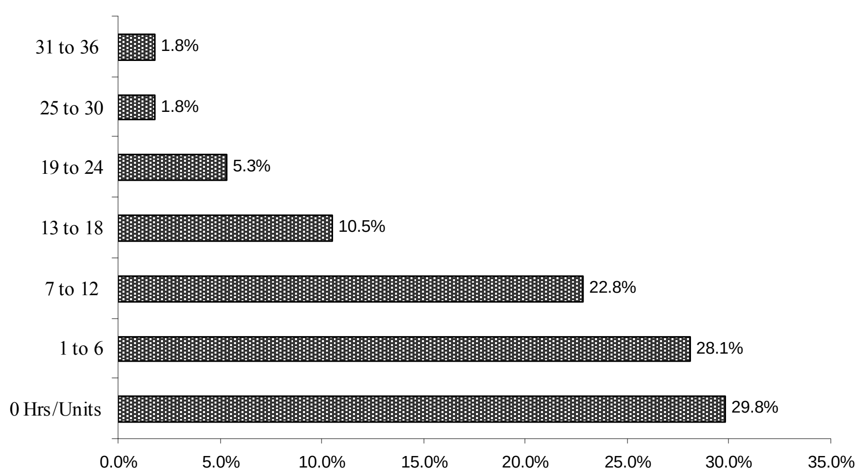

Figure 5. *Postsecondary horticulture hours (units) teachers report completing (n=57)*

To determine previous horticulture experience, teachers were asked to identify the number of years of horticulture work experience prior to teaching. Over half (54%) of the respondents reported having no previous work experience in horticulture. Thirty-three percent reported from 1 to 5 years experience, and 7% said they worked between 6-10 years. One respondent claimed 11 or more years of experience prior to teaching (Figure 6)

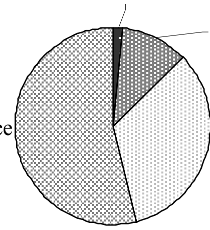

Figure 6. *Reported years of horticulture work experience before teaching (n=57)*

Objective 4: Determine barriers to the effective operation of greenhouses by agricultural education teachers.

The survey questionnaire directed teachers who responded negatively to the question of whether or not their program included a greenhouse facility (n=19, 25%), to complete the section of the questionnaire which asked respondents to check a list of existing barriers that prevented the program from operating a greenhouse. Funding associated with the cost to purchase a greenhouse (f = 8; 42.1%) was the most frequently cited barrier. Maintenance cost (26.7%) and a lack of knowledge or experience of the instructor (26.3%) were frequently cited barriers. Lesser named barriers included the perception that a greenhouse does not "fit" with the local program (15.8%), limited use in the local program (15.8%), and time required to operate and maintain (10.5%). One respondent cited "*cost to repair*" as barrier. No respondents indicated a lack of student interest as a possible barrier.

Conclusions

This study examined the status of use of greenhouse facilities by agricultural education teachers in Arizona. Greenhouse facilities are a common laboratory teaching facility in the majority of agricultural education programs in Arizona, but plant nurseries are not as common a horticulture feature. The typical greenhouse facility in an agricultural education program in Arizona is 1,300 square feet in size and is equipped with heating, cooling, ventilation, fans, and irrigation including misters. The facility is used primarily for classroom instruction, student SAE's, local program fundraising, and public relations or recruitment, and used by 1 to 5 class periods. Greenhouses are not typically used to train Career Development Event (CDE) teams, or for agriscience fair research projects. Teachers agree they can use a greenhouse to effectively teach to twelve state plant science standards. Teachers agree a greenhouse can be an effective tool to teach math and science concepts to students and feel they have administrative support for using a greenhouse. Unfortunately, agricultural education teachers in Arizona have a limited horticulture background in terms of the number of college hours completed, and years of horticulture work experience obtained before they enter teaching. Also, they were not likely to receive instruction during their teacher preparation to use a greenhouse to teach horticulture and plant science. This may translate as to why they are not satisfied with quantity or quality of use of their greenhouses.

A lack of funding is the number one perceived barrier to existing agricultural education programs from constructing or operating a greenhouse, followed by maintenance costs, and a lack of knowledge and experience. This finding appears logical from the point that very few teachers have previous horticulture experience, and have completed few horticulture-related college courses. However, teachers at new agricultural education programs without a greenhouse indicate having plans to construct and operate a greenhouse as part of their local program.

Agricultural education instructors in Arizona use greenhouse facilities as a way to provide hands-on (psychomotor) instruction to apply plant science knowledge (cognitive) delivered in the classroom. Student's use of the specialized facility reinforces essential concepts taught in the classroom, making greater strides toward student achievement. This appears to support the theory of cognitive apprenticeship.

Implications

As the study of agricultural education grows beyond traditional production agriculture to include more diverse, highly technical instructional methodologies and sophisticated facilities, so will the need for university teacher preparation programs to update their coursework and training. Schlautman and Silletto (1992) believe teacher educators need to keep current with changes in agriculture technology (including horticulture) to better prepare future agriculture educators to be effective instructors. Findings from this study can better prepare future agriculture teachers in Arizona to use their existing greenhouse facilities, and assist teachers establish new greenhouse facilities to strengthen the teaching of plant science and horticulture competencies, and to prepare students for hands-on careers in ornamental horticulture. The use of greenhouses to provide hands-on instruction can be valuable in teaching plant science standards.

Recommendations

Based upon the findings of this study, the following recommendations are offered for consideration:

1. University students pursuing a degree in agricultural education should receive instruction in the use of greenhouse laboratory facilities during their undergraduate experience. The instruction should include not only the components of a greenhouse, but should focus on how greenhouse facilities can be used for educational purposes, specifically teaching science and math standards. Agricultural education faculty should meet with plant science faculty to discuss ways of incorporating the use of greenhouses for teaching in existing university-level courses, or develop a short course designed to meet the needs of high school teaches with greenhouse facilities. Professional development in the form of short courses should be developed to provide assistance to teachers with existing facilities learn to become more proficient users.

2. University teacher educators need to include in their instruction of laboratory facilities to pre-service student teachers, a unit which focuses on greenhouse facilities and their role in psychomotor development of secondary students. Pre-service student teachers should

tour greenhouse facilities of effective local programs to observe and gain knowledge of how the laboratories "fit" the total agriculture program.

3. States leading in production in ornamental horticulture, and with significant numbers of secondary programs offering aquaculture, biotechnology, and/or ornamental horticulture should conduct similar studies to determine the level of preparation of teachers to use specialized facilities, and the impact it may have on teacher preparation.

4. National-level funding for a multi-state study of use of specialized instructional facilities in agricultural education should be made available to assist teacher preparation programs in universities and colleges to provide up-to-date, specialized, technical instruction to future teachers so they are better prepared to teach in newer, more advanced facilities.

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Pacific Northwest Agricultural Educators' Perceived Teacher Efficacy toward Enhancing Mathematics

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Abstract

Oregon and Washington agricultural educators were surveyed to determine the level of confidence in their mathematics problem solving ability and their perceived level of teaching efficacy. Personal mathematics efficacy and personal teaching efficacy were further analyzed in an effort to determine which factor had a greater influence on mathematics teaching efficacy. The constructs were measured using the Mathematics Enhancement Teaching Efficacy questionnaire developed specifically for the study. Using structural equation modeling, correlations were determined among the three constructs.

The results of the study concluded Oregon and Washington agricultural educators perceived themselves to be very efficacious in personal mathematics and teaching ability. In addition, the teachers reported a high degree of confidence in teaching mathematics within their curricula. Statistical analyses determined personal mathematics efficacy had a stronger correlation to mathematics teaching efficacy than personal teaching efficacy. The findings suggest a teacher's content knowledge, and not pedagogical knowledge, had more influence on efficacy related to enhancing interdisciplinary mathematics. This conclusion is important for designing professional development activities and determining the needs of pre-service agriculture teachers as efforts to enhance mathematics in agricultural education increase.

Introduction

With all good inventions, if people feel they don't know how to use the invention they likely will not have the desire to try it. Enhancing mathematics in agriculture lessons could share a similar fate. If agriculture teachers perceive they are not efficacious in their abilities to teach mathematical concepts embedded in their lessons, then efforts to enhance mathematic connections in agricultural education may be futile.

Career and Technical Education (CTE) will face many struggles for resources and identity in a standards-based environment stressing higher student achievement in core academics such as mathematics and science (Case, 2006). The struggles have prompted research in pedagogical methods and curriculum content for all of CTE instruction. The goal is to strengthen the academic rigor of interdisciplinary connections between CTE and core-academic subjects, such as science and mathematics.

The National Research Center for Career and Technical Education (NRCCTE) published the results from a multi-state project examining mathematics enhancement of CTE (Stone, Alfeld, Pearson, Lewis, & Jensen, 2006). The NRCCTE study found evidence to conclude student scores in mathematics could be improved using a prescribed pedagogical method that enhances mathematics in CTE coursework. Mathematics performance was improved on standardized tests, and no significant difference in test scores for CTE content knowledge was determined between a control and experimental sample. The conclusions of the NRCCTE study provided evidence that CTE lessons can enhance student performance in mathematics without sacrificing CTE content objectives in the process.

Aspects the NRCCTE study did not examine were the effects of CTE teacher readiness or efficacy related to enhancing mathematics. Wu and Greenan (2003) suggest success and failure of student mathematics achievement in CTE programs is dependent on the confidence CTE teachers have toward the instruction of mathematical concepts. Wu and Greenan found that CTE teachers did not feel efficacious in their abilities to teach mathematics and suggested that CTE teachers be provided specific professional development aimed at integrating mathematics into their lessons.

Theoretical Framework

Teacher efficacy is rooted in self-efficacy theory most notably associated with the research of Albert Bandura. Self-efficacy is described as the beliefs in one's own ability to perform a task can affect his or her willingness to participate and influence the level of proficiency at which the individual will complete the task (Bandura, 1977). It was in later work that Bandura (1997) summarized the relationship among three interrelated components (environment, personal factors, and personal behavior) that he identified as the essential influences on self-efficacy beliefs of individuals.

Bandura's theory proposes that a person would alter their behavior toward a task depending on the perceptions they have about the environment and their own personal talents related to the task. For example, when applied to enhancing mathematics in agricultural education, a teacher may be more willing to add relevant instruction on mathematics concepts to their lesson if the school administration is encouraging the interdisciplinary connections and the teacher feels confident in their personal ability to perform mathematics. If one of those conditions is not positive, such as a low confidence in mathematics ability of the teacher, then the teacher may not feel as willing to promote mathematic applications in their lessons.

The specific environmental and personal factors that contribute to teacher efficacy vary widely and have dynamic characteristics based on the individual teacher (Tschannen-Moran & Woolfolk Hoy, 2001). However, once research provides the evidence of contributing factors, professional development programs, and other assistance can be targeted more specifically to improve teacher practice (Guskey, 1981).

Conceptual Framework

A teacher's perception of their efficacy towards classroom practice could have many interconnected factors. This study proposed to measure two constructs that literature provided evidence of direct links for having an influence on mathematics teaching efficacy. Personal mathematics efficacy is intended to measure a teacher's perceptions of their content knowledge mastery, and personal teaching efficacy measures pedagogical perceptions.

Because structural equation modeling was the mode of statistical analyses for our study, a hypothetical model must be derived from theory as the basis for determining model goodness of fit. The *a priori* model proposed is illustrated in figure 1.

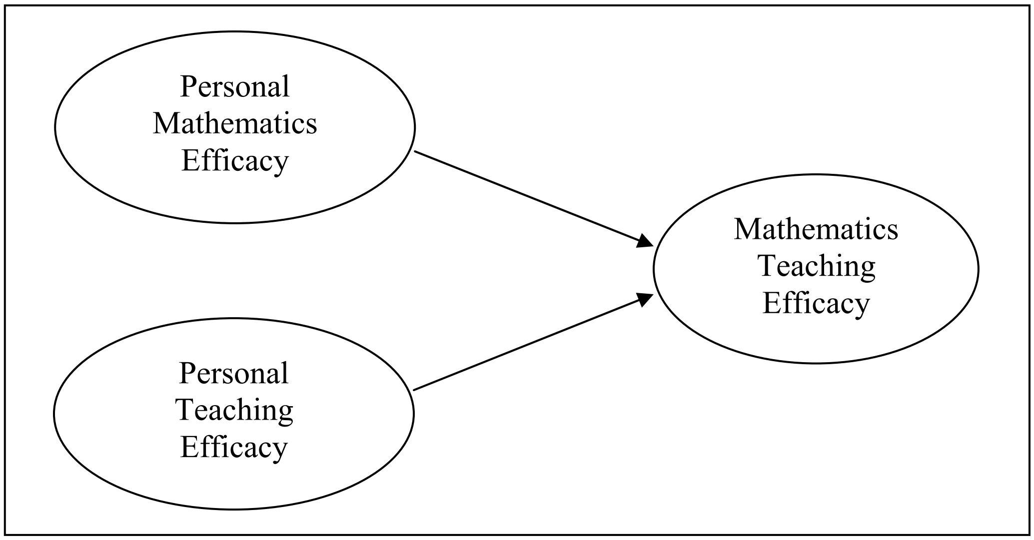

Figure 1. A conceptual model depicting relationships among personal mathematics efficacy and personal teaching efficacy with mathematics teaching efficacy.

The literature on mathematics teaching and teaching efficacy provided several instruments already developed to measure the constructs included in the hypothetical model. Of the many instruments, three were chosen because of their strong reliability and proven validity for measuring the intended constructs identified for this model.

Personal mathematics efficacy was measured using eight questions to solicit the perceptions teachers had toward their ability to solve mathematical problems. This scale was used initially by Schulz (2005, April) in a study of international college students. The original instrument has three parts, for the METE instrument only the eight questions pertaining to mathematics self-efficacy scale were used with slight modifications for the target population included in this study.

Tschannen-Moran and Woolfolk Hoy (2001) developed the Teachers' Sense of Efficacy Scale (TSES), an instrument design to determine pedagogical efficacy for three constructs including instructional strategies, classroom management, and student engagement. The short-form version of this instrument was used to measure personal teaching efficacy.

To provide the final test for correlating construct measures, mathematics teaching efficacy was measured using a third instrument component. The personal mathematics teaching efficacy subscale of the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI) provided the data for the dependant variable in the model (Enochs, Smith, & Huinker, 2000). For the specific purposes of this study, slight modification to wording was done to reflect mathematics enhancement rather than teaching.

Purpose of Study

The purpose of this research study was to determine teacher efficacy beliefs that agricultural educators have toward enhancing mathematics in their curricula. Baseline knowledge regarding mathematics efficacy for Oregon and Washington agricultural educators was not available from previous studies. By surveying the population of teachers, valuable evidence was collected supporting conclusions for the perceptions of readiness of teachers to enhance mathematics concepts in their lessons. Data from this instrument was used to validate a conceptual model constructed to determine the most probable influences on teacher efficacy for this population.

Research Questions

Stone, et al. (2006) discovered a prescriptive system that was effective in achieving desirable results of student performance when enhancing interdisciplinary studies in mathematics. However, the results call into question what a teacher must know in order to be effective at teaching mathematical concepts in their lessons. This study focuses on two questions inspired, but not addresses by the NRCCTE study. Specifically, the research questions that were investigated included:

1. What is the current level of personal mathematics efficacy, personal teaching efficacy, and mathematics teaching efficacy of Oregon and Washington agricultural educators?
2. Which factor, personal mathematics efficacy or personal teaching efficacy, establishes the strongest correlation with a teacher’s confidence in their ability to enhance mathematics in agricultural education?

Methods for Data Collection and Analyses

The Mathematics Enhancement Teaching Efficacy (METE) instrument was developed to assess teacher efficacy related to constructs pertaining to the enhancement of mathematics in interdisciplinary curricula (Jansen, 2007). The METE instrument contained 33 items that measured teacher efficacy associated with personal teaching efficacy, personal mathematics efficacy, and mathematics teaching efficacy. The METE instrument was used in a web-based format to survey Oregon and Washington agricultural educators. The results from the survey provided necessary data required to conduct structural equation modeling analyses.

A pilot study of Utah agricultural educators was conducted to field test the instrument. All aspects of the questionnaire administration were monitored during the pilot test to ensure clarity and effectiveness of questions, instructions, and delivery of questionnaire using the web-based format.

The target survey was intended to include the entire population of Oregon and Washington agriculture teachers. Teacher education institutions for the respective states provided contact information for potential participants. From these lists, 375 secondary agricultural education teachers were verified. The questionnaire was emailed to each agricultural educator teaching in these two states. A second email was sent to non-responders 10 days following the first survey period. A total of 230 responses were received to achieve a 61.3% response rate.

The data collected was screened for missing responses before statistical analyses were conducted. Of the 230 cases, 17 cases were found to be missing responses for efficacy related questions. The method chosen to deal with the missing data sets was to eliminate any cases that were incomplete. Kline (2005) suggests in large sample sizes (over 200 cases); it is justifiable to delete a few incomplete cases from the data set. For structural equation modeling analyses, the recommended sample size is 200 or more cases (Grimm & Yarnold, 1995; Kline, 2005). Therefore, it was determined dropping the 17 incomplete cases would be the most practical way of handling missing data and by doing so the sample size would be large enough not to compromise structural equation modeling analyses.

Following the data screening process, non-response error was controlled for because of the absence of a perfect response rate. MANOVA tests were used to compare responses from early respondents and late respondents. Research provides evidence to support the notion that non-responders and late-responders are similar; therefore if no significant difference is found between early and late responders the results can be generalized to the entire population (Miller, Torres, & Linder, 2005).

Structural equation modeling (SEM) provided the statistical analyses necessary to draw the conclusions for this study. SEM is a two-step process involving confirmatory factor analysis followed by the determination of correlations within a structural path model (Kline, 2005). Because SEM relies on confirmatory factor analysis to determine appropriate model fit, factors to be measured must be determined *a priori* from the literature and theory (Grimm & Yarnold).

Results

The following section reports the results for reliability, validity, descriptive statistics, and the structural equation path model derived from the statistical analyses conducted using EQS® software.

Reliability

Reliability of the METE instrument was assessed for the instrument as a whole and each contributing parts representing separate constructs of efficacy. The instrument in both the pilot and the target study proved to be very reliable at .927 and .905 respectively. Table 1 provides a summary of the reliability determinations for both the pilot study and the target study.

Table 1.
Reliability Analyses of Pilot Study Survey Instrument

Section Title	Pilot Study *alpha* Coefficient (N = 23)	Target Study *alpha* Coefficient (N = 213)
Mathematics Teaching Efficacy	.916	.884
Personal Mathematics Efficacy	.888	.836
Personal Teaching Efficacy	.908	.908
Overall Combined Efficacy Instrument	.927	.905

Validity

To establish face and content validity for the METE instrument, a panel of expert reviewers analyzed the questions and format for appropriateness and clarity. A field test of the instrument was conducted with Utah agricultural educators prior to administration of the survey to the target population in an effort to determine any potential changes to the questionnaire. Because the instrument was comprised of scales determined in previous studies found to be reliable and valid, only minor format and wording changes were made to the questionnaire instructions.

The first phase of structural equation modeling is confirmatory factor analysis (CFA). By conducting CFA, the researcher can determine if the items included in the questionnaire are measuring the intended factors as defined by theory. CFA is testing the goodness of fit of a model and differs from exploratory factor analysis (EFA). In EFA, items are grouped together and the groupings signify a factor. Because the researcher assigns specific items to a factor during CFA, construct validity is confirmed if the goodness of fit falls within acceptable parameters determined in CFA literature.

As a guide for the interpretation of the CFA results, Kline (2005) suggests chi-square, Comparative Fit Index (CFI), and Root Mean-Square Error of Approximation (RMSEA), as the three major considerations to determine a model's goodness of fit using the robust method. Table 2 presents the results for the instrument from the analyses using EQS® software.

Table 2.
Confirmatory Factor Analysis Results (N = 213)

Fit index	Statistic
Chi-square	627.932
CFI	.945
RMSEA	.037

Chi-square fit index, also referred to as the likelihood ratio, tests for the over-identification of a model. A *p*-value is calculated based on the chi-square statistic and the degrees of freedom for the test. The *p*-value significance level is typically set at .05 or .01 according to Bentler (1980). The analysis for this study concluded the *p*-value was .00002 based on the scaled chi-square statistic and 489 degrees of freedom. Therefore, the null hypothesis is rejected and the model is found to be a good fit based on this specific fit index.

Bentler (1990) sets the minimum level of Comparative Fit Index at .90. CFI assesses the relative improvement in fit of a hypothetical model and a baseline model. For this study, the CFI was determined at .945 meeting the minimum threshold of acceptance. The RMSEA measures the error of approximation, or how well the model fits in relationship to the population covariance matrix (Kline, 2005). The higher the determined RMSEA value indicates evidence of a poor fitting model. Browne and Cudeck as cited by Kline suggest that the thumb rule for interpreting a good model fit is to determine a RMSEA index is value of ≤ .05. Therefore, it can be concluded that all three tests for model fit fall into appropriate ranges of acceptability for CFA.

Another important aspect involved with CFA analyses is to determine the robustness of individual items used to measure factors. Coefficient values for measurement paths between the item and the factor were evaluated to the standard of ± .4 as the minimum threshold for acceptance (Bentler, 1980). Only one item, MTE 1, was found to have a coefficient below the acceptable threshold of .400.

Descriptive Statistics

Each component included on the METE instrument used a specific scale to measure perceived efficacy. Table 3 provides an overview of the combined mean scores for each scale and reference to the specifics defining each scale. The results indicated in Table 3 report means at the upper end of the scales. This skewness suggests the respondents indicated a high level of perceived confidence in their abilities for each measure.

Table 3.
Means for Scales for Mathematics Enhancement Teaching Efficacy Instrument

Measurement	*M*	Scale
Personal Mathematics Efficacy (PME)	3.72	1-4 Confidence Scale (Not Confident to Very Confident)
Personal Teaching Efficacy (PTE)	7.30	1-9 Influence Scale (Nothing to A Great Deal of Influence)
Mathematics Teaching Efficacy (MTE)	3.71	1-5 Agreement Scale (Strongly Disagree to Strongly Agree)

Table 4 provides a complete summary of the means, standard deviations, and confirmatory factor analysis standardized factor loadings for each item included in the survey. The standardized factor loading is the estimated correlation coefficient determined for the relationship between the item and the factor for which the item measures.

Table 4.
Item Statistics with CFA Standardized Factor Loadings (N = 213)

Item	*M*	*SD*	Standardized Factor Loading	Item	*M*	*SD*	Standardized Factor Loading
MTE 1	3.91	.696	.338*	PME 5	3.83	.475	.824
MTE 2	3.42	1.182	.617	PME 6	3.64	.594	.763
MTE 3	3.52	.810	.730	PME 7	3.32	.777	.823
MTE 4	3.78	.836	.693	PME 8	3.82	.419	.753
MTE 5	3.93	.777	.729	PTE 1	8.05	1.081	.769
MTE 6	4.31	.751	.502	PTE 2	6.59	1.306	.794
MTE 7	3.73	.985	.608	PTE 3	7.06	1.141	.833
MTE 8	3.89	.709	.562	PTE 4	6.90	1.203	.790
MTE 9	3.33	1.085	.709	PTE 5	7.36	1.118	.678
MTE 10	3.39	1.226	.637	PTE 6	7.69	1.119	.834
MTE 11	3.90	.815	.708	PTE 7	7.52	1.101	.823
MTE 12	4.06	.850	.610	PTE 8	7.53	1.184	.889
MTE 13	3.06	.975	.532	PTE 9	7.47	1.147	.798
PME 1	3.63	.548	.786	PTE 10	7.68	1.015	.752
PME 2	3.88	.342	.729	PTE 11	6.45	1.389	.455
PME 3	3.84	.404	.644	PTE 12	7.29	1.148	.766
PME 4	3.83	.388	.701				

* Standardized factor loading is below the .400 acceptance threshold.

Structural Equation Model

Confirmatory factor analysis determined construct validity and provided evidence to accept the hypothetical model derived from the literature. The second and final step of structural equation modeling is to determine the strength of correlation among factors. In CFA, factor variances were set to unity for estimation of the variables and their variances. Structural models attempt to explain the variance for factors; therefore, this standardization step is not used. Also with CFA, measurement error estimation was important to determine covariance structure. The calculation of variable error values are replaced in a structural model by the calculation of prediction error of factors. This alteration is represented by the addition of disturbance estimates to the model.

Figure 2 provides an illustration of the structural model analysis. Coefficient estimates predicting the strength of correlations among the three factors under investigation are provided. A second order analysis for personal teaching efficacy was included because personal teaching efficacy is comprised of three independent constructs. The illustration shows a coefficient of .569 between personal mathematics efficacy and mathematics teaching efficacy and a coefficient of .233 between personal teaching efficacy and mathematics teaching efficacy.

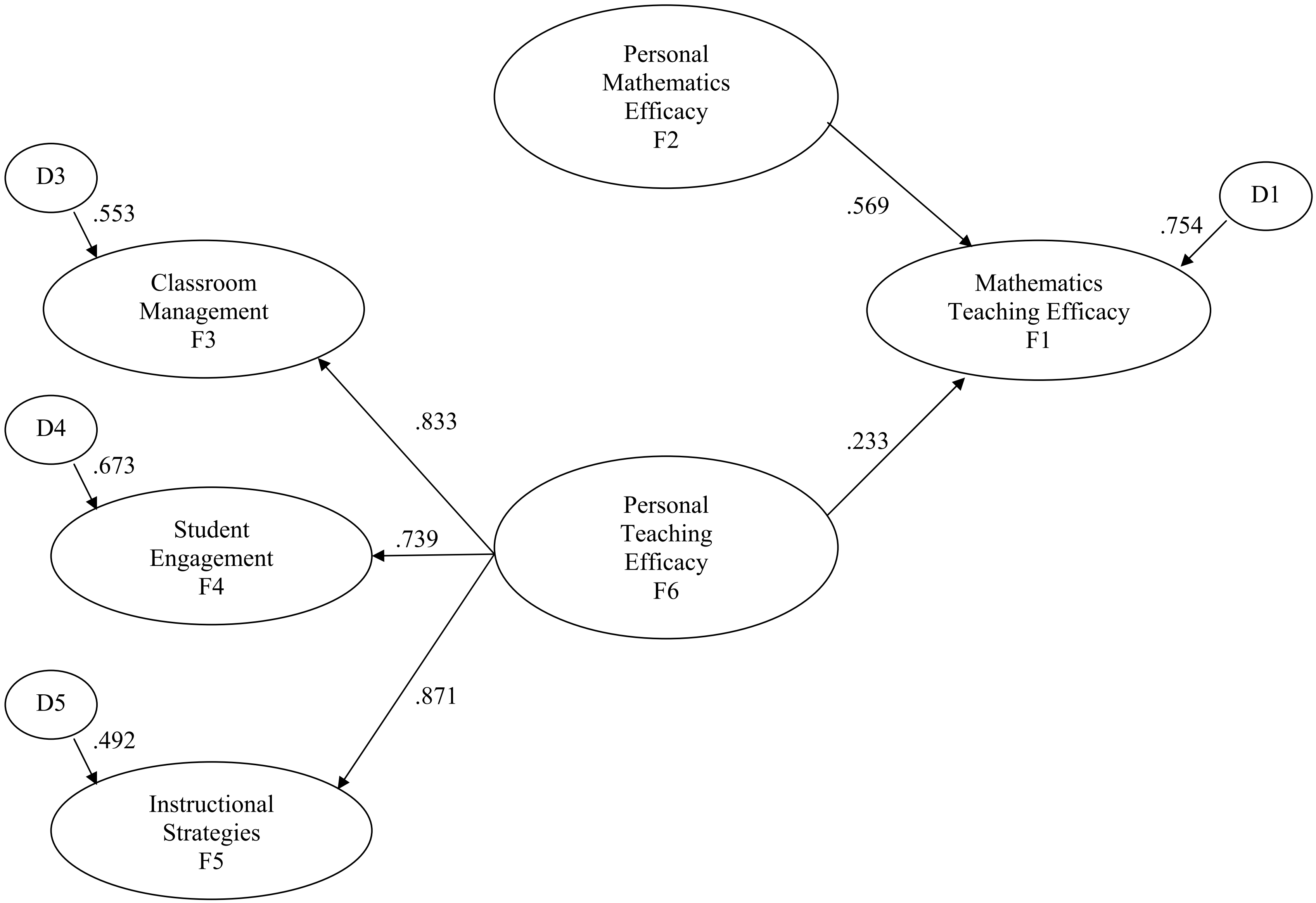

Figure 2. Structural equation model for mathematic enhancement teaching efficacy of Pacific Northwest agriculture education teachers.

Conclusions

The METE instrument was determined to be a reliable and valid instrument for measuring the constructs examined in this study. The survey included the entire population of Oregon and Washington agricultural educators and yielded 230 responses (61.3%). Steps to control non-response error determined that no significant difference existed between early and late responders; therefore, theory suggests that the study results can be generalized to the entire target population.

An expert panel of researchers verified the face and content validity of the METE instrument. Statistical analyses determined the alpha level for reliability of the METE instrument at .905. Confirmatory factor analysis verified the instrument items measured the intended constructs of efficacy identified by the literature. One item, MTE 1, was determined to have a correlation coefficient value below the acceptable .400 threshold. This item is suspect for removal from the instrument, however model fit indices were very acceptable, and analysis of model respecification was not significant to warrant removing the item.

The specific descriptive statistical findings indicate that Oregon and Washington agricultural educators perceive themselves as very confident in mathematics problem solving. Additionally, the respondents reported they had a high degree of confidence in their ability to engage students, use instructional strategies, and control classroom management, all issues comprising personal teaching efficacy. The teachers also tended to agree that they had confidence in their ability to enhance mathematics in lessons.

These findings indicate Pacific Northwest agricultural educators perceive themselves to be efficacious for the defining constructs related to mathematics enhancement included in this study. This conclusion addresses the first research question for the study. The second question was to determine which construct, personal mathematics efficacy or personal teaching efficacy, established the strongest relationship with mathematics teaching efficacy.

The second phase of structural equation modeling was used to estimate the correlation coefficient among factors. From this analysis, determinations can be made as to which construct of efficacy relates the strongest to mathematics teaching efficacy. The strongest relationship was indicated between personal mathematics efficacy and mathematics teaching efficacy with a coefficient of .569. This finding would suggest that personal mathematics efficacy has a greater impact on confidence to enhancing mathematics in agriculture lessons than efficacy in teaching practice.

Implications

Findings from the structural equation modeling analyses suggest that efficacy to enhance mathematics in lessons was largely associated with the teacher's perceived ability in doing mathematics rather than the perceived ability in pedagogy. Although a teacher may be very confident in their ability to teach, in this case subject knowledge has a stronger implication on their confidence to enhance mathematics.

Such a finding provides the evidence that Guskey (1981) suggests can be useful in determining how to narrow the focus for professional development activities. The METE instrument determined content knowledge specifically related to mathematics seems to have a greater influence on mathematics teaching than pedagogical techniques and strategies. These findings should influence the selection of programming for future professional development activities aimed to enhance mathematics in agricultural education lessons.

Another important implication that emerged from the findings in this study concerns pre-service preparation of agricultural educators. A closer examination of program requirements related to the level of mathematics exposure and proficiency in mathematics is called for. As agricultural education becomes a viable avenue for increasing the rigor and relevance of core-academic connections, pre-service teaching requirements in mathematics may need to be increased to meet the demands of interdisciplinary instruction.

Recommendations

Collective efficacy, as defined by Bandura (1997), asserts that efficacy has many influences which are shared among the culture that people interact in. Complete isolation is usually not a realistic condition for practicing teachers, they are influenced in ways to promote or hinder efficacy by the settings, people, individual goals for attainment, and resources they encounter in their lives.

Collective efficacy involves much more than subject matter content and pedagogical traits examined in this study. Alterations in teachers' culture, for example creating a professional learning community among mathematics and agriculture teachers, could produce very rapid changes in their perceptions of concerns related to the adoption of a new instructional strategy (Jansen, Enochs, & Thompson, 2006). Further investigation into traits that define efficacy of agricultural educators is very important to discover how best to establish confidence in teaching practices to improve mathematics enhancement of lessons.

Because of the challenges faced with researching collective efficacy, more case studies are needed to clearly grasp the complexities of agricultural educators. One important reason to warrant the call for observational studies is the value of qualitative data to support self-reported survey responses. Ross, McDougall, Hogaboam-Gray, and LeSage (2003) challenged the constraints to validity that self-reported surveys have in defining teacher habits relative to their reported self-beliefs. Their research found self-reported teacher results tended to differ from what the researchers observed first hand. By employing a qualitative assessment of mathematics enhancement activities, teacher needs toward professional development may have a more defined target.

The true measure of teacher efficacy is determining if the improvement in a teacher's confidence will result in positive changes in student achievement. A final recommendation would be a study comparing student mathematic achievement scores of two or more groups of teachers with varying levels of mathematics teaching efficacy. Such a study could provide another validation for the effectiveness of the theory and for the instrument designed to measure a teacher's confidence toward enhancing mathematics in their lessons.

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The Relationship of Agricultural Mechanics Teachers' Confidence in their Mathematic Skills and Confidence in their Ability to Teach Mathematic Skills

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Abstract

This study assessed Idaho agricultural science and technology teachers that taught at least one agricultural mechanics course during the 2006-2007 school year in terms of their confidence level in their own mathematics skills and their ability to teach mathematics skills. Data were collected using Dillman's Tailored Design Method (2000) resulting in a response rate of 56.84% (N=95, n=54). Data were used to identify relationships between the level of confidence in mathematic abilities and confidence in ability to teach mathematics. A strong relationship was found between the confidence agricultural mechanics teachers had in their ability to perform mathematic tasks and their confidence to teach mathematic skills. The respondents were completely confident in their mathematics skills and their ability to teach mathematics skills. Respondents who were confident in their ability to teach mathematics skills are poised to implement mathematics instruction within the agricultural mechanics courses they teach.

Introduction/Theoretical Framework

High school students in the United States are consistently outperformed by those from Asian and some European countries on international assessments of mathematics and science, according to *The Condition of Education 2006* report released by the U.S. Department of Education's National Center for Education Statistics (National Center for Educational Statistics, 2006). Previous research (Gliem & Elliot, 1988; Gliem, Lichtensteiger, & Hard, 1987; Hague & Phua, 1990; Miller & Gliem, 1994) has suggested that student scores on proficiency tests are not reflective of the number and level of mathematics courses completed by the students. To improve student performance in mathematics, Shinn, et al. (2003) shared that students will learn mathematics best when they can apply the concepts to real life. The context of agriculture can act as a unifying theme for mathematics and can add meaning to what students learn (Shinn, et al., 2003).

Researchers (Melodia & Small, 2002; National Research Council, 1988; Shinn et al., 2003) agree that agricultural education provides opportunities for teaching mathematics. In 1988, the National Research Council recommended that all students needed a basic understanding of mathematics and science concepts and that teaching mathematics and science through agriculture was an effective approach to student learning. Melodia and Small (2002) believed that:

> It is important that a quality agriculture teacher recognize he/she already integrates science and mathematics in many ways. The next step is to be intentional about

> integration. Teachers must understand the core competencies and standards to which the school and state are being held accountable. p. 19

Because 46% of the secondary agriculture courses taught in Idaho are agricultural mechanics courses (Idaho Division of Professional-Technical Education, Agriculture & Natural Resources, 2007a) it is important to ensure that mathematics is integrated in agricultural mechanics courses. There are numerous opportunities to integrate mathematics into agricultural mechanics courses. Basic mathematics such as concepts of measurement can be applied within Idaho's agricultural mechanics courses. For example, basic measuring as it applies to measuring a piece of material to cut in agricultural structures or agricultural fabrication. More complex forms of measurement can also be applied such as measuring bore diameter, horsepower, and torque in agricultural power technology or small gasoline engines. Additional mathematics such as concepts and principals of geometry can be applied in agricultural structures as it relates to cutting truss components or in agricultural fabrication in relation to calculating stress loads.

The state curriculum for Idaho agricultural mechanics courses provides agriculture teachers the opportunity to integrate mathematic standards into each of the ten agricultural mechanics courses. Generalized mathematic standards include: (1) Number and Operation, (2) Concepts and Principals of Measurement, (3) Concepts & Language of Algebra and Functions, (4) Concepts and Principals of Geometry, and (5) Data Analysis, Probability, and Statistics. The Idaho state achievement standards have been linked to the state curriculum for each of the ten agricultural mechanics courses. Specific achievement standards that are repeatedly highlighted throughout Idaho's agricultural mechanics curriculums include (Idaho Division of Professional-Technical Education, Agriculture Science &Technology, 2003):

- Apply dimensional analysis.
- Apply appropriate technology and models to find solutions to problems.
- Understand and use U.S. customary and metric measurements.
- Understand and use a variety of problem-solving skills.
- Apply the geometry of right triangles.
- Apply concepts of size, shape, and spatial relationships.
- Solve simple linear systems of equations or inequalities.
- Evaluate algebraic expressions.
- Use algebraic symbolism as a tool to represent mathematical relationships.
- Perform error analysis.
- Understand and use numbers.
- Use reasoning skills to recognize problems and express them mathematically.

Some professional technical education classes similar to agricultural mechanics have positively aided in increased mathematic assessment scores by incorporating mathematics. A mathematic integration reform at New Castle County Vocational Technical School District consisted of professional collaboration between shop and mathematics teachers. Mathematic teachers visited professional technical learning laboratories to teach mathematics lessons that corresponded to the units within the learning labs. Mathematic teachers also observed how mathematics was applied and then used learning lab references to teach mathematics in their own classrooms. The mathematics integration reform resulted in a 13% increase of student scores on the Delaware Mathematic Assessment from the previous year (Ancess, 2001). Within agricultural education, researchers (Parr, Edwards, & Leising, 2006) found that integrating mathematics into agricultural mathematics instruction had a significant and positive influence on student performance.

Idaho secondary agricultural mechanics courses provide the opportunity for agricultural teachers to reach a large percentage of students. During the 2006-2007 school year, secondary agricultural science and technology instructors offered 1219 sections of Agricultural courses. Agricultural mechanics courses accounted for 46% of the secondary agriculture courses taught in Idaho (Idaho Department of Education, Agriculture & Natural Resources, 2007a). Enrollment in Idaho agricultural mechanics courses during the 2006-2007 school year accounted for 8,128 students of the 20,527 students enrolled (40%) in secondary agricultural education courses (Idaho Department of Education, Agriculture & Natural Resources, 2007b).

Several studies (Gliem & Elliot, 1988; Gliem, Lichtensteiger, & Hard, 1987; Gliem & Warmbrod, 1986; Miller & Gliem, 1993; Persinger & Gliem, 1987) have been conducted to determine whether secondary students, undergraduates in agricultural education, and teachers of agricultural education were proficient in applying mathematics concepts to agriculturally-related problems. Findings have consistently indicated that secondary and undergraduate students as well as teachers were not proficient in solving agriculturally-related mathematics problems. In their study involving agriculture teachers, Miller and Gliem (1994) stated:

> In order for agriculture students to become better mathematical problem-solvers, teachers must become better mathematical problem-solvers. Simply improving teachers' ability to apply mathematics to agricultural related problems will not fully address the issue. It is recommended that high quality instructional materials involving the application of mathematics to agriculture be developed cooperatively by teacher educators in mathematics and agriculture as well as secondary agriculture and mathematics teachers. Inservice education should be provided to agriculture teachers regarding ways to utilize these instructional materials in their agriculture programs. p. 2

Mathematics initiatives may place additional emphasis on mathematics courses and less on elective courses such as agricultural mechanics. If additional emphasis was placed solely on mathematics by requiring more traditional mathematics courses, a reduction in possible elective courses, including agriculture courses could result. Such reductions in electives may threaten Idaho agriculture programs with reduction or even loss of programs as policymakers search for ways to improve the mathematic ability of students and school administrators search for financial means to employ more mathematics teachers. Melodia and Small (2002) declared:

> Agriculture programs are being closed across the country in face of increasing demand of accountability and standards regarding student achievement in math, science and other core competencies. Additional "seat time" is not the answer to student academic achievement. Instead, agriculture educators must promote the strength of the integrated model of agricultural education. Simply, agricultural education provides not only the context, but the content for students to be successful in math and science. p. 18

Despite such assertions, teaching mathematics within agricultural mechanics courses has not been stressed in teacher preparation or from the state department of education in Idaho. A need may develop to demonstrate that agricultural mechanics courses provide a context for mathematics instruction in order to justify funding for the courses.

The theoretical framework for this study was Bandura's (1986, 1997) social cognitive theory. An individual's belief about his or her own abilities on a specific task is called self-efficacy or confidence. Betz and Hackett (1993) reported that mathematics confidence is a major predictor of mathematic performance. Hackett and Betz (1989) found a moderate relationship between mathematics self-efficacy and mathematics performance. Bandura's (1986, 1997) triadic reciprocity, suggests that when an individual is confident in a specific skill they are identified as being efficacious, meaning that their performance of that specific skill is reflective of their confidence. Bandura (1986, 1997) demonstrated that low confidence in regard to a behavior leads to avoidance of the behavior and high confidence should increase the frequency of the behavior. The more confidence one has in their mathematic ability, the better they should be at performing mathematics. In other words, if a teacher has more mathematics confidence, they should have higher confidence as a mathematics teacher, meaning that they can teach mathematics well since they have confidence in their own ability to performance mathematic tasks. Therefore, if mathematics is considered a behavior, the frequency and ability of agricultural mechanics teachers to teach mathematics in the context of agricultural mechanics should be reflective of their confidence to perform mathematics tasks. The confidence of teachers to perform mathematic tasks in relation to the confidence of teachers to teach mathematics has been researched very little both inside and outside of agricultural education.

Bandura (1986, 1997) shared that one's belief in their ability was related to their perception of their performance. Therefore, if agricultural mechanics teachers believe in their own mathematic abilities they should have similar belief in their ability to teach mathematics. It is unknown if agricultural mechanics teachers are confident in their own mathematics skills or if they are confident to teach mathematics skills.

Purpose/Objectives

The purpose of this study, conducted as part of a larger study, was to examine agricultural mechanics teachers' confidence level in their own mathematic skills and their confidence to teach mathematic skills. Specific objectives of the study were to:

1. Determine the level of Idaho's agricultural mechanics Teachers' confidence in their own mathematic skills.

2. Determine the level of Idaho's agricultural mechanics teachers' confidence in their own ability to teach mathematic skills.

3. Describe the relationship between agricultural mechanics teachers' confidence in their own mathematic skills and confidence in their own ability to teach mathematic skills.

Methods/Procedures

Population and Sample

This one shot case study [**X O design**] (Campbell & Stanley, 1963) examined the perceptions of Idaho's secondary agricultural mechanics teachers' toward their perceptions of their own mathematical ability and their ability to teach mathematical skills. This was a census study reflective of all of Idaho's agricultural science and technology teachers that taught at least one agricultural mechanics course during the 2006-2007 school year (*N=95*). The Idaho Division of Professional-Technical Education annually collects approved course lists and enrollment numbers from agricultural and natural resource programs statewide. These state compiled statistics were used to identify the target population for this study. The response rate was 56.84% (*N=95, n=54*). Statistics were used to enhance details within the data.

Instrumentation

The instrument used to collect data from this study had three portions. The first portion was composed of highest mathematics course completed at the college level. The second portion was composed of the Mathematics Self-Efficacy Scale (MSES) by Betz & Hackett (1993). The MSES is copyrighted which prevents the researcher from showing the instrument in its entirety. The MSES consists of two subsections. The first subsection is entitled Mathematics Courses (16 items) and the second subsection is entitled Everyday Mathematic Tasks (18 items). The third portion was composed of the researcher developed Mathematics Sense of Teacher-Efficacy Scale (MSTES).

Betz and Hackett released the latest version of the MSES in 1993. The MSES is one of few instruments available that has been proven over time to be reliable and valid. The MSES is copyrighted and available through www.mindgarden.com. Therefore, the instrument cannot be fully displayed. The MSES has two sections that include Mathematics Courses (16 items) and Everyday Mathematic Tasks (18 items).

The Mathematics Courses section identified the participant's level of confidence in passing a mathematic-based college course with an A or B. The courses included 8 mathematics courses, 4 science-based courses, 3 prerequisite mathematics courses, and one other course. The scale for this section is 0 to 9, as follows: 0=no confidence, 1-3=very little confidence, 4-5=some confidence, 6-7=much confidence, and 8-9=complete confidence. The reliability of this section has produced a Cronbach's Alpha Coefficient (Cronbach, 1951) of 0.92 (Betz & Hackett, 1993).

The Everyday Mathematic Tasks section was divided between arithmetic, algebra, and geometry. Further, the instrument was equivalently divided across three types of operations: comprehension, computational skills, and ability to apply mathematic principles and levels of abstraction (real vs. abstract). The same 0-9 scale from part 1 was used for this section. The reliability of this section also produced a Cronbach's Alpha Coefficient (Cronbach, 1951) of 0.92 (Betz & Hackett, 1993).

The MSES represented an individual's confidence in their ability to accurately complete mathematics tasks. The MSTES was a mirror image of the MSES instrument, except the leading question was changed from MSES "How much confidence do you have that you could successfully" to "How much confidence do you have that you could successfully teach how to…" The MSTES was reviewed by a panel of experts to establish face and content validity. The MSTES was then pilot tested by 15 ($N=25$) preservice agricultural education students at the University of Idaho with a 60.00% response rate. None of the participants in the pilot study were part of the population of the study. The scale for this section was 0 to 9, as follows: 0=no confidence, 1-3=very little confidence, 4-5=some confidence, 6-7=much confidence, & 8-9=complete confidence. The reliability of this section produced a Cronbach's Alpha Coefficient (Cronbach, 1951) of 0.91.

Data Collection and Analysis

Dillman's (2000) methods for collecting mail and internet survey's was followed. Data collection was eight weeks. Both internet and hard copy surveys were used with intent of improving the response. First, a notice was mailed out to the sample to bring their attention to future mailings and emails. A few days later, the instructions for the online version of the instrument were mailed to participants followed by a similar email several days later to remind individuals to participate. The regular mail was sent three days prior to the email to allow for delivery time with the intent of both forms arriving on the same day. One week after the instructions were mailed out, a thank you/reminder post card was sent out. Three days later email thank you/reminder messages were also sent. Three weeks after the instructions were initially mailed a hard copy of the instrument was mailed regular mail with the intent of gaining participation of those that chose not to respond via the internet. A final email was sent a few days later to encourage participation. Finally, after five weeks, the researcher made phone calls to non-respondents to encourage participation.

The return date indicated the respondent's completed instrument was either submitted online via email or postmarked through the US Mail. Both email and physical addresses were obtained from the *2006-2007 Idaho Secondary Agricultural Science and Technology Instructor Directory* (Agricultural & Extension Education Department, 2006). Completed instruments were considered early if they were received with an online date stamp by Survey Monkey between February 5th and February 25th. Completed instruments were considered late if they were received with an online date stamp or postmarked by the US Mail between February 26th and March 27th. Because there were no statistical differences between early and late respondents (*Table 1*) on the measures of MSTES, non-respondents were assumed to be similar to the two groups (Miller & Smith, 1983).

Table 1

Agricultural Mechanics Teacher Return Date and Corresponding Frequency

Group	Return Date	*F*
Early Respondents	February 5th - February 25th	35
Late Respondents	February 26th - March 27th	19
	Total Respondents	54

At the end of the data collection, the data set was analyzed using SPSS 15.0 (2006). Data were nominal, ordinal, or ratio in nature and correlated, producing Pearson product moment coefficients representing the linear relationships between the constructs of Mathematics Self Efficacy and Mathematics Sense of Teacher Efficacy. Specific items on each instrument produced frequencies, means, and standard deviations.

Results/Findings

Objective 1: Determine the level of Idaho's agricultural mechanics teachers' confidence in their own mathematic skills.

Idaho agricultural mechanics teachers *(n=53)* indicated they had much confidence in their own ability to complete mathematic related courses. The respondents mean score on part one of the MSES was 6.37 with average standard deviation of 1.37 as found in *Table 2*. Basic College Mathematics was the only course in which respondents indicated they had complete confidence to pass with an A or B. Respondents had much confidence to pass 11 of the courses listed, some confidence to pass 3 of the courses, and very little confidence to pass Advanced Calculus with a grade of A or B.

Table 2

Mathematics Self-Efficacy Part 1(n=53)

			Range	
	M	*SD*	*Min*	*Max*
Basic College Mathematics	8.00	1.39	5	9
	7.60	1.15	5	9
	7.47	1.58	3	9
	7.42	1.69	1	9
	6.98	1.91	1	9
	6.81	1.68	1	9
	6.68	1.83	2	9
	6.58	1.79	2	9
	6.57	1.95	2	9
	6.40	1.89	2	9
	6.38	2.14	1	9
	6.36	2.24	1	9
	5.40	2.45	0	9
	5.11	1.63	1	8
	4.57	2.15	0	9
Advanced Calculus	3.66	2.27	0	8
Average	6.37	1.37		

Note. Scale values are 0=no confidence, 1-3=very little confidence, 4-5=some confidence, 6-7=much confidence, 8-9=complete confidence.

Idaho agricultural mechanics teachers (*n=52*) indicated they had complete confidence in their own ability to complete mathematic related tasks. The mean score on part two was 8.21 with average standard deviation of 0.82 as found in *Table 3*. Respondents indicated they had complete confidence to complete twelve of the eighteen tasks. Respondents had much confidence to complete the other six tasks. The task to “Compute a car’s gas mileage” was the task respondents had the most confidence to complete followed by “Multiply and divide using a calculator”. “Add two large numbers (eg. 5379 + 62543) in your head” was the task that respondents had the least confidence to complete.

Table 3

Mathematics Self-Efficacy Part 2 (n=52)

			Range	
	M	*SD*	*Min*	*Max*
6. Compute your car's gas mileage. [a]	8.86	0.72	4	9
5. Multiply and divide using a calculator. [a]	8.82	0.74	4	9
7.	8.71	0.70	5	9
11.	8.65	0.89	4	9
16.	8.53	0.64	7	9
8.	8.49	0.99	4	9
18.	8.49	0.86	6	9
17.	8.43	0.88	6	9
14.	8.37	1.11	4	9
10.	8.33	1.16	4	9
3.	8.29	1.03	4	9
15.	8.16	1.01	5	9
2.	7.98	1.68	0	9
13.	7.98	1.42	4	9
9.	7.90	1.57	0	9
12.	7.45	1.84	2	9
4.	7.25	1.85	0	9
1. Add two large numbers (eg. 5379 + 62543) in your head. [a]	7.10	2.08	2	9
Average	8.21	0.82		

Note. Scale values are 0=no confidence, 1-3=very little confidence, 4-5=some confidence, 6-7=much confidence, 8-9=complete confidence.
[a]*n=51,* [b]*n=52*

The mean score of the total MSES with parts 1 and 2 combined was 7.33 with average standard deviation of 1.15 as found in *Table 4*. The mean score of 7.33 indicates that Idaho's AST teachers have much confidence in their own mathematic skills.

Table 4

Average Combined Mean Score of MSES (n=53)

	M	*SD*
MSES Part 1 Average *M* [a]	6.37	1.37
MSES Part 2 Average *M* [b]	8.21	0.82
Combined Average *M*	7.33	1.15

Note. Scale values are 0=no confidence, 1-3=very little confidence, 4-5=some confidence, 6-7=much confidence, 8-9=complete confidence.
[a] *n=53,* [b] *n=51*

Objective 2: Determine the level of Idaho's agricultural mechanics teachers' confidence in their own ability to teach mathematic skills.

The mean score for teachers' (*n=45*) confidence level in their ability to teach mathematics in agricultural mechanics was 8.09 on a scale of 0 to 9 with average standard deviation of 0.64 (*Table 5)*. Respondents indicated they had complete confidence to teach twelve of the eighteen tasks and much confidence to teach the other six tasks. "Multiply and divide using a calculator" was the task that respondents had the most confidence to teach followed by "Compute your car's gas mileage". "Compute your income taxes for the year" was the task that respondents had the least confidence to teach.

Table 5

Mathematics Teaching Self-Efficacy (n=45)

			Range	
	M	*SD*	*Min*	*Max*
5. Multiply and divide using a calculator [a]	8.87	0.34	8	9
6. Compute your car's gas mileage [a]	8.80	0.46	7	9
7.	8.53	0.79	6	9
8.	8.42	0.87	5	9
11.	8.36	0.88	6	9
10.	8.27	1.10	5	9
17.	8.25	0.89	6	9
3.	8.24	1.05	4	9
14.	8.21	1.06	5	9
18.	8.20	1.05	6	9
2.	8.11	1.32	4	9
16.	8.11	1.02	4	9
13.	7.78	1.41	4	9
15.	7.74	1.42	3	9
9.	7.64	1.26	4	9
4.	7.60	1.37	4	9
1.	7.24	1.90	0	9
12. Compute your income taxes for the year [a]	6.91	1.81	3	9
Average	8.09	0.64		

Note. Scale values are 0=no confidence, 1-3=very little confidence, 4-5=some confidence, 6-7=much confidence, 8-9=complete confidence.
[a]*n=45,* [b]*n=44,* [c]*n=43*

Objective 3: Describe the relationship between agricultural mechanics teachers' confidence in their own mathematic skills and confidence in their own ability to teach mathematic skills.

Calculations of the relationship between teacher's confidence in their own mathematic skills and their confidence to teach mathematic skills resulted in an r value of 0.72 and was statistically significant (*p<.05 two-tailed)*. Utilizing Bartz's (1999) adjectives describing strength of relationships an r value of 0.72 is interpreted as a strong relationship. This shows that if a teacher is confident in their own mathematic ability then they are also confident in their ability to teach mathematics.

Conclusions/Implications/Recommendations

Bandura (1986, 1997) shared that one's belief in their ability was related to their perception of their performance. Hackett and Betz (1989) concluded there is a moderate relationship between mathematics self-efficacy and performance. Idaho agricultural mechanics teachers showed a very strong relationship between their confidence in their own mathematic ability and their confidence in their ability to teach mathematic skills. The respondents of this study confirmed Bandura's self-efficacy theory.

For part I of the MSES, Idaho's agricultural mechanics teachers indicated they had much confidence in their own ability to complete mathematics related courses with a grade of A or B. For part II of the MSES they indicated they had complete confidence in their own ability to complete mathematic tasks. The combined MSES scores indicated that Idaho's agricultural mechanics teachers had much confidence in their mathematic abilities.

One reason for the difference between mean scores in the two parts of the MSES could be because some of the college courses listed were not courses related to agricultural education majors. Therefore, the title alone may not have provided enough information for participants to be familiar with the course.

The agricultural mechanics teachers in this study are completely confident in their mathematical abilities. With Bandura's (1986, 1997) triadic reciprocity, when an individual is confident in a specific skill they are identified as being efficacious, meaning that their performance of that specific skill is reflective of their confidence. Bandura also stated that frequency of a behavior increases as confidence in the behavior increased. However, previous research (Persinger & Gliem, 1987; Gliem & Elliot, 1988; Gliem, Lichtensteiger, & Hard, 1987; Gliem & Warmbrod, 1986; Miller & Gliem, 1993) has consistently indicated that teachers performed poorly in solving agriculture-related mathematics problems. The previous research would suggest that Idaho's agricultural mechanics teachers may not be as proficient in their mathematic ability as they have indicated, despite their complete confidence. While looking at actual mathematic problem-solving ability was outside the scope of the present study, future research should be conducted to establish a relationship self-reported confidence data such as that collected in this study with actual performance measures.

Further research should be performed to determine if Idaho's agricultural mechanics teachers are confident in their mathematic skills and abilities to teach mathematics in general as measured by the MSES or to teach mathematics as it applies specifically to agricultural mechanics. Part I of the MSES should be revised and piloted to focus specifically on agricultural science related courses. Performance evaluations should be conducted to demonstrate a relationship between the teachers' MSES score and their mathematics performance.

Idaho's agricultural mechanics teachers indicated they had complete confidence in their ability to teach mathematic skills. The mean score of the MSTES which was used to determine this confidence level was very close to the mean score for part II of the MSES which determined the confidence level of Idaho's agricultural mechanics teachers' in their own mathematic skills.

Because "secondary agricultural education…has high potential for engaging students in active, hands-on/minds-on learning environments rich with opportunities for learning mathematics" (Shinn et al., 2003, p. 16) and Idaho's agricultural mechanics teachers indicated they have complete confidence in their ability to teach mathematics, then Idaho's secondary agricultural mechanics courses should enhance mathematics instruction if Idaho's agricultural mechanics teachers do incorporate mathematics into such courses.

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Concurrent Research Session B

Theme: Agricultural Communications

Chair: Dr. Marty Frick, Montana State University

Facilitator: Dr. Reynold Gardner, Oregon State University

An analysis of the level of trust Texas cotton producers place in the Texas newspaper media: A qualitative determination of the characteristics of trust

Dr. Cindy Akers, Texas Tech University
Jerod Foster, Texas Tech University
Dr. Scott Burris, Texas Tech University
Dr. Steven Fraze, Texas Tech University

Abstract

Newspapers provide information to a wide-range of audiences. However, newspapers are sometimes looked upon as biased, liberal members of the mass communication industry. This issue has been a focus for researchers in the realm of agricultural communications, as well as members of the general public. Many efforts have been made in recent years to study the quality and quantity of the Texas newspaper media's coverage of cotton and cotton-related issues. However, the cotton producer has had little opportunity to voice his/her opinion on the issue. This study sought to identify producers' perspectives on trust for the Texas newspaper media, as well as determine those characteristics which Texas cotton producers look for in other entities in order for them to enact that behavior in them. Key findings of this research study included the identification of the characteristics that determine trust among Texas cotton producers. Producers also identified their level of trust for the Texas newspaper media, while also stating the low utilization of the newspaper information regarding cotton and related issues. Finally, producers recognized their perspectives of other institutional specific information entities such as magazines, extension service publications, and other cotton-related publications.

Introduction/Theoretical Framework

Agricultural coverage in the media has historically suffered criticism for both lack of coverage and improper reporting of information. Casabonne (2004) examined emotional intelligence and level of bias of Texas agricultural reporters and found that readers' confidence was seemingly waning in reporters' ability to report information accurately and with low bias. The mass media in general has taken several blows in recent years, cited as being liberal and biased (Goldberg, 2001).

Since reporters and other journalists have great visibility, it is of little wonder why they endure intense review of their work (Wingenbach & Rutherford, 2005). When journalists do commit discrepancies in their reporting, it is very noticeable, and they are placed under scrutiny.

This scrutiny does not exclude any sector of the media, especially newspapers and other sources of print media. In a past Gallup Poll, results stated U.S. citizens held more confidence in TV news than in print form, and more trust was placed in nighttime news programs than in print news (Newport & Saad, 1998). Zacchino (2000) reported that readers express concerns of article and institutional credibility when anonymous sources are used, when bias is included in news coverage, and when advertising trumps editorial in allocated newspaper space, which is often referred to as the news hole. Readers and journalists alike were considerably upset, and the author wrote, "[journalists] have a trust with our readers that can be easily broken by lapses in ethics that they hold as dearly as do journalists" (p. 29).

Newspaper journalists themselves may have trust concerns with regards to sources of information which they draw upon for story content. Wingenbach and Rutherford (2005) stated that even though a mismatch in beat reporting may have an influence on the outcome of a story, what is uncertain is the perceived trustworthiness, bias, and fairness reporters place in their reporting with the inclusion of information from some of their sources.

Trust is a significant factor in other sectors of the mass media as well. Advertising effectiveness is on such example. Irani & Sinclair (2004)analyzed trust, risk and credibility of plant biotechnology advertising. Trust was the one key predictor for every measure used to characterize effectiveness of the advertisements. Trust was found to be one of two predictors for attitude toward the advertiser and toward purchase intention.

In a study examining food ethics, the term risk was adjoined to trust, stating that even though there is certain risk in purchasing or familiarizing with certain subjects, or food products as was the case for this study, risk does not directly influence trust (Brom, 2000). "When we *trust* someone, we do not reckon with this possibility. Risk taking and trusting are on different levels. A trusting person neither actively thinks of trusting, nor about the risks involved in trusting" (Brom, 2000, p. 132).

Research does exist for producer trust in other institutions such as cooperatives. In a study by James and Sykuta (2004), soybean producers were found to place more trust into marketing cooperatives than in investor-owned entities. The authors described trust as the belief that one person would not take advantage of another, and that expectation was partly related to how those in which the trust is placed is distinguished as trustworthy and competent.

The Theory of Planned Behavior pulls together three primary elements that influence intention, the key component of the model predicting behavior. Ajzen (2006) stated that attitude toward the behavior is a combination of the strength of a certain belief and the evaluation of the behavioral outcome. Ajzen (2006) also presented subjective norm as "the perceived social pressure to engage or not to engage in a behavior." Finally, he described perceived behavioral control as an individual's acknowledgement of how well they can exhibit a particular behavior. However, Ajzen (2006) stated that this can be impacted by the actual behavior control which describes the requirements, combined with intention, to display a behavior.

For the purpose of this study, the Theory of Planned Behavior Model will be referenced in predicting influencing factors that affect trust as a behavior Texas cotton producer's exhibit toward coverage of their commodity in state newspapers.

Purpose and Research Questions

The purpose of this study is to determine the level of trust Texas cotton producers place in the coverage of cotton and cotton-related issues by Texas newspapers and their trusts' influence on the utilization of the information provided in the coverage. The following research questions were created to assist in supporting the purpose of this study:

1. What are the behavioral characteristics of trust as described by Texas cotton producers?
2. How do Texas cotton producers describe the level of trust they place in Texas newspapers and the amount of information they utilize from newspaper content?

3. How do Texas cotton producers compare the level of trust they place in Texas newspapers to the level of trust they place in other more industry specific entities such as magazine publications, organizational information, or cooperative extension service information?

Methods

Design / Data Collection

Data was collected using face-to-face interviews. Fraenkel and Wallen (2006) state that interviews are a significant part of research in that it facilitates the verification or refutation of any perceptions a researcher has from observation.

Interview sessions were structured using a combination of a standardized open-ended interview and a general interview guide approach. This enables the researcher to provide consistency in the data collection, making the instrument highly visible, efficient, and easy to analyze. The researchers called for combining the general interview guide approach with the standardized approach. The general interview guide strategy provides a platform of general ideas and issues in which the interview is based on for the interviewer and interviewee (Patton, 2001).

In order to obtain demographic information from the interview participants, a short questionnaire was created. The surveys were sent to each interview participant either by e-mail or physical mail.

Population and Sample

The study participants were chosen among the Texas cotton producers in the Plains and Coastal regions of the state. Producers selected considered their cotton production practices the primary source of their income and have had experience with local and regional newspapers within the state, either through participating in the development of a story or through readership.

A purposive sample was drawn from recommendations from Texas Cooperative Extension county agents as well as cotton production and marketing organizations such as Plains Cotton Cooperative Association and Plains Cotton Growers.

Participants were selected from the Plains and Coastal regions of the state. Both areas are cotton-producing regions, and the Plains region is considered one of the most agriculturally intensive areas in the United States, primarily a result of cotton production.

The number of cotton producers chosen from each region was determined by the level of cotton production in each region. Six producers were interviewed from the Plains region while four producers were interviewed from the Coastal region. Pseudonyms were selected by the researcher for each of the session members.

Instrumentation

The researcher-designed interview protocol was founded by the Theory of Planned Behavior's (Azjen, 1991) determinants of a particular behavior. As stated earlier, the design of the interview sessions was structured according to a combination of methods including a standardized open-ended method and a general interview guide approach, allowing for freedom of interaction among the interviewer and interviewee, yet if focus was lost or decreased, direction could be restored (Patton, 2001).

Data Analysis

Analysis of the data was conducted in the form of note taking and memo creation after each interview, however, coding and interpretation of the participants' responses was conducted after all interviews were completed. During each interview, notes were taken on information that spurred themes of consistency between each participant's responses, as well as information that may aid in future interviews. After each interview, time was spent reflecting on the information exchanged as well as establishing initial considerations for the research journal. From these notes, a researcher created journal was written in order to reflect the researcher's perspective of the interviews. After all of the interviews were completed, they were transcribed in detail.

Open, line-by-line coding occurred after transcribing each interview (Charmaz, 2006). Memos were developed in order for the researchers to note when certain codes occurred across several individuals. After initial coding, the researchers followed the process of analysis and implemented focused coding. Focused coding is referred to as a type of categorization and sub-categorization of initial codes that are used frequently or bear some importance to the study (Charmaz, 2006).

After coding, the researcher engaged in advanced memo development, a process in which the actual data was combined with the memos made previously, and themes of consistency were developed, as well as supportive evidence through the implementation of quotes within these memos. Findley (2007) suggested using quotations from participants in the advanced memos to strengthen the findings as well as provide depth to each category of raw data.

As a result of focused coding and the implementation of advanced memos, five focused codes were developed for research question one, four focused codes were identified for research question two, particularly in regards to producer trust in Texas newspapers, and four focused codes were identified for research question three. The three theoretical categories developed for this study include (1) behavior, (2) perception of Texas newspapers, and (3) stance on industry specific publications. An illustration of how the developed focused codes for this study were categorized theoretically is shown in figure 1.

Trustworthiness

Denzin and Lincoln (2003) state in order for trustworthiness to be achieved, the study's credibility, dependability, transferability, and confirmability need to be sufficed as well. To accomplish this prior to data analysis, the researchers engaged in interview sessions with each individual participant. The researchers used multiple sources of data, and multiple forms of data were collected, including interview transcripts, the researcher's journal and the questionnaire sent out to each participant. An audit trail was created including original audio recordings of interviews, transcripts, interview notes, a researcher journal, and records of communication. Merriam (2002) states that in using transferability, interpretation and applicability of research results is left up to the reader.

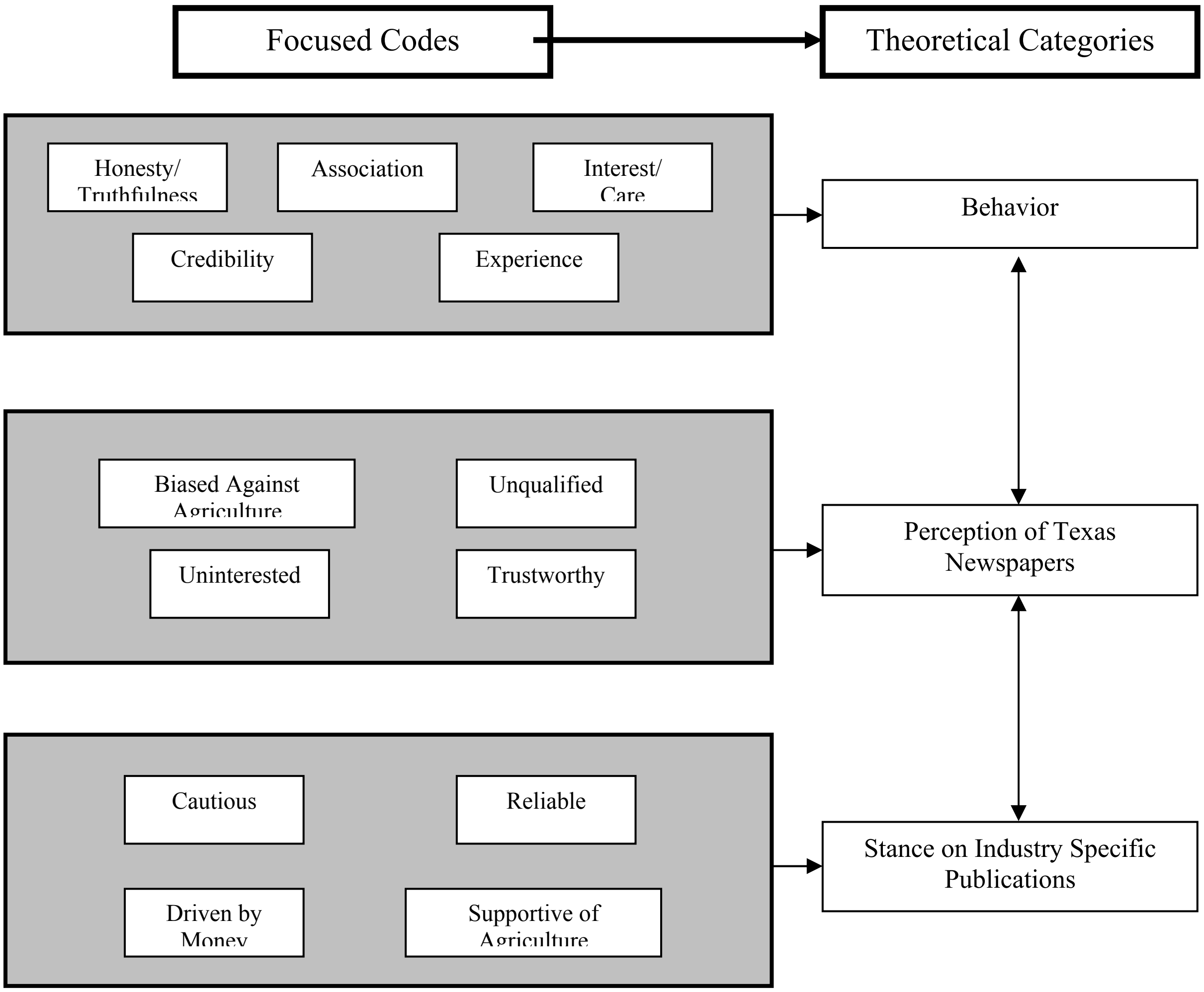

Figure 1. Shift from Focused Codes to Theoretical Categories Describing the Producer's Trust in Texas Newspapers

Findings

Characteristics of Participants

All ten producers that participated in the study were male and of Caucasian decent. The average age of the participants was 47.5 years, with the following categories representing the range of ages: three participants were between the ages of 30 and 39; one was between the ages of 40 and 49; five producers were between the ages of 50 and 59; and one participant was in his sixties.

One producer stated he has less than 200 acres of cotton in production, while two producers have between 501 and 1,000 acres in production. Four producers stated they have between 1,001 and 2,500 acres of cotton in production, and the remaining three have between 2,501 and 5,000 acres in production. In comparison, each producer responded to the question regarding average household income: one producer stated his household income being between $30,001 and $45,000; two producers stated theirs being between $65,001 and $80,000; one producer stated his household income being between $80,001 and $95,000; and six producers stated their household income as being more than $95,000.

One producer stated high school as being the highest level of education attained, while two stated high school and some college/university as the highest. One producer obtained an associate's degree, and two producers possess bachelor's degrees.

It is also important to have an understanding of the group's reading habits in regards to newspapers. Two producers subscribe to three different newspapers, while five producers subscribe to 2 newspapers. One producer subscribes to only one newspaper, and two producers do not subscribe to any newspapers. Of the ten producers, four spent less than 15 minutes of each day reading the newspaper, and one producer stated he spends 15 to 30 minutes a day reading the newspaper. Four stated spending 31 minutes to one hour a day reading the newspaper, while one producer spends 61 minutes to two hours reading the newspaper each day.

Characteristics of Trust Sought by Texas Cotton Producers

The final question in the interview process was "What is it that makes you trust?". The answers to that question help define research question 1. Difficulty in describing what made up their trust was not an inhibiting factor for the study's participants, nor was it difficult for several common themes to be identified within what was being stated. From the responses recorded, it was evident there were several areas of commonality between them, several of which could be combined into more focused codes. These areas make up the characteristics that comprise the behavior of trust in Texas cotton producers, as described in the remainder of this section.

<u>Honesty</u>

Several responded to the question with truthfulness or honesty being a large attribute in their ability to trust. One participant answered the question with only:

> Ryan: Be truthful with me…being truthful and listening, I guess.

This short but to the point answer clearly stated what this producer's trust was made up of. Yet another described it as how it looks to others:

> Gram: …definitely truthful, tell you the truth. People start being untruthful with you…that's a big red flag.

This producer considered being untruthful a warning sign, whether you are a newspaper reporter or anyone else. Producers who boasted honesty as one of their main reasons to trust considered it one of, if not their largest, attributes of the behavior.

<u>Association</u>

The theme association refers to the ability of a relationship to be formed between the trusting and those receiving that trust. Several producers answered with this characteristic. The two primary characteristics that are categorized as subgroups to association are relatability and time, relatability being the degree to which one can relate with another about certain issues or experiences, and time being exposure, or as one participant dictates, face-time:

> Kirk: Man, you really got to have some time to know them…Probably just face-time, I guess, is probably one of the biggest things on trusting someone.

This individual values time spent with an entity in order to form a relationship or association. Others feel as though a genuine tie has been established in general, as one producer stated:

> James: …being able to relate…when you feel like somebody's relating to you, then I form a pretty good trust in somebody when I feel they are relating to me…just in life in general…

Credibility

While this last statement is categorized under association, it also parallels with credibility. Credibility is defined as the ability to encourage belief or enact belief in another (*Credibility*, 2006). Credibility is often associated with being correct, but it also relates with status. For this reason, two subgroups exist within the theme of credibility: notoriety and rapport. Notoriety is the degree to which someone is known, while rapport is a device built within someone in order to enable trust. The following statement is made of credibility:

> Kirk: That's probably the biggest thing for me is that you get to know somebody, or you heard about somebody through somebody else that you trust, that you would trust that they say they are pretty credible.

Experience

Experience was another theme found among the variety of characteristics. Under the umbrella of experience exists two subgroups: skill and knowledge. Skill pertains to one's ability to perform, and knowledge is related to those cognitive enablers that aid in being able to perform. One producer believes that while certain characteristics are hidden from the viewer, others can be noticed, such as knowledge, and a certain degree of judgment can be made as to whether that source could be trusted:

> Gram: You can take a writer or a magazine for instance and read his work and form some judgments about him. But you probably don't know much about whether he's…you'd just be guessing about the honesty and character and all that stuff. But you could know about his knowledge.

Another producer spoke of other informing signs in which he refers to in order to attribute the cause of a degree of his trust in some person:

> Peter: Probably a person's skill at talking…in conversation…eye contact…body language.

Interest/Care

The most obvious theme found in asking producers what makes them trust is that of interest/care. Four subgroups exist within the theme of interest/care: awareness, eagerness, sympathy, and open-mindedness. Awareness was exhibited as a characteristic sought from one that was familiar with issues pertaining to the producer, while eagerness was portrayed as something one must have in order to be interested in a certain issue or topic. Sympathy, like relatability, is something sought by producers for individuals to have for them, while open-mindedness was categorized by the producers' desires to be heard without rejection. The following statements made by four producers after being asked the question of what makes them trust relate the producers' need for these characteristics to be present in order for them to exhibit trust:

> Keith: There's a radio guy that does ag reports in the morning…you just get a sense that he cares about what he's doin'.

> Stevie: Well, I think down here and speakin' of agriculture in general, we don't have anybody expressing an effort anymore in getting to know our situation which would help tremendously with the amount of trust they could build in regards to farmers.

> Jack: You listening to my point of view and everything else without trying to interject and put something that you feel is right that is not necessarily a fact.

> James: I think somebody that first of all is interested…you can tell that the very first time you sit down and visit with someone…whether they're interested in what's going on with your life…I tend to trust somebody who's actually interested and cares.

Utilization of Newspaper Information

The second research question this study poses asks: How do Texas cotton producers describe the level of trust they place in Texas newspapers and the amount of information they utilize from newspaper content?

During the interview process, a specific question was asked of each participant: How would you rate and describe the level of trust you place in the Texas newspaper coverage of cotton and cotton-related issues? The ten producers were evenly split on whether the newspaper media was more trustworthy or more untrustworthy.

One producer stated his distrust for his local newspapers:

> Keith: I just don't trust many of my local ones or regional ones…I guess there's really no conspiracy goin' on against cotton with newspapers. It's just that I don't think they get the whole story.

While another producer describes the newspapers as being more trustworthy and reliable:

> Gram: The local papers I have pretty good trust in them to cover an article factually and unbiased.

One particular aspect that was of note is that the majority of perspectives from the Coastal Region producers stated the newspapers to be more untrustworthy, while only fewer than half of the interviewees from the Plains region saw newspapers in the same light.

The one producer from the Coastal region that exhibited more trust in the newspaper media did so in a manner that was supportive of the newspaper, even though he realized there were times when the newspaper could improve its coverage:

> Jimmy: Something like a six or seven or something on a one to ten (scale, one being most untrustworthy, ten being most trustworthy). Uh, I mean, they can only, depending on how the reporter, most of the time they report what they are told, but if they are totally ignorant about the deal, it's hard to get the right facts out there. They may slip something else in there.

One of the producers in the Plains region that felt the newspapers were more untrustworthy described the newspapers as reporting only what is pertinent to themselves:

> Jack: But, sometimes I feel like they only report what they want to report. They don't report the whole story.

Newspaper Bias Against Agriculture

Several producers expressed their level of trust to be lower in Texas newspaper's coverage of cotton and cotton-related issues for a variety of reasons, one being their belief that the newspapers report with a bias against agriculture. While this is a stereotypical statement to make of the media, it is important to consider when analyzing how trust is distributed among newspapers. Many of the responses that dealt with newspaper bias against agriculture were given as seemingly uncompromising statements about the press, such as the producer that relates a story to his position:

> Keith: I think our paper still has a bias against the farmer and for the little house on the corner that's getting sprayed. We're the big evil…spraying cotton left and right like it is goin' out of style, which is not the case...

A large concern among producers was how they perceived they were purposely portrayed in a poor manner. Another producer from the Coastal region feels the newspaper indeed exhibits a tilt against the industry, however, he believes the newspaper still believes they can come back to the same source after "burning" him/her on another issue:

> Stevie: It's not on our side. It shows a bias and an agenda. They come to us next week and want to talk to us about another subject.

Another attitude was the perception of the newspaper media as viewed along side other forms of media:

> Peter: I'm more conservative, and I think the paper is not any different than most news media…pretty liberal.

This producer, from the Plains region, spoke highly of the newspaper he was involved with locally; however, he felt that overall, the press followed suit with other forms of media in that it exhibited a more liberal point-of-view.

A reoccurring theme among why producers have little trust in the newspaper media as that of a bias the newspaper has against agriculture, it is obvious this is a heated area of inquiry, and for some of the producers, it seemed to be a statement they wanted to make. One producer from the Coastal region even mentioned before the interview began:

> Stevie: I've got some opinions about it I guess is what I'm trying to say, too…It hasn't always been a good experience for me to be interviewed with a newspaper guy.

Therefore, some came into the interview, once the topic of inquiry was established, with a mindset of how they are unduly represented by the media who in fact has an agenda with agriculture in general.

Newspaper Uninterested in Reporting

Another factor that played a strong role, in particularly the most evident, in factors contributing to the decrease of trust for the newspaper media among producers was the perception that the newspapers held very little interest in covering the cotton story, or the newspapers felt there was little interest to be garnered from their broader audience. One producer from the Coastal region made this statement, seemingly longing for someone that has an interest in coverage of their issues:

> Stevie: We don't have the exciting person coming to see us who has a heart-felt interest in our situation…primarily wantin' to get the story and get it out...

One producer from the Plains region was very expressive in stating his area's non-interest perspective on agriculture in one of the more agriculturally intensive areas of the nation:

> Jack: For the most part, I think there is a disinterest in any type of reporting pertaining to agriculture, and it doesn't matter if it's the reporter or these organizations to begin with, they are not really interested in any kind of a story that really pertains to us.

This disinterest in reporting anything agriculture, according to this particular producer, puts many people at a disadvantage knowledge-wise, and coverage falls victim to other pertinent stories:

> Jack: Compared to the war in Iraq, I guarantee this farming thing won't even get a sentence. And I guess what they say sells papers, but I feel like it is a very big disservice for the general public, and especially our children, that they don't get any of this information, and what they get is very small bits of it.

Newspaper Unqualified

Several producers expressed their concern for the experience that many newspaper reports lack in regards to reporting on cotton and agriculture in general. One producer explained how the absence of an agricultural reporter can throw others with less experience into an unknown environment, resulting in misrepresentation of the interviewee:

> Stevie: …. they're not educated in what they're asking…and they have to be told what questions to ask so they're not aware of the subtle things you might be assuming they understand when you're talking to them…you read your article in the newspaper the next day, it's just full of things you did not emphasize that they emphasized…inaccuracies…you get the attitude they're feeling "well, we got this recorded. It's behind us. We don't have to worry about it again, so the heck with it." Move on to it…but all your friends and neighbors read what you were quoted in saying. You spend the next week with friends having to say, "No, I didn't really say that."

Lack of reporter education seems to be a continuous factor that deems a newspaper unqualified to report on cotton. Educating the newspaper media about what is of concern for them and producers, according to a Coastal region producer, could help prevent situations as described below:

> Mick: They don't know whether they're putting something in or out of context. And sometimes, what you say out of context greatly affects what it means...Lots of times, they make a statement that was made in the early part of the interview that is not relative where they put it in the article.

In some respect, this inexperience in newspaper coverage of cotton and agriculture, combined with the feeling that newspapers do not see the cotton story as interesting, seemed to provide encouragement to the feeling that the newspaper media is biased against the industry. However, those that did find the newspapers more trustworthy had the opposite to say.

Newspaper is Trustworthy

> Jimmy: Well, a lot of times, I mean, when something big happens, they cover the story, and they do pretty good on it.

This statement made by a producer in the Coastal region, carries much of the sentiment the others have for their increased trust in the newspaper media as it covers cotton and cotton-related issues:

> Gram: The local papers I have pretty good trust in them to cover an article factually and unbiased, in an unbiased manner.

This statement is made in a positive manner; however, there is a little hesitancy in the use of phrases such as “pretty good,” “usually pretty straight forward,” and “fairly good job.”

> Kirk: Most of the time, they don’t try to sway it. It won’t be a bad article, they usually pretty much put the facts out there, tell it how it is, and it’s usually pretty straight forward.

> Peter: I think they make a point to recognize the industry and recognize, “Hey, it’s cotton planting time,” or, “Hey, it’s harvest time,” so I guess they make it a part of the community…So they raise awareness of cotton and cotton production, so they do a fairly good job of that.

After realizing why several participants of the study do not see the newspaper media as trustworthy and how others perceive it as the opposite, better insight into whether or not those producers see the newspaper coverage of cotton and cotton-related issues useful in their own practice is evident. Below is one of the statements made by a producer who saw the information as useful and the newspaper media as more trustworthy:

> James: I think that I have a lot of trust in it as far as what I read in there… I use it and apply it to my operations so I feel like I have a real good handle on that. They do a real good job of keeping us informed with what’s goin’ on…like the boll weevil.

The majority of the sentiments expressed among the producers believed the information published in the newspaper pertaining to cotton was less useful, several of which saw no use at all. One producer who described the newspaper media as more trustworthy stated the newspaper was useful for human interest stories only:

> Peter: Human interest. There’s really no education to the news reported here besides any meeting being posted or something like that.

While those that saw the newspapers as more untrustworthy initially described the usefulness of the information pertaining to their industry provided in newspapers was irrelevant and a waste:

> Keith: My local paper…it’s a waste of a 75 cent paper…read the gossip…all it is is gossip about what’s goin’ on in the county.

Trust In Other Institutional Entities

In determining if the level of trust cotton producers have for the newspapers parallels with their trust of other institutional entities. The questions was asked: How do Texas cotton producers compare the level of trust they place in Texas newspapers to the level of trust they place in other more industry specific entities such as magazine publications, organizational information, or cooperative extension service information?

The producers were split evenly on whether they perceived the newspaper media as more trustworthy or more untrustworthy; however, the responses to this question varied more in form, and not every response answered the question very clearly. Several producers responded to the question by stating their level of trust has no relationship with their level of trust in other entities. Among these producers were those that were categorized as believing the newspaper media as more untrustworthy, while the others were categorized as perceiving newspapers to be more trustworthy.

While these several individuals responded with clear-cut answers, a few producers answered in different terms. The statements made by these producers were structured more as examples in which further questions were used to probe for a stable answer. Those producers were split in regards to trust in the newspaper; however, each of them gave their own unique answer. One producer, who perceived the newspaper media as more untrustworthy stated his trust in other entities as a result of the question:

> Keith: What the newspaper prints up?.
>
> Interviewer: Like if you had a negative feeling toward your newspaper…when more information comes out similar to that reporting, does your level of awareness become heightened?
>
> Keith: Yeah, I would say it when they made a mistake…yeah, I can see that.
>
> Interviewer: Do you trust newspapers more than magazines, industry specific magazines? If Progressive Farmer came to interview you, you'd be more for it than...
>
> Keith: Somebody that was in the same boat as the farmer…I would.

The other producer that was categorized as perceiving the newspaper media as more untrustworthy responded by explicitly stating his increase in trust for magazines:

> Jack: I'm more apt to believe the magazine just because, in my personal opinion, they have people that are supposed to really be involved in that area, or that's supposed to be their area of expertise…

While these two responses to the question were not as specific as those that stated whether it specifically did or did not affect their trust in other entities, they do give insight into how they compare other entities' information to newspaper coverage.

One of the producers categorized as perceiving the newspaper media as trustworthy, yet did not give a specific answer to the question regarding its effect on trust in industry specific entities, was positive in his remarks regarding those institutions, specifically magazines:

> James: …there's some good ones like the (organization magazine publication). I've been in several stories in that. The larger ones…I think they're an asset to agriculture as a whole. I don't know…they really can't pin point what's going on in this region…

This insight offers a small comparison between larger industry magazine publications versus smaller publications, yet has little to offer in regards to whether or not his belief that the newspaper media is more trustworthy helps predict his trust for other industry specific entities.

Overall, the majority of the producers that stated specifically whether their level of trust affected their level of trust in other institutions such as magazines, organization information, or cooperative extension information stated it did not affect their outlook on these entities in any way. Among these producers, the majority perceived the newspaper media as more trustworthy. As previously stated, a small number of the producers expressed their level of trust in newspapers had an effect on their level of trust in other entities. These producers perceived the newspapers as more untrustworthy.

Several of the participants responded to the question with other focused answers, a few of which categorized the newspaper as more untrustworthy, yet spoke more positive about other entities, magazines specifically. The other respondents with different answers to the question believed newspapers to be more trustworthy, however, only one responded favorably to magazines specifically while the other responded unfavorably.

Recommendations

While this study contains a relatively small sample, and its perceived generalizability is low, it is still important to consider the findings relative to a broader base of representation. Several recommendations can be made for the newspaper media while other recommendations can be made for the producers. These recommendations will be made according to the relationships, processes, and interpretations (Denzin & Lincoln, 2003) the Texas cotton producers have and make about the Texas newspaper media. Finally, recommendations will be made for future research in the field of identifying factors affecting trust and the behavior's relationship with other variables of study.

Recommendations for Texas Newspapers

While each producer expressed his own perception of the Texas newspaper industry, it is appropriate to take those attitudes into consideration for recommendations of change, improvements, or elimination of certain activities that negate the quality of the newspaper coverage of the cotton industry. Several producers described the newspaper media as having a negative bias or agenda directed toward agriculture in general and cotton specifically. Newspapers hold that attitude and the discontinuance of that attitude in their own hands. They have the ability to search for those bias remarks in their editorial positions, as well as from the writer point-of-view. If the newspaper media is to report on any issue objectively, in this case cotton and cotton-related information, it is important for newspapers to eliminate the bias in their coverage from the inception of any article going to press.

Qualification was a characteristic of the Texas newspaper media that the cotton producers interviewed hope to see more of. Many of the producers believed the newspapers, particularly the reporters sent to cover cotton-related stories, did not have the knowledge or experience to satisfactorily report on the issues. This attitude transcended just the cotton industry as several of the producers interviewed were involved with other agricultural endeavors.

A recommendation to position those with more agricultural or scientific knowledge in those areas of coverage would greatly improve the communication between cotton producers and reporters. If that cannot be achieved, it is greatly recommended that reporters be required to do more in-depth research on the cotton industry prior to reporting on industry issues.

Many of the producers interviewed expressed concern that there was a decrease in the interest expressed in covering the cotton story. This attitude parallels with newspaper qualification in reporting on cotton and related issues. In providing more qualified journalists to report on the cotton industry, the interest level for reporting on the issue has potential to increase, and to the producer, this translates into more effort being shown to accurately and appropriately report on their industry and situation.

Another recommendation to make for the Texas newspaper media as it pertains to coverage of cotton and related issues is to make an effort to form more trusting relationships with the producers in their area of coverage. By doing so, producers will be more accessible for contact and to communicate with for information regarding their industry. Producers identified five characteristics that aided their ability to trust in another entity. These characteristics should provide a considerably strong stepping stone for newspapers to analyze how they are approaching cotton industry representatives, as well as the agricultural industry in general.

To achieve these recommendations, an inhibitor of change could come in the form of a media/producer training program. Media training programs exist for members of the cotton industry through a variety of organizations; however, it would benefit the coverage of their information if one was provided from the other perspective, that of the reporter.

Recommendations for Texas Cotton Producers

Just as it is important and obvious it is to make recommendations to the Texas newspaper media, it is also important that recommendations be made to those that provided the data for this research.

One evident recommendation was made by some of the study's participants themselves, in that if producers really wanted more information reported pertaining to cotton and the cotton industry, then many more members of that industry will have to become more proactive. One participant suggested that if one was to be an advocate for cotton, then that individual would indeed need to be an advocate. Another producer stated his belief on the issue as how agriculture in general has not yet realized how important it is to get good and accurate information to the newspapers.

By becoming a more proactive industry, cotton producers could potentially have more access to being more vocal and positive about the representation their commodity receives from other entities, particularly the newspaper industry. To become more proactive may mean simply become more *active* within the industry on a local, regional, or national scale, by having more representation with in industry organizations and politics, or by becoming a more accessible source for the newspaper media.

Another recommendation to be made to the Texas cotton producer community, as a result of this study, is to make an effort in becoming better educated about the newspaper industry itself. Producing cotton gives the producer an inherent ability of knowing how the entire industry operates. In order for them to properly portray their industry to the press, it would be beneficial to have some knowledge of how the newspaper industry operates the structure of newspaper articles, the background of an average reporter, and other industry issues of interest and advantage.

In learning more about the newspaper media and how an article and why an article comes through development, cotton producers may stand to have a better understanding of how and why things appear biased or slanted toward a certain perspective.

In order for producers to become more aware of the newspaper industry, a media-training program could be put to use. During this media training, a certain section could be dedicated to how the newspaper industry operates as well as describe those characteristics of the medium listed previously. This training could also provide cotton producers information on how to speak to the media, how to be accessible as a resource for information, in order to avoid being misrepresented. Several regional, state, and national industry organizations currently offer such media training programs.

Recommendations for Future Research

An initial suggestion would be to replicate the current research study among production members of other commodities to compare the characteristics of trust each different commodity exhibits. By doing this, research could provide the similarities between members of different commodity groups, as well as direct future research recommendations in those respective directions.

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Perceptions of Oklahoma Agricultural Education Teachers' about Selected Agricultural Communications Competencies: A Case for Curriculum Reform

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Abstract

Appropriate curriculum for secondary agricultural education (AGED) is of paramount importance, including resources that support learning in agricultural communications (AGCM). Better understanding the views of AGED teachers regarding their knowledge about the competencies required of students who pursue careers in AGCM as well as perceptions of their ability to teach the curriculum used to assist students in acquiring that competence is equally important. This descriptive study assessed teachers' knowledge and perceived ability regarding the aforesaid. It relied on a purposeful sample of Oklahoma AGED teachers. The teachers responded to 48 items describing their perceptions of importance for selected AGCM competencies and their perceived ability to teach those skills; the items were grouped into five constructs. Two five-point, summated-rated scales were employed to measure "Importance" and "Ability." Reliability estimates by competency construct (i.e., Cronbach's alpha) ranged from 0.71 to 0.92. Selected personal and professional characteristics of the teachers also were collected. The overall response rate for the survey was 238/431 or 55.22%. Results of this study should better inform developers of AGCM curriculum for the secondary AGED audience, teacher educators who provide related preservice and inservice education, and university-level AGCM educators who teach aspiring secondary AGED instructors.

Introduction

A need exists for the disciplines of agricultural communications and agricultural education to work together in the secondary education system. The National Research Council [NRC] (1988) reported students of agricultural education programs should be well-versed and understand the basic principles of agriculture and communication. Their report, albeit published 20 years ago, stated people were becoming more removed from farm life; the same can be said for 2008, making it imperative agriculturalists communicate effectively and efficiently what is occurring in agriculture. In addition, Terry and Bailey-Evans (1995) stated the discipline of agricultural communications has become an important part of achieving the mission of agricultural education in and about agriculture. As the profession of agricultural communications continues to develop and refine its current mission in society, the academic programs must relate to this mission (Buck & Paulson, 1995). Moreover, agricultural education teachers need to have the skills and knowledge base to teach the fundamentals of communication for students to gain adequate knowledge to reach their full communication potential (Connors & Elliot, 1994).

As agriculture and communication methods and objectives have changed, so have the competencies needed to become an agricultural communicator (Akers, 2000; Sprecker & Rudd, 1997). Studies such as Buck and Paulson's (1995) have determined the type of education needed for an agricultural communicator. University-level studies have been conducted to determine the curriculum/competency needs for students enrolled in agricultural communications programs (Sprecker & Rudd, 1997; Terry & Bailey-Evans, 1995). Although a study by Akers (2000) suggested curriculum needs of students enrolled in high school agricultural communications courses as perceived by industry professionals, a study has not assessed the secondary agricultural education teachers' perceptions about their ability to teach agricultural communications in Oklahoma.

Conceptual Framework

According to Dunkin and Biddle (1974), four types of variables contribute to the teaching and learning process: presage variables, context variables, process variables and product variables (see Figure 1). Presage variables, which were the variables considered in this study, "concern the characteristics of teachers that may be examined for their effects on the teaching process" (Dunkin & Biddle, 1974, p. 39). Presage variables were relevant to this study because Oklahoma secondary agricultural education teachers were asked to report selected personal and professional characteristics as well as their perceptions on agricultural communications competencies for secondary agricultural education curriculum. These variables may include, but are not limited to, teacher formative experiences (such as gender and years teaching agricultural education), teacher training experiences (such as alma mater institution and highest degree earned), and teacher properties (such as whether the respondent was currently teaching agricultural communications) (Dunkin & Biddle).

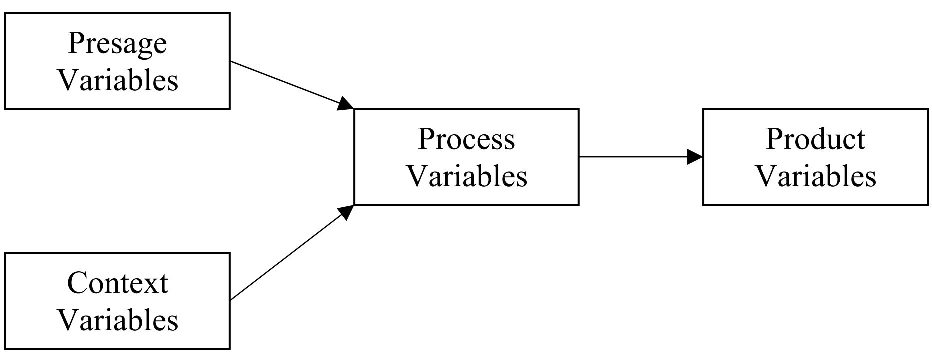

Figure 1. A Model for the Study of Classroom Teaching. (Taken from Parr, Edwards, and Leising, in press, p. 4)

Purpose/Objectives

The purpose of this research was to determine Oklahoma agricultural education teachers' perceptions of importance of and their ability to teach agricultural communications competencies, especially as they relate to the secondary curriculum for agricultural education. Specifically, the objectives were as follows:

1. To describe selected personal and professional characteristics of Oklahoma agricultural education teachers;
2. To determine the importance of selected agricultural communications competencies, as perceived by Oklahoma agricultural education teachers; and
3. To determine Oklahoma agricultural education teachers' perceived ability to teach selected agricultural communications competencies.

Methods/Procedures

Sample Selection and Data Collection

The target population for this descriptive study included Oklahoma secondary agricultural education teachers (N = 431). The accessible population, which was derived from the target population, was Oklahoma secondary agricultural education teachers who attended their respective district meeting at the 2006 CareerTech Summer Conference in Tulsa, Oklahoma. All teachers are required to attend the summer conference and one of five district meetings; registration indicated all were in attendance at the conference. Thus, for the purposes of this study, it was assumed all agricultural education teachers attended their district meeting. Completed instruments were collected from each of the five districts.

The instrument for this study was presented to agricultural education teachers during the five district meetings for them to complete. Due to time limitations, however, respondents who had not completed the instrument could take it with them, complete it, and mail it to the researchers. Self-addressed envelopes were provided for those who took their instrument with them. During the district meetings, 235 instruments were returned; three instruments were received via postal mail. The overall response rate was 238, or 55.22%. Due to the possibility of non-response error (Dillman, 2000), caution should be taken regarding the generalizability of this study's findings beyond the participating respondents.

Instrumentation

Because no instrument was readily available, an instrument was developed to assess the perception of importance and teaching ability of agricultural communications competencies as perceived by Oklahoma secondary agricultural education teachers. Multiple components were used to design and validate the instrument, specifically the curriculum guides published by the Oklahoma Department of Career and Technology Education's Curriculum and Instructional Materials Center [CIMC] (2001, 2002, 2003) and the agricultural communications competencies identified by Akers (2000).

To create the instrument, the researcher identified competencies potentially taught in a high school agricultural communications course in Oklahoma. This was done by using the Akers (2000) study to identify the competencies and their topic areas that should be taught to high school students and by using the existing CIMC curriculum guides (CIMC, 2001; CIMC, 2002; CIMC, 2003). Subsequently, 31 competencies identified by Akers (2000) were not included in this study's instrument because they did not have a correlating CIMC test question or because they were identified in the Akers (2000) study as being collegiate-level competencies. The remaining 51 competencies were included as part of the instrument used for the pilot study.

The CIMC curriculum guides (CIMC, 2001; CIMC, 2002; CIMC, 2003) provided insight as to what agricultural communications constructs could be taught to high school students if the instructor teaching the class chose to use the guide. These curriculum guides are available by purchase to all high school agricultural education teachers to use when teaching agricultural communications courses in Oklahoma.

After comparing competencies that should be taught in high school agricultural communications courses as identified by Akers (2000) and what competencies could be taught based on the CIMC curriculum guides (CIMC, 2001; CIMC, 2002; CIMC, 2003), Akers' (2000) related topic areas were combined and conceptualized as five constructs: 1) Communication Skills/Computer/Information Technology; 2) Communication History; 3) Research/Information Gathering/Writing; 4) Ethics/Leadership Development/Professional Development; and 5) Public Relations/Advertising/Marketing.

The competencies were put into table format in the instrument and two five-point, summated-rating scales were developed to determine the respondents' perceived importance of agricultural communications competencies and their perceived ability in teaching the specific competencies. The instrument was constructed this way to make assessment of the identified agricultural communications competencies easier for the respondents to self-evaluate in a shorter amount of time.

To the left of each competency was a scale for respondents perceived importance of the competency for the secondary agricultural education curriculum. The scale ranged from high importance to low importance (A = "High Importance," B = "Much Importance," C = "Some Importance," D = "Low Importance," and E = "No Importance"). For the purpose of interpreting the results, the researcher used the following numerical scale: 5.00 – 4.50 = "High Importance," 4.49 – 3.50 = "Much Importance," 3.49 – 2.50 = "Some Importance," 2.49 – 1.50 = "Low Importance," and 1.49 – 1.00 = "No Importance" (Boone, Gartin, Boone, & Hughes, 2006).

To the right of the competency was a similar five-point scale. This section was created to determine the respondents' perceived ability in teaching the specific agricultural communications competencies. The scale ranged from high ability to no ability (A = "Very High Ability," B = "High Ability," C = "Average Ability," D = "Low Ability," and E = "No Ability"). For the purpose of interpreting the results, the researcher used the following numerical scale: 5.00 – 4.50 = "Very High Ability," 4.49 – 3.50 = "High Ability," 3.49 – 2.50 = "Average Ability," 2.49 – 1.50 = "Low Ability," and 1.49 – 1.00 = "No Ability" (Boone et al.).

Face and content validity were determined by a panel of experts, including faculty in agricultural communications and agricultural education, who reviewed the instrument and determined the questions asked were appropriate for use in the study. Following review by the panel of experts, a pilot test was conducted at a meeting with agricultural education teachers from neighboring states. Based on the results from the pilot study, three competencies were removed to improve the instrument's reliability estimate; consequently, 48 agricultural communications competencies were assessed by the study's respondents. Reliability estimates (Cronbach's alpha) ranged from 0.71 to 0.89 for perceived importance and from 0.75 to 0.92 for the perceived ability of the five constructs.

Data were analyzed using SPSS for Windows Version 15.0 to calculate means and standard deviations for the competency items. Frequencies and percentages also were calculated for selected personal and professional characteristics of the respondents.

Findings/Results

Selected Characteristics of Oklahoma Agricultural Education Teachers

Based on the results of this study, 84.45% of respondents were male, 70.17% had earned only a bachelor's degree, and 80.25% had graduated from Oklahoma State University. One-hundred-seven teachers (44.96%) responded they were teaching prior to 1996, and 112 (47.06%) responded they were not (7.98% non-response to this question). It was in 1996 that agricultural education majors at the specified university were first required to take an upper-division agricultural communications course. The largest percentage of respondents indicated they had taught secondary agricultural education courses for one to five years (31.93%). The second largest percentage of respondents had taught 20 or more years (23.95%). Of the respondents, 60.59% did not currently teach an agricultural communications course; additionally, 57.35% of teachers who had taught an agricultural communications course had taught it for one to two years.

Of the agricultural education teachers who indicated they had taught an agricultural communications course (n = 120), 71 respondents (59.17%) used the CIMC curriculum guides. The results of the open-ended questions indicated that respondents who did not use the CIMC curriculum guides got their resources to teach agricultural communications from various locations, including books, Web sites, and self-made materials. It was also suggested by the teachers that more assistance is needed to teach agricultural communications curriculum, the layout of the existing curriculum was an issue and delivery via a computer-assisted approach needs to be considered.

Perception of Importance and Teaching Ability for Agricultural Communications Competencies

As shown in Table 1, none of the communication skills and computer/information technology competencies (M = 3.84), communication history competencies (M = 4.04), public relations, advertising, and marketing competencies (M = 3.96), or research, information gathering, and writing competencies (M = 3.96) were perceived by respondents to be of "high importance." One competency for the ethics, leadership development, and professional development construct (M = 4.32) was perceived by respondents to be of "high importance": "Demonstrate a proper work ethic" (M = 4.50).

The following competencies for the research, information gathering, and writing construct were perceived by respondents to be of "some importance": "Write for broadcast" (M = 3.47) and "Utilize an Associated Press Stylebook" (M = 3.37). All other competencies were perceived by respondents to be of "much importance." Respondents perceived the five agricultural communications constructs as being of "much importance" (Table 1).

This study found that agricultural education teachers did not perceive themselves to hold a "very high ability" to teach any agricultural communications competencies for the five constructs investigated. As shown in Table 1, respondents perceived themselves to have a "high ability" to teach the following competencies for communication skills and computer/information technology: "Use e-mail properly" (*M* = 3.71) and "Perform basic word processing" (*M* = 3.62). Respondents perceived they held a "high ability" to teach the remaining competencies for these two constructs. Further, the teachers perceived themselves as having a "high ability" to teach three competencies in the communications history construct: "List qualities of an effective communicator" (*M* = 3.67); "Identify barriers to effective communication" (*M* = 3.51); and "Demonstrate different methods of communication" (*M* = 3.56). Respondents also perceived they had a "high ability" to teach 13 competencies under the ethics, leadership development, and professional development construct: "Demonstrate professional/business etiquette" (*M* = 3.79); "Demonstrate a proper work ethic" (*M* = 4.16); "Demonstrate listening skills" (*M* = 3.86); "Speak intelligently before a group" (*M* = 3.88); "Interview for employment" (*M* = 3.89); "Work in a team activity" (*M* = 3.87); "Work under pressure" (*M* = 3.93); "Identify the importance of correctly reporting the facts" (*M* = 3.74); "Deliver a formal, oral presentation using clear, enunciation, gesture, tone and vocabulary" (*M* = 3.78); "Give an effective interview" (*M* = 3.70); "Distinguish between right and wrong" (*M* = 4.13); "Discuss the techniques and principles involved in public speaking" (*M* = 3.71) and "Prepare a 4-6 minute speech within a 30-minute preparation time" (*M* = 3.53). They also perceived having a "high ability" to teach one public relations, advertising, and marketing competency ("Discuss the role of public relations in agricultural companies" [*M* = 3.57]) as well as five research, information gathering, and writing competencies ("Utilize correct grammar" [*M* = 3.56]; "Identify biased information" [*M* = 3.53]; "Effectively interview a person" [*M* = 3.60]; "Create a résumé" [*M* = 3.80]; and, "Write a speech" [*M* = 3.69]).

Overall construct means indicated that respondents held a perception of "high ability" to teach competencies in communications history (*M* = 3.54) and ethics/leadership development/professional development (*M* = 3.84). Respondents perceived that they held an "average ability" to teach competencies in communication skills/computer/information technology (*M* = 3.24), public relations/advertising/marketing construct (*M* = 3.45), and research/information gathering/writing (*M* = 3.35) (Table 1).

Table 1

Oklahoma Agricultural Education Teachers' Perceived Importance of and Ability to Teach Agricultural Communication Competencies by Construct (N = 238)

Construct Competency	Importance		Teaching Ability	
	M	*SD*	*M*	*SD*
Communication Skills and Computer/Information Technology				
Properly use a 35mm camera	3.68	0.94	3.41	0.98
Use e-mail properly	4.14	0.82	3.71	0.95
Properly use a digital camera	4.05	0.82	3.45	0.86
Properly use a video camera	3.77	0.86	3.43	0.82
Perform basic word processing	4.17	0.79	3.62	0.87
Utilize desktop publishing techniques	3.90	0.78	3.22	0.89
Properly identify appropriate file formats when using scanning programs	3.77	0.82	3.12	0.94
Effectively scan a document	3.83	0.91	3.31	0.86
Create and design a Web page	3.84	0.93	2.76	1.14
Develop a multimedia presentation	3.96	0.76	3.20	0.92
Utilize graphic editing programs	3.60	0.84	2.76	0.96
Identify the steps in the printing/developing process	3.50	0.93	2.70	1.04
Construct Means	3.84	0.58	3.24	0.66
Communication History				
List qualities of an effective communicator	4.14	0.73	3.67	0.72
Identify barriers to effective communication	3.91	0.79	3.51	0.77

Construct Competency	Importance *M*	Importance *SD*	Teaching Ability *M*	Teaching Ability *SD*
Demonstrate different methods of communication	4.07	0.75	3.56	0.75
Identify strategies to improve communications	4.00	0.77	3.44	0.73
Construct Means	4.04	0.55	3.54	0.56
Ethics, Leadership Development, and Professional Development				
Demonstrate professional/business etiquette	4.31	0.68	3.79	0.79
Demonstrate a proper work ethic	4.50	0.69	4.16	0.81
Demonstrate listening skills	4.35	0.70	3.86	0.80
Speak intelligently before a group	4.49	0.73	3.88	0.76
Interview for employment	4.44	0.74	3.89	0.74
Work in a team activity	4.30	0.68	3.87	0.78
Work under pressure	4.32	0.70	3.93	0.83
Identify the importance of correctly reporting the facts	4.16	0.76	3.74	0.84
Deliver a formal, oral presentation using clear enunciation, gesture, tone and vocabulary	4.42	0.70	3.78	0.79
Give an effective interview	4.12	0.75	3.70	0.81
Distinguish between right and wrong	4.49	0.73	4.13	0.89
Discuss the techniques and principles involved in public speaking	4.21	0.74	3.71	0.86
Prepare a 4-6 minute speech within a 30-minute preparation time	4.01	0.87	3.53	0.91

Construct Competency	Importance *M*	Importance *SD*	Teaching Ability *M*	Teaching Ability *SD*
Construct Means	4.32	0.49	3.84	0.59
Public Relations, Advertising, and Marketing				
Discuss the role of public relations in agricultural companies	4.13	0.76	3.57	0.87
Discuss the role of public relations in farm organizations	4.01	0.78	3.48	0.77
Identify key elements of a public relations campaign	3.79	0.81	3.27	0.82
Demonstrate sales skills	3.95	0.78	3.47	0.89
Construct Means	3.96	0.61	3.45	0.64
Research, Information Gathering, and Writing				
Identify the components and format of news releases	3.82	0.81	3.25	0.79
Utilize correct grammar	4.48	0.67	3.56	0.77
Identify what makes a topic newsworthy	3.90	0.78	3.48	0.77
Identify biased information	3.95	0.77	3.53	0.79
Effectively interview a person	4.02	0.85	3.60	0.82
Write a news release	4.05	0.77	3.47	0.81
Accurately proofread a document	4.22	0.72	3.46	0.83
Seek, gather and synthesize information	3.99	0.74	3.48	0.80
Write a feature story	3.82	0.78	3.29	0.80
Create a résumé	4.45	0.74	3.80	0.86
Write for broadcast	3.47	0.93	3.00	0.95

Construct Competency	Importance *M*	Importance *SD*	Teaching Ability *M*	Teaching Ability *SD*
Effectively edit a story	3.75	0.83	3.26	0.84
Write a speech	4.28	0.70	3.69	0.86
Write for the Web	3.60	0.90	2.75	0.97
Utilize an Associated Press Stylebook	3.37	0.98	2.66	1.09
Construct Means	3.96	0.50	3.35	0.54
Overall Composite Mean	4.02		3.48	

Conclusions, Recommendations and Implications

Concerning research objective number one, this study found Oklahoma secondary agricultural education teachers were male, held a bachelor's degree earned at a specific Midwestern university, did not teach agricultural communications courses, and started their teaching careers after 1996, indicating the majority of teachers have successfully completed at least one junior-level agricultural communications writing course. Most of the agricultural education teachers who taught an agricultural communications course had done so for fewer than two years; most used the Curriculum and Instructional Materials Center curriculum guides as their primary teaching resource.

For research objective number two, this study found Oklahoma secondary agricultural education teachers perceived 46 of 48 agricultural communications competencies in five construct areas held "much importance" for the high school agricultural education curriculum. Akers (2000) reported a similar finding from agricultural communications faculty and industry professionals.

Regarding research objective number three, this study found Oklahoma secondary agricultural education teachers perceived themselves to have "high ability" to teach competencies in both the ethics, leadership development, and professional development and the communications history constructs. However, they perceived their ability to teach competencies in the communications skills, computer and information technology construct, public relations, advertising, and marketing construct, and research, information gathering, and writing competencies construct as only average.

CIMC curriculum guides were not being used by all Oklahoma agricultural education teachers who are teaching agricultural communications courses. Core agricultural communications competencies should be established so uniformity in teaching agricultural communications courses can be accomplished and requisite curriculum materials developed. Collegiate-level competencies (Akers, 2000) should not be included in high school curriculum and should be removed from the CIMC curriculum guides.

A large number and variety of agricultural communications competencies were identified in this research as being important. Although it may be impossible for every secondary agricultural education student to study each of these areas in depth, it is important students be provided an introduction to the various areas of agricultural communications identified as important. The professional development needs of agricultural educators must be determined if collegiate programs are to "prepare and provide an abundance of fully qualified and highly motivated agricultural educators at all levels" (Osborne, n.d., p. 8). If it is hoped to establish a "national curriculum" for teaching agricultural communications in secondary agricultural education, more research is needed to determine other states' agricultural education teachers' perceptions about agricultural communications competencies. Such research can help determine strategies to "provide a rigorous, relevant, standards-based curriculum in agricultural, food, and natural resources systems" (Osborne, n.d., p. 3) for both secondary and postsecondary agricultural education programs.

Additional research also is needed to determine perceptions of important agricultural communications competencies held by other stakeholder groups, such as agricultural communications faculty, agricultural education teacher education faculty, state agricultural education program staff and the agricultural communications industry.

The results of the open-ended questions indicated respondents who did not use the CIMC curriculum guides got their resources to teach agricultural communications from various locations, including books, Web sites, and self-made materials. It also was suggested that more assistance is needed to teach agricultural communications curriculum, the layout of the curriculum is an issue, and computer-assisted delivery needs to be considered. To increase knowledge of agricultural communications competencies in the five construct areas, in-service, summer courses or other professional development activities should be provided for agricultural education teachers who are teaching or wish to teach an agricultural communications course.

Finally, current agricultural communications courses for agricultural education students need to be evaluated to determine if these students are taught competencies they would teach in their future high school classrooms. In addition, more agricultural communications courses should be made available to agricultural education majors at the collegiate level to continue to increase aspiring agricultural education teachers' knowledge of agricultural communications competencies.

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The Importance of Writing in the Agricultural Industry

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Abstract

This descriptive study focused employers' perceptions of the importance of writing in the workplace and the writing abilities of the graduates of Midwestern university's agricultural college. These recruiters primarily represent profit organizations and recruit for business- and management-type positions in the United States. The majority of the Agricultural, Food, Environmental, and Natural Sciences Career Fair recruiters who responded in this study reported they took writing skills into consideration frequently or almost always, and they assessed the writing abilities of graduates most frequently by their written letter of application. In addition, recruiters indicated almost all of their employees have some responsibility for writing, and the most frequent type of writing is e-mail correspondence. Overall, recruiters reported they were satisfied with the writing abilities of the graduates of the Midwestern university's agricultural college. Furthermore, the results of this study were comparable to the national study conducted by The National Commission on Writing for America's Families, Schools, and Colleges in 2004.

Introduction/Conceptual Framework

In the 21st Century, communication skills have become a must in the workforce (National Association of Colleges and Employers, 2006). "The 'perfect' candidate for the job is a top-notch communicator and a hard worker" (NACE, 2007). To increase the awareness of the need for more writing in the workplace, The National Commission on Writing for America's Families, Schools, and Colleges (NCoW) produced a series of reports reflecting the need for writing in the workplace and beyond (NCoW, 2003; NCoW, 2004; NCoW, 2005; NCoW, 2006). According to NCoW (2003), "Writing is not a frill for the few, but an essential skill for the many" (p. 11). The commission's 2004 report indicated the need for writing in the workforce, and its 2005 report explored the importance of writing in the government sector, finding writing is more important in the American government sector than it is in the non-governmental workplace (NCoW, 2005). Additionally, the 2006 report looked at writing from the students' point of view (NCoW, 2006).

As today's students will be tomorrow's employees, Stevens (2005) assessed employers' satisfactions with graduates' writing abilities and found employers were not fully satisfied with graduates' business communications skills or workplace writing skills. Brand, Gartin, Boone, and Boone (2006) found graduates from the West Virginia University College of Agriculture, Forestry, and Consumer Sciences are somewhat prepared for the workforce with their written communication skills. Additionally, they found employers felt written communication skills were important skills for entry-level employees, but one employer commented writing abilities were lacking among college graduates (Brand, Gartin, Boone, & Boone, 2006). Andelt, Barrett, and Bosshamer (1997) determined employers wanted agricultural graduates with strong communications skills. By assessing the communication needs of the agricultural industry, educational institutions should close the gap between the skills of new college graduates and the needs of the industry (Andelt, Barrett, & Bosshamer, 1997; Stevens, 2005). The National Commission (2004) and Andelt, Barrett, and Bosshamer (1997) indicated if students are to be successful in the workplace and life, they must be able to write. However, employers report graduates fall short in their communication skills (NACE, 2006).

Writing in agriculture began as early as 1588 with information dissemination from one to another but continues today through major organizations (Boone, Meisenbach, & Tucker, 2000; Burnett & Tucker, 2001). The founding principles of land grant institutions were to educate rural students with technical skills needed for success as well as basic skills, such as writing (Benjamin, 1962; Burnett & Tucker, 2001; McDowell, 2002; McDowell, 2003). According to Burnett and Tucker (2001), new college graduates have become the diffusers of information, so they must have the ability to convey information effectively. “A professional education requires a knowledge of the liberal arts to be complete” (Orr, 1996, p. 2831). According to the National Commission on Writing (2006), educators need to create a writing-friendly environment for students to prosper and use their basic skills. For writing education to have success, students must see it as purposeful not as a necessity (NCoW, 2006).

As the communication needs change in the agricultural industry, universities and colleges need to adjust to the needs of the industry (Gerson & Gerson, 1994; Singh, Ekanem, Tegegne, Muhammad, & Comer, 2004) and need to evaluate employers’ perceptions of students’ writing abilities (Stevens, 2005). Because of the continued need for strong communication skills in the workplace, Stevens (2005) recommended colleges and universities review the writing abilities of their graduates every three to five years. “In an era when agricultural education is concerned with informing people about agriculture, faculty must ensure students are literate in the subject matter, have the skills to effectively communicate, and are successful in finding employment after graduation” (Garton & Robinson, 2006, p. 553). According to Scanlon and Baxter (1993), new college graduates want to obtain skills such as writing, so they can be more prepared for the workplace.

Graduates’ ability to write in the workplace may be the key to obtaining their dream job (NACE Research, 2006; Stewart, 1987) because the National Association of Colleges and Employers Job Outlook 2006 found employers seek strong communication skills more than any other skills in recent college graduates. Although some educators argue communication skills should not be taught outside the walls of an English classroom (Stewart, 1987), “developing the kinds of thoughtful writers needed in business, and elsewhere in the nation’s life, will require educators to understand writing as an activity calling for extended preparation across subject matters — from kindergarten through college” (NCoW, 2004, p. 20). Smith and Bernhardt (1997) considered writing a business commodity and the center of business communication. “In a widely heralded information economy, written information (whether in hard copy or electronic form) is often the commodity that is being traded” (Smith & Bernhardt, 1997).

> “General education at [state university] is intended to construct a broad foundation for the student’s specialized course of study; develop the student’s ability to read, observe and listen with comprehension; enhance the student’s skills in communicating effectively;

expand the student's capacity for critical analysis and problem solving; assist the student in understanding and respecting diversity in people, beliefs and societies; and develop the student's ability to appreciate and function in the human and natural environment" ([state university], 2007, p. 13).

Flowers and Reaves (1991), Maciorowski and Ricke (2000), and Scanlon and Baxter (1993) characterized writing as a way to learn in an agricultural course. Written communication should be a part of learning in all disciplines, not just English (Stewart, 1987; NCoW, 2003; Smith, Charnley, & McCall, 1993; Flowers and Reaves, 1991). University and college faculty and administration need to integrate writing across all disciplines, including agriculture (NCoW, 2003; Smith, Charnley, and McCall, 1993). The writing-across-the-curriculum movement was developed to help improve the writing skills in all disciplines (Scanlon and Baxter, 1993) and has been used with success in an animal science course at the University of Kentucky (Aaron, 1996), forestry courses at Virginia Tech and North Carolina State University (Wellman, McMullen, and Hirsch, 1990), and an animal science course at Berea College in Kentucky (Orr, 1996). Wellman, McMullen, and Hirsch (1990) found although the students did not believe writing was beneficial, writing in forestry courses helped them identify the writing needs within their profession. Agricultural educators have the responsibility to prepare students for the communication demands of the industry (Flowers & Reaves, 1991; Stevens, 2005; Stewart, 1987); however, an agricultural-based classroom cannot sufficiently be changed into an English classroom but rather the basics of English can be included in agricultural curriculum (Tobey, 1979). "Perhaps it's time to sharpen the pencils of our agriculture students and work on one of the essential basic skills valued by the agricultural industry, thinking and communicating thoughts to others" (Flowers & Reaves, 1991, p. 16).

Purpose/Objectives

The purpose of this study was to determine the 2000-2005 Agricultural, Food, Environmental, and Natural Sciences Career Fair recruiters' perceptions of the writing abilities of the graduates of a Midwestern university's agricultural college. To accomplish this purpose, the researchers used the following objectives:

1. Describe selected characteristics of the Agricultural, Food, Environmental, and Natural Sciences Career Fair recruiters and recruiting organizations;
2. Determine the recruiters' perceptions of the importance of writing when recruiting new employees;
3. Determine the recruiters' perceptions of the frequency and types of writing required of a recent college graduate in the recruiters' workplace; and
4. Determine recruiters' perceptions of the writing abilities of the graduates of a Midwestern university's agricultural college.

Methods/Procedures

A descriptive instrument was used to survey recruiters who participated in the Agricultural, Food, Environmental, and Natural Sciences Career Fairs from 2000 to 2005. This population was selected because of its familiarity with new college graduates. According to

Muijs (2004), survey research is a popular non-experimental quantitative research method because it is flexible and allows the researcher to obtain a large amount of information easily. The university's Career Services supplied the researchers with the database containing the recruiters from 2000 to 2005. Even though 142 (N = 142) individuals recruited during this time frame, the researchers obtained only 112 sufficient addresses; therefore, 112 (N = 112) recruiters were used in the survey. The response rate for the study was 30.36% (n = 34).

The researchers obtained approval from The National Commission on Writing to use The Business Roundtable and National Writing Commission Human Resource Survey March 2004 as the basis for the development of the instrument for this study. Muijs (2004) stated a survey should be short and take less than 30 minutes to complete to increase response rates. Additionally, survey feedback, follow-up phone calls, and Web surveys help increase response rates (Muijs, 2004). Furthermore, Dillman (2007) determined Web-based surveys to be one of the best ways to collect data; however, Best and Krueger (2004) suggested some disadvantages to Web-based surveys, which included lack of Internet access, varied survey appearance on every computer, and unreliable participant records. However, by obtaining the recruiters' e-mail addresses, the researchers determined most recruiters had Internet access and used surveymonkey.com to provide uniform on-screen views. Each recruiter received four e-mails — pre-notification e-mail, survey e-mail, follow-up e-mail, and second follow-up e-mail, which contained the link to the surveymonkey.com survey. By clicking on the survey link, the recruiters consented to the terms of the study.

The Web-based instrument contained three parts — organizational demographics, importance of writing skills in the recruitment process and the workplace, and recruiter demographics. Part One of the instrument identified the types of organizations that participated in the Agricultural, Food, Environmental, and Natural Sciences Career Fair, the types of positions for which they recruit, and the number of employees associated with the organization. Part Two of the instrument was related to the importance of writing in the agricultural industry and contained questions about the frequency and types of writing required of recent college graduates. Part Three of the survey identified the demographics of the recruiter. Additionally, the survey asked respondents about their perceptions of their writing abilities upon graduation if they graduated from the Midwestern university's agricultural college.

To determine validity, a panel of experts, which consisted of university faculty and staff, reviewed the instrument (Dillman, 2007; Muijs, 2004). Muijs (2004) also suggested a pilot study be conducted prior to the study to test the reliability of the instrument. The researchers conducted the pilot survey using employers who did not recruit at the Agricultural, Food, Environmental and Natural Sciences Career Fair from 2000 to 2005. The researcher used Statistical Package for the Social Sciences (SPSS®) version 15.0 to determine the Cronbach's Alpha — a reliability coefficient — for the scaled items in the instrument. The Cronbach's Alpha was 0.867 for this study, and a coefficient alpha of at least 0.7 is considered reliable (Muijs, 2004). The researchers visually compared the other items in the instrument to ensure reliability; as no differences were detected, no changes were made in the instrument.

Results/Findings

Research objective one addressed selected characteristics of the Agricultural, Food, Environmental, and Natural Sciences Career Fair recruiters and recruiting organizations from January 1, 2000, to December 31, 2005 (Table 1). Nineteen recruiters (55.90%) represented "profit" organizations; the remaining recruiters (*n* = 15) defined the nature of their recruiting organization as "government" (*n* = 6; 17.60%), "education," (*n* = 5; 14.70%) and "non-profit" (*n* = 4; 11.80%). Fifteen recruiters (45.50%) hire "management and business" positions, while others hire for "agricultural forestry and production" (*n* = 7; 21.20%), "education, communication, and government" (*n* = 7; 21.20%), and "scientific and engineering" (*n* = 4; 12.10%) positions. Five respondents (18.50%) were graduates of the Midwestern university conducting this study.

Table 1
Recruiter and Recruiting Organization Characteristics

Characteristics	*n*	Percentage (%)
Nature of recruiting organizations		
Profit	19	55.90
Government	6	17.60
Education	5	14.70
Non-Profit	4	11.80
Types of positions for which organizations hire		
Management and Business	15	45.50
Agricultural Forestry and Production	7	21.20
Education, Communication, and Government	7	21.20
Scientific and Engineering	4	12.10
Graduates of the Midwestern University's Agricultural College		
Yes	5	18.50
No	22	81.50

In addition, recruiters were asked to report the number of individuals employed at the recruiting organizations (Table 2) on January 1, 2006, and the average number of employees and graduates of the Midwestern university's agricultural college hired annually inside and outside the United States from January 1, 2000, to December 31, 2005. The number of individuals employed on January 1, 2006, inside the United States ranged from 4 to 8,000 (*n* = 26), while the number of employees outside the United States ranged between 0 and 500 (*n* = 11). The average number of employees hired annually from January 1, 2000, to December 31, 2005, inside the United States ranged from 4 to 350 (*n* = 25). The number of employees hired outside the United States ranged from zero to five (*n* = 10). The number of graduates from the Midwestern university's agricultural college hired inside the United States annually from January 1, 2000, to December 31, 2005, ranged from 0 to 10 (*n* = 27).

Table 2

Employees Within CASNR Recruiting Organizations: January 1, 2000, to December 31, 2007

	Extreme				
Employees	Low	High	Mean	Mode	Median
Employed on January 1, 2006					
Inside the United States	4	8,000	1,237.04	3,000.00	525.00
Outside the United States	0	500	48.36	0.00	0.00
Hired each year					
Inside the United States	4	350	81.72	35.00	35.00
Outside the United States	0	5	0.70	0.00	0.00
Hired each year who are Midwestern university agriculture graduates					
Inside the United States	0	10	2.07	0.00	1
Outside the United States	0	0	0	0	0

Research objective two addressed respondents' perceptions of the importance of writing when recruiting new employees. Using summated-scaled response items (1 = almost never; 2 = occasionally; 3 = frequently; 4 = almost always), the instrument sought information concerning respondents' perceptions of writing when recruiting for professional and hourly staff, including consideration of writing when hiring new employees, impact of a poorly composed job applicant's letter or other written material when hiring, and how often samples of written materials or presentations are required of a job applicant (Table 3). The real limits (Boone, Gartin, Boone & Hughes, 2006) of the scale used on the instrument were 1.00 to 1.49 = almost never; 1.50 to 2.49 = occasionally, 2.50 to 3.49 = frequently, and 3.50 to 4.00 = almost always.

For professional staff, the recruiters reported they "frequently" consider writing when hiring new college graduates (n = 28; M = 3.11) and a poorly composed job applicant's letter or other written material "frequently" has an impact when hiring (n = 26; M = 3.48). Furthermore, recruiters reported they "occasionally" require samples of written materials or presentations when hiring professional staff (n = 29; M = 2.07), effective writing skills are "frequently" important for promotional considerations (n = 25; M = 2.96), and opportunities to improve writing skills once hired are "occasional" (n = 26; M = 2.35).

For hourly staff, the recruiters reported they "frequently" consider writing when hiring new college graduates (n = 26; M = 2.54) and a poorly composed job applicant's letter or other written material "frequently" have an impact when hiring (n = 24; M = 2.88). Additionally, recruiters reported they "occasionally" require samples of written materials or presentations when hiring hourly staff (n = 26; M = 1.54), effective writing skills are "frequently" important for promotional considerations (n = 23; M = 2.61), and opportunities to improve writing skills once hired are "occasional" (n = 24; M = 2.00).

Moreover, recruiters were asked to identify how they assess a job applicant's writing ability (Table 4). To assess applicants' writing abilities, respondents indicated they use the individual's letter/written application (n = 23; 82.10%) and personal communication with references (n = 18; 64.30%). Other options were writing sample provided by job applicant (n =

13; 46.40%), review of coursework on résumé (*n* = 11; 39.30%), writing test taken during the job interview (*n* = 3; 10.70%), and open Web forum such as e.g., Facebook, MySpace, blogs, etc. (*n* = 2; 7.10%).

Table 3

Employers' Perceptions of the Importance of Writing in the Workplace

	n	*M*	*SD*
Professional Staff			
Consideration of writing skills when hiring new employees	28	3.11	1.10
Impact of a poorly composed job applicant's letter or other written material when hiring	27	3.48	0.70
Samples of written materials/presentations required of job applicant	29	2.07	1.10
Importance of effective writing skills when making promotion Decisions	25	2.96	0.79
Opportunities to improve writing skills when an employee possesses poor writing skills	26	2.35	1.06
Hourly Staff			
Consideration of writing skills when hiring new employees	26	2.54	1.07
Impact of a poorly composed job applicant's letter or other written material when hiring	24	2.88	0.85
Samples of written materials/presentations required of job applicant	26	1.54	0.86
Importance of effective writing skills when making promotion Decisions	23	2.61	0.94
Opportunities to improve writing skills when an employee possesses poor writing skills	24	2.00	0.93

Note. Real limits of scale are 1.00 to 1.49 = almost never; 1.50 to 2.49 = occasionally, 2.50 to 3.49 = frequently, 3.50 to 4.00 = almost always.

Table 4

Assessment of a Job Applicant's Writing Ability

	n	Percentage (%)
Impression based on letter/written application	23	82.10
Personal communication with references	18	64.30
Writing sample provided by job applicant	13	46.40
Review of coursework on résumé	11	39.30
Writing test taken during the job interview	3	10.70
Open Web forum (e.g., Facebook, MySpace, blogs, etc.)	2	7.10

In terms of salary negations when hiring a new college graduates, recruiters were asked to use the following summated scale to indicate the value of good writing skills: 1 = \$0-\$1,000; 2 = \$1,001-\$2,500; 2.50 to 3.49 = \$2,501-\$5,000; 3.50 to 4.49 = \$5,001-\$7,500; 4.50 to 5.59 = \$7,501-\$10,000; 5.50 to 6.00 = more than \$10,000. Recruiters reported good writing skills are worth between "\$2,501 and \$5,000" (*n* = 23; *M* = 3.22), albeit the large standard deviation indicates variation among the respondents (Table 5).

Table 5

The Value of Good Writing Skills When Hiring New Employees

	n	*M*	*SD*
Value of good writing skills	23	3.22	1.83

Note. Real limits of scale are 1.00 to 1.49 = \$0-\$1,000; 1.50 to 2.49 = \$1,001-\$2,500; 2.50 to 3.49 = \$2,501-\$5,000; 3.50 to 4.49 = \$5,001-\$7,500; 4.50 to 5.59 = \$7,501-\$10,000; 5.50 to 6.00 = more than \$10,000.

Research objective three sought to determine the frequency and types of writing required of a recent college graduate (Table 6). Respondents were offered the following summated scale for these items: 1 = a few; 2 = about 1/3rd; 3 = about 2/3rds; and 4 = almost all. For professional staff, recruiters reported "almost all" employees have some responsibility for writing (n = 28; M = 3.5) and "about 2/3rds" of their employees have effective communication characteristics (n = 27; M = 3.37). Recruiters indicated "about 2/3rds" of hourly employees have responsibility for writing (n = 25; M = 2.6) and "about 1/3rd" have effective communication characteristics (n = 25; M = 2.24).

Table 6

Employers' Perceptions of Written Communication Practices in the Workplace

	n	*M*	*SD*
Professional Staff			
Employees who have some responsibility for writing	28	3.50	0.88
Employees who have effective communication characteristics	27	3.37	0.63
Hourly Staff			
Employees who have some responsibility for writing	25	2.60	1.23
Employees who have effective communication characteristics	25	2.24	0.88

Note. The real limits of the scale are 1.00 to 1.49 = a few; 1.5 to 2.49 = about 1/3rd; 2.50 to 3.49 = about 2/3rds; 3.50 to 4.00 = almost all.

Furthermore, recruiters were asked to identify the types of writing and frequency performed on the job, using a provided summated scale: 1 = almost never, 2 = occasionally, 3 = frequently, 4 = almost always (Table 7). Twenty-one (77.80%) of the recruiters reported employees "almost always" use e-mail correspondence. Fourteen (51.90%) reported employees "frequently" use other memoranda and correspondence and "frequently" use oral presentations with slides and visuals, e.g., PowerPoint. Other writing types were reported as being required less "frequently": oral presentations without visuals (n = 27; 48.10%); formal reports (n = 27; 40.70%); and technical reports (n = 27; 44.40%). Recruiters indicated employees "occasionally" use Web text (n = 26; M = 2.42).

Additionally, recruiters were asked to identify the characteristics of effective communication using the provided summated scale: 1 = not at all important, 2 = not very important, 3 = important, and 4 = extremely important (Table 8). Recruiters considered the following communications characteristics as "extremely important": accuracy (n = 27; M =

3.89); clarity (n = 27; M = 3.81); conciseness (n = 27; M = 3.74); and spelling, punctuation, and grammar (n = 27; M = 3.67). Visual appeal (n = 26; M = 3.38) and scientific precision (n = 25; M = 3.28) were reported as "important."

Table 7

Types of Writing and Frequency Performed on the Job

	n	*M*	*SD*
E-mail correspondence	27	3.78	0.42
Other memoranda and correspondence	27	2.89	0.85
Oral presentations with slides/visuals (e.g., PowerPoint)	27	3.19	0.68
Oral presentations without visuals	27	2.93	0.73
Formal reports	27	2.81	0.96
Technical reports	27	2.74	0.86
Web text	26	2.42	0.99

Note. The real limits of the scale are 1.00 to 1.49 = almost never; 1.50 to 2.49 = occasionally; 2.50 to 3.49 = frequently; 3.50 to 4.00 = almost always.

Table 8

Characteristics of Effective Communication

	n	*M*	*SD*
Accuracy	27	3.89	0.32
Clarity	27	3.81	0.40
Conciseness	27	3.74	0.45
Scientific precision	25	3.28	0.74
Visual appeal	26	3.38	0.64
Spelling, punctuation, and grammar	27	3.67	0.64

Note. The real limits of the scale are 1.00 to 1.49 = not at all important; 1.50 to 2.49 = not very important; 2.50 to 3.49 = important; 3.50 to 4.00 = extremely important.

Using a summated scale, recruiters (n = 17) reported their annual cost of writing training as "$0 - $500" (47.10%), "$501 - $1,000" (17.60%), "$1,001 - $1,500" (23.50%), and "more than $1,500" (11.80%).

Research objective four determined employers' perceptions of the writing abilities of the Midwestern university's agricultural college graduates. Seven recruiters (46.40%) reported "almost all" agricultural graduates of the Midwestern university had sufficient writing abilities, although the mean (M = 2.87) indicated "about 2/3rds" of these graduates were considered to have satisfactory writing abilities. Respondents were offered the following summated scale for this items: 1 = a few; 2 = about 1/3rd; 3 = about 2/3rds; and 4 = almost all.

Respondents were provided with the following summated scale to express their satisfaction with the writing abilities of the Midwestern university's agricultural college: 1 = not at all satisfied, 2 = not very satisfied, 3 = satisfied, and 4 = extremely satisfied. Eight recruiters

(53.30%) reported they were "satisfied" with hired graduates' writing abilities (Table 9), and nine (64.70%) were satisfied with the interviewed graduates' writing abilities.

Table 9

Satisfaction With Writing Abilities of Graduates of a Midwestern University

	n	*M*	*SD*
Hired graduates	15	3.20	0.68
Interviewed graduates	17	2.94	0.74

Note. The real limits of the scale are 1.00 to 1.49 = not at all satisfied; 1.50 to 2.49 = not very satisfied; 2.50 to 3.49 = satisfied; 3.50 to 4.00 = extremely satisfied.

Finally, the recruiters could provide additional comments regarding graduates of the Midwestern university's agricultural college. One recruiter commented, "I have been very pleased with the overall performance of the [Midwestern university's agricultural college] graduates that I have hired." However, another commented, "I have not been pleased with the writing skills of our [Midwestern university's agricultural college] graduates because I continually find myself spending time editing their work."

Conclusions/Recommendations/Implications

Researchers found career fair recruiters represent profit organizations and recruit predominately for business- and management-type positions. Additionally, their organizations employ as many as 8,000 people and as few as four and hire an average of 81 employees, including on average two graduates of the Midwestern university's agricultural college, annually. The vast majority of these employees work in the United States.

Recruiters consider writing abilities an important part of the recruiting process and the workplace as they frequently take writing skills into consideration when hiring for both professional and hourly staff. In fact, the respondents reported taking writing skills into consideration slightly more than do the companies of the Business Roundtable (NCoW, 2004), which is comprised of 160 member companies represented by their chief executive officers (Business Roundtable: About us, n.d.). The most frequently assessed item is the applicant's job application and accompanying business letter.

The vast majority of new agricultural college graduates are responsible to write and use e-mail correspondence in their jobs, which mirrors results for all graduates (NCoW, 2004). Accuracy, clarity, conciseness, and correct grammar are the most important characteristics of effective communication according to recruiters, which parallels The National Commission on Writing 2004 study. However, recruiters indicated fewer employees have effective communications skills that the proportion who have the responsibility for writing in their positions.

Moreover, recruiters are satisfied with the writing abilities of the Midwestern university's agricultural college graduates. In comparison, The National Commission on Writing (2004) determined 65% of new college graduates have sufficient writing abilities, which is similar to the "about 2/3rds" reported for the Midwestern university's agricultural college graduates.

Regrettably, with the small response rate (30.36%), this study's findings may have rather limited generalizability beyond the participating sample, especially for items with relatively large standard deviations; however, as this study's results are comparable to the results reported by The National Commission on Writing (2004), they provide a beginning point for consideration when agricultural faculty review curriculum and provide insight to the need to continue to improve writing education.

The researchers recommend faculty, staff, and administration continue to stay abreast of the changing communication needs in the agricultural industry by assessing current writing curriculum in the college, incorporating writing skills into agricultural curriculum, using writing as a way of learning, and preparing students for workforce communication with real-world scenario writing assignments. In addition, faculty should attend career fairs and participate in other networking opportunities to gain employer insight on the writing skills employers want graduates to possess. In addition, research needs to determine instructors' perceptions of graduates' writing abilities and evaluate graduates' satisfactions of their writing education.

According to Stevens (2005), this type of study should be replicated every five years. Therefore, researchers recommend the Midwestern university's agricultural college, as well as other agricultural colleges, periodically conduct this type of study to ensure graduates meet the communication needs of the agricultural industry.

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Concurrent Research Session C

Theme: Teaching and Learning in University Academic Programs

Chair: Dr. Carl Reynolds, University of Wyoming

Facilitator: Vicki Coonrod, Tarleton State University

Are College of Agriculture Graduates Satisfied with Their Career Choices?

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Abstract

Job satisfaction plays a role in whether or not employees remain in their chosen profession. The purpose of this study was to track the career paths of graduates from the University of Missouri. Specifically, the study sought to determine the career choice, employment status, salary, and overall job satisfaction of college graduates. The findings of the study revealed graduates are entering a wide array of careers. Nearly three-fourths of the graduates were full-time employees, while 20% were attending graduate or professional school. Nearly 30% of full-time employees worked in management and sales positions. While 80% of graduates worked between 30 – 59 hours per week, those who were employed on a part-time basis were found to be most satisfied with their employment status. In all, graduates were satisfied with their current salary regardless of the financial reward. Graduates with degrees in general agriculture and food & science nutrition earned the highest salaries but were least satisfied with their chosen career. Graduates who entered industry as scientists were most satisfied with their chosen occupation, while graduates employed as support staff and research assistants were undecided about their level of job satisfaction. Overall, graduates were satisfied with their chosen career field.

Introduction/Theoretical Framework

The role of higher education has been largely influenced by industry (Morley, 2001). While there are differing views on the intent of higher education, one emergent theme appears to surface; to a degree, higher education exists to prepare students for future employment (Cole & Thompson, 2002; Evers, Rush, & Berdrow, 1998; Martin, Milne-Home, Barrett, Spalding, & Jones, 2000; McLaughlin, 1995; Peddle, 2000) and life after college (Kember & Leung, 2005; Martin et al., 2000). However, research has indicated that graduates have unrealistic expectations of the workforce and are not prepared to enter industry after graduation (Candy & Crebert, 1991). A lack of preparation could result in graduate's having low levels of job satisfaction in their respective careers.

Dawis and Lofquist (1984) stated the general expectation is for all individuals to engage in work with the ultimate goal of becoming full-time employees. Once employed, it is important for graduates to be satisfied with their career because job satisfaction plays a role in determining whether or not graduates remain in their chosen career (Robinson & Garton, 2006). Therefore, assessing graduates' job satisfaction is imperative.

It has been noted job satisfaction is the overall feeling people have about their jobs (Dawis & Lofquist, 1984; Martin, 2002; Rowden, 2002). Rowden (2002) stated there are two perspectives of job satisfaction. The first is the humanitarian perspective, which states ". . . that people deserve to be treated fairly and with respect" (p. 4). The second is the utilitarian perspective which ". . . can lead to behavior by employees that affects organizational functioning, as well as a reflection on organizational functioning" (p. 4). Companies realize that a more satisfied employee leads to more effectiveness and productivity on the job (Martin, 2002). However, a dissatisfied employee can result in that person possessing negative behaviors and unwarranted actions. Such actions consist of the employee being absent from work, which can ultimately result in the employee leaving the profession or trade altogether (Dawis & Lofquist, 1984). Therefore, managers and supervisors should pay close attention to both humanitarian and utilitarian perspectives of job satisfaction as they relate to their employees to create a fair working environment with high morale among their workforce.

Bluestein (2001) concluded that individuals tend to seek employment that resonates with their value systems. Brown (2002) referred to these values as work values which consist of "Financial prosperity, altruism, achievement, and responsibility" (p. 49). The attitudes workers bring to their jobs and the motivation they possess while performing at their jobs leads to job satisfaction. Gilmer and Deci (1977) concluded "workers' attitudes toward their jobs reflect the extent to which they are satisfied with their jobs and their work lives" (p. 228).

While workers often choose careers that interest them, a lack of job satisfaction can result in worker turnover, which creates multiple problems for organizations and society as a whole. Boverie and Kroth (2000) opined:

> Because there will be fewer people to take the place of the current baby boomers, recruiting and keeping employees will be one of the toughest organizational tasks for at least the next two decades. The values of these new employees will emphasize less loyalty to organizations, more job hopping, a greater importance on having fun, and quality time off (p. 850).

In addition to worker turnover, the overall job tenure of employees has decreased from seven years to four years (Gregg & Wadsworth, as cited in Morley, 2001). Workers are becoming more disposable and less committed. Therefore, hiring recent college graduates has become risky (Morley, 2001).

The theoretical frameworks for this study consisted of a combination of the psychological theory of work adjustment (Dawis & Lofquist, 1984) and the career success theory (Hughes, 1937). The psychological theory of work adjustment proposes:

> Work is an interaction between an individual and a work environment in which each has requirements of the other. The work environment requires certain tasks to be performed and the individual brings skills to perform the tasks. The individual, in exchange, requires compensation for work performance and additional conditions of work such as a safe environment, a comfortable place to work, congenial co-workers, a competent supervisor, and an opportunity to achieve (Dawis & Lofquist, 1984, p. 56).

The theory of career success contains both objective and subjective variables (Hughes, 1937). Among the objective variables are an individual's salary, promotion status, and overall level of job satisfaction. Heslin (2005) stated, "Career success research increasingly assesses both objective and subjective career outcomes, apparently presuming that people define their success in largely the same way (i.e., current salary, promotions and job satisfaction)" (p. 127).

Hu and Kuh (2003) noted ". . . more students than ever are participating in higher education and the knowledge, skills, and competencies acquired during college are essential for the postcollege success of individuals, preparation of an informed citizenry, and continued expansion of an information-based economy" (p. 185). However, "University programs in the humanities, social sciences, and natural sciences typically do not prepare university graduates directly for work or for specific occupations, unlike their counterparts in professional programs" (Kwok 2004, p. 5). Martin et al. (2000) added that the variety of potential jobs graduates can enter makes it almost impossible for higher education institutions to prepare all students for every technical skill needed in their careers.

While job satisfaction is important to managers and supervisors, it also has implications for higher education institutions. Higher education institutions recognize that satisfied alumni often act as advocates on behalf of their accrediting institution, which can lead to better recruitment practices for potential students (Schmidt et al. as cited in Martin et al., 2000, p. 200). Because satisfied individuals tend to remain in their chosen field for longer periods of time creating a more stable workforce, they are more apt to respond favorably about their accrediting institution to perspective students.

Barkley, Stock, and Sylvius (1999) stated that "Given the major changes in the career expectations and experiences of agricultural alumni, up-to-date information on salaries and career experiences is a vital ingredient for sound, forward-looking college and career decisions" (p. 785). Martin et al. (2000) added "there is . . . a need for institutions to monitor graduate satisfaction, better prepare them for employment, and explore the relationship between these two dimensions" (p. 203). With these statements serving as needs for the study, certain questions arise. Within this Midwestern state's College of Agriculture (COA), where do its graduates find employment? Are the majority of these graduates gaining full-time employment? Lastly, what attributes of graduates' employment leads to job satisfaction?

Purpose and Objectives

The purpose of this study was to track the career paths of COA graduates from the University of Missouri (MU). Specifically, the study sought to determine the career choice, employment status, salary, and overall job satisfaction of college graduates. The following research objectives guided the study:

1. Describe the employment status, career path, and salary status of COA graduates.
2. Describe COA graduates' level of job satisfaction by employment status, career path, and salary status.
3. Describe the number of hours per week COA graduates are engaged in their work.
4. Identify COA graduates' salary status by academic degree.
5. Assess COA graduates' level of job satisfaction by academic degree.

Methods and Procedures

The design of the study was survey research. Descriptive statistics were employed to analyze the data. The population for this study was MU COA graduates from January 2004 to May 2005 (*N* = 711). As part of a larger study, a random sample (*n* = 272) of the population was mailed a questionnaire. The questionnaire consisted of four sections, with job satisfaction and demographics comprising two of the sections. The Brayfield-Rothe (1951) job satisfaction instrument, as modified by Warner (1973) was employed for the job satisfaction section. This section consisted of 14 questions on job satisfaction and dissatisfaction factors and used a five-point Likert scale ranging from 1 - strongly disagree to 5 - strongly agree. A panel of experts consisting of COA university faculty established content and face validity. Cano and Miller (1992) established reliability for the job satisfaction section through prior research and reported a Cronbach's alpha coefficient of .94 for the summated scale.

To assess the objectives in the study, modes of central tendency and variability consisting of frequencies, percentages, means, and standard deviations were used. Based on graduates' responses to their chosen career paths, they were collapsed into one of the following categories: sales, management, communications, government agencies, production agriculture, scientists, research assistants, teachers, support staff, financial services, food services, educational trainers (industry), graduate school, and other. The "other" category served as a "catch-all" for graduates who could not be placed in one of the existing categories. Examples of the "other" category consisted of: zookeeper, cash register operator, inventory analyst, and pharmacy technician to name a few.

The Dillman (2004) Tailored Design Method was used to collect data. Postcards announcing the forthcoming questionnaire were mailed two weeks prior to mailing the complete questionnaire package which consisted of a cover letter, questionnaire, and pre-paid return envelope. A follow-up postcard was sent to non-respondents ten days after the initial mailing of the complete package. A second complete package was mailed to non-respondents ten days after the follow-up postcard. Recipients were instructed to complete the questionnaires and return them to the researcher in the pre-paid, stamped envelope included. In all, 141 participants responded for a 52% response rate.

Non-response error was accounted for by comparing early and late respondents (Miller & Smith, 1983). In an effort to be conservative, the first 25% (*n* = 35; early respondents) were compared to the last 25% (*n* = 35; late respondents). This represented the extreme ends of the spectrum concerning early and late respondents, allowing for the greatest amount of possible discrepancy. Specifically, early and late respondents were compared with regard to their overall level of job satisfaction. No significant differences were found (Table 1).

Table 1
Comparison of Early and Late Respondents on Level of Job Satisfaction

	Early Respondents		Late Respondents		
Variable	*M*	*SD*	*M*	*SD*	p-value
Overall Job Satisfaction	3.89	.86	3.99	.69	.60

Note. Scale: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, 5 = Strongly Agree; $p \leq .05$

Because this study employed an existing data set, the demographic information of the graduates had previously been collected. A greater percentage of females ($f = 75$; 53%) responded to the initial study than did males ($f = 66$; 47%). The department comprising the largest number of total graduates during the two-year period (January 2004 – May 2005) was hotel and restaurant management ($N = 36$), while the department comprising the fewest number of total graduates consisted of: agricultural economics, agricultural journalism, agricultural systems management, food and science and nutrition, general agriculture, plant science, and soil and atmospheric science ($f = 15$). The greatest number of graduates responding to the initial study consisted of animal science ($f = 15$), while the fewest number of respondents consisted of graduates in parks, recreation, and tourism, soil and atmospheric science, and general agriculture ($f = 5$). The degree programs consisting of graduates with the highest grade point average (GPA) were biochemistry and forestry, with each having a GPA of 3.47. The degree program with the lowest GPA was general agriculture ($M = 2.56$).

Findings

Objective one sought to describe the employment status, career path, and salary status of COA graduates. One hundred (71%) graduates were employed full-time (Table 2). Of the respondents, 28 (20%) were attending graduate or professional school, and five (3.5%) were employed part-time. Three (2.1%) graduates were unemployed and seeking employment. The remaining graduates were either caring for family full-time or comprised the "other" category.

Table 2
Employment Status of College of Agriculture Graduates (n = 141)

Employment Status	*f*	%
Employed full-time	100	71.0
Attending graduate or professional school	28	20.0
Employed part-time	5	3.5
Unemployed, seeking employment	3	2.1
Caring for family full-time	1	0.7
Other	4	2.8

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

Table 3 depicts the various career paths graduates entered. The career paths were adopted from a study by Garton and Robinson (2006) which employed the same categories. Roughly half of the graduates were enrolled in graduate school (19.9%), or were employed in careers consisting of management (19.1%) and sales (10.6%). Teachers accounted for 6.4% of the respondents, followed by communications and government agencies (5.7%), production agriculture and scientists (4.3%), research assistants (3.5%), and support staff (2.8%). The least populated career choices consisted of educational training in industry, financial services, and food services, consisting of 2.1% each. Eleven graduates (7.8%) fell into the "other" category.

Table 3
Career Path of College of Agriculture Graduates (n = 136)

Rank	Career Choice	*f*	%
1.	Graduate School	28	19.9
2.	Management	27	19.1
3.	Sales	15	10.6
4.	Other	11	7.8
5.	Teachers	9	6.4
6.	Communications	8	5.7
6.	Government Agencies	8	5.7
8.	Production Agriculture	6	4.3
8.	Scientists	6	4.3
10.	Research Assistants	5	3.5
11.	Support Staff	4	2.8
12.	Educational Trainers (Industry)	3	2.1
12.	Financial Services	3	2.1
12.	Food Services	3	2.1

To assess the salaries earned by graduates, Table 4 was constructed. The highest percentage of graduates earned a salary less than $20,000 per year (31%). Over 16% of graduates earned an annual salary between $20,000 – $29,999. Nearly 20% of graduates earned between $30,000 – $34,999, while nearly 30% of graduates earned $35,000 – $44,999 per year. Nearly 4% of graduates earned a salary greater than $45,000 per year.

Table 4
Salary Status of College of Agriculture Graduates (n = 129)

Salary	*f*	%
Less than $20,000	40	31.0
$20,000 – $24,999	11	8.5
$25,000 – $29,999	10	7.8
$30,000 – $34,999	25	19.4
$35,000 – $39,999	18	13.9
$40,000 – $44,999	20	15.5
Greater than $45,000	5	3.9

Objective two sought to describe the level of job satisfaction by COA graduates' employment status, career path, and salary. Table 5 was constructed to describe graduates' level of job satisfaction by their employment status. Graduates employed on a part-time basis were most satisfied with their job (M = 4.27; SD = .38). Graduates who were attending graduate or professional school (M = 4.16; SD = .34) had the next highest rating of job satisfaction, followed by graduates employed full-time (M = 3.88; SD = .80) and caring for family full-time (M = 3.64;

SD = .00). Graduates comprising the "other" (*M* = 3.54; *SD* = .79) category were least satisfied with their employment status.

Table 5
Job Satisfaction of College of Agriculture Graduates by Employment Status (n = 135)

Employment Status	*f*	%	*M*	*SD*
Employed full-time	99	73.3	3.88	.80
Attending graduate or professional school	26	19.3	4.16	.34
Employed part-time	5	3.7	4.27	.38
Caring for family full-time	1	0.7	3.64	.00
Other	4	2.9	3.54	.79

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

The career paths graduates entered were ranked from highest to lowest in terms of mean scores (Table 6). The career paths comprising the greatest number of graduates consisted of graduate school and management (*f* = 26, 20.8%), while 15 graduates entered careers in sales (12%). The career paths least taken by graduates were: research assistants (*f* = 5, 4%), support staff (*f* = 4, 3.2%), and financial services, educational trainers in industry, and food services (*f* = 3, 2.4%).

When assessing for job satisfaction by career path, graduates who entered career paths as scientists (*M* = 4.55; *SD* = .44) were most satisfied. Graduates rounding out the top five most satisfied with their career path included those who entered into careers in financial services (*M* = 4.29; *SD* = .70), teaching (*M* = 4.25; *SD* = .53), graduate school (*M* = 4.17; *SD* = .35), and educational training (*M* = 4.12; *SD* = .04). The career path graduates were least satisfied with were those who were employed as research assistants (*M* = 3.07; *SD* = 1.39). Rounding out the bottom five career paths graduates were least satisfied with were: food services (*M* = 3.71; *SD* = .56), production agriculture (*M* = 3.69; *SD* = .43), "other" (*M* = 3.68; *SD* = .86), and support staff (*M* = 3.36; *SD* = 1.20).

Table 6
Job Satisfaction of College of Agriculture Graduates by Career Path (n = 125)

Rank	Career Choice	*f*	%	*M*	*SD*
1.	Scientists	6	4.8	4.55	.44
2.	Financial Services	3	2.4	4.29	.70
3.	Teachers	9	7.2	4.25	.53
4.	Graduate School	26	20.8	4.17	.35
5.	Educational Trainers (Industry)	3	2.4	4.12	.04
6.	Sales	15	12.0	4.00	.52
7.	Management	26	20.8	3.95	.75
8.	Communications	8	6.4	3.81	.74
9.	Food Services	3	2.4	3.71	.56
10.	Production Agriculture	6	4.8	3.69	.43
11.	Other	11	8.8	3.68	.86
12.	Support Staff	4	3.2	3.36	1.20
13.	Research Assistants	5	4.0	3.07	1.39
	Total	125	100	3.96	.70

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

Table 7 describes graduates' level of job satisfaction by their current salary. In terms of satisfaction, graduates earning between \$35,000 – \$39,999 were most satisfied (*M* = 4.11; *SD* = .52) with their current salary. Graduates earning less than \$20,000 were the next most satisfied (*M* = 4.04, *SD* = .56) with their salary, followed by graduates earning \$30,000 – \$34,999 (*M* = 3.93; *SD* = .68). Graduates who were least satisfied with their current salary were those earning between \$20,000 – \$24,999 (*M* = 3.58; *SD* = .95).

Table 7
Job Satisfaction of College of Agriculture Graduates by Salary Status (n = 129)

Salary	*M*	*SD*
Less than \$20,000	4.04	.56
\$20,000 – \$24,999	3.58	.95
\$25,000 – \$29,999	3.72	.99
\$30,000 – \$34,999	3.93	.68
\$35,000 – \$39,999	4.11	.52
\$40,000 – \$44,999	3.92	.78
Greater than \$45,000	3.84	.85

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

Objective three sought to assess the number of hours per week COA graduates worked at their job. Nearly 7% of graduates work less than 20 hours per week, while over 70% of graduates work between 40 and 59 hours per week (Table 8). Over 15% of graduates work between 21 – 39 hours per week. Six percent work between 60 – 79 hours per week, while a little over 1% of graduates work over 80 hours per week.

Table 8
Number of Hours per Week College of Agriculture Graduates Work at their Jobs (n = 136)

Hours per Week	*f*	%
Less than 20 hours	9	6.6
21 – 29 hours	6	4.4
30 – 39 hours	15	11.0
40 – 49 hours	71	52.2
50 – 59 hours	25	18.4
60 – 69 hours	5	3.8
70 – 79 hours	3	2.2
More than 80 hours	2	1.4

Objective four sought to identify COA graduates' salary status by academic degree. Only five graduates earned above $45,000 per year (Table 9). These graduates obtained their academic degrees in either agricultural journalism, food science and nutrition or general agriculture. The greatest number of graduates earning less than $20,000 was those in animal science (*f* = 6; % = 4.4%) and agricultural journalism (*f* = 5; 3.8%) degree programs. The majority of agricultural economics and hotel and restaurant management graduates earned a salary between $30,000 – $34,999 per year.

Table 9
Annual Salary of College of Agriculture Graduates by Academic Degree

	Annual Salary						
Academic Degree	Under $20,000	$20,000 – 24,999	$25,000 – 29,999	$30,000 – 34,999	$35,000 – 39,999	$40,000 - 44,999	Above $45,000
Agricultural Economics	2	1	0	4	0	0	0
Agricultural Education	4	1	1	3	4	1	0
Agricultural Journalism	5	1	0	2	0	2	1
Agribusiness Management	3	1	0	4	0	3	0
Agricultural Systems Mgt	2	1	0	3	2	3	0
Animal Science	6	2	2	3	1	0	0
Biochemistry	3	1	0	0	1	3	0
Food Science & Nutrition	1	0	0	0	2	1	3
General Agriculture	0	0	1	0	1	2	1
Hotel & Restaurant Mgt	1	1	0	4	2	2	0
Plant Science	3	0	2	1	1	2	0
Fisheries & Wildlife	2	1	2	0	2	0	0
Forestry	4	0	1	0	0	0	0
Parks, Recreation, & Tourism	1	1	0	1	2	0	0
Soil & Atmospheric Science	3	0	1	0	0	1	0

The purpose of objective five was to assess COA graduates' level of job satisfaction by academic degree. Academic degrees were ranked from highest to lowest according to their mean job satisfaction score (Table 10). Graduates from the fisheries and wildlife degree program experienced the greatest level of job satisfaction (*M* = 4.29; *SD* = 1.01). In addition, graduates in agricultural systems management (*M* = 4.21; *SD* = .33), biochemistry (*M* = 4.21; *SD* = .46), parks, recreation, and tourism (*M* = 4.09; *SD* = .71), and plant science (*M* = 4.04; *SD* = .39) rounded out the top five academic degrees in terms of job satisfaction. Graduates with degrees in food science and nutrition (*M* = 3.52; *SD* = 1.08) were least satisfied with their jobs. Graduates with degrees in agribusiness management (*M* = 3.73; *SD* = .73), forestry (*M* = 3.73; *SD* = .83), animal science (*M* = 3.61; *SD* = .76), and general agriculture (*M* = 3.57; *SD* = 1.34) rounded out the bottom five academic degrees in which graduates were least satisfied. Overall, COA graduates tended to be satisfied with their respective careers (*M* = 3.93; *SD* = .73).

Table 10
Assessing Job Satisfaction of College of Agriculture Graduates by Academic Degree (n = 141)

Rank	Academic Degree	*f*	%	*M*	*SD*
1.	Fisheries & Wildlife	7	5.0	4.29	1.01
2.	Agricultural Systems Management	13	9.2	4.21	.33
2.	Biochemistry	10	7.1	4.21	.46
4.	Parks, Recreation, & Tourism	5	3.5	4.09	.71
5.	Plant Science	10	7.1	4.04	.39
6.	Hotel & Restaurant Management	10	7.1	4.03	.53
7.	Agricultural Journalism	11	7.8	4.02	.65
8.	Soil & Atmospheric Science	5	3.5	3.99	.89
9.	Agricultural Education	14	9.9	3.98	.63
10.	Agricultural Economics	9	6.4	3.83	.81
11.	Agribusiness Management	13	9.2	3.73	.73
11.	Forestry	6	4.3	3.73	.83
13.	Animal Science	15	10.6	3.61	.76
14.	General Agriculture	5	3.5	3.57	1.34
15.	Food Science & Nutrition	8	5.8	3.52	1.08
	Overall Level of Satisfaction (all graduates)	141	100.0	3.93	.73

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

Conclusions

The MU COA has a strong success rate of graduate employability. Nearly three-fourths of MU COA graduates were employed full-time, while only three percent of the graduates surveyed were unemployed. It was revealed that graduates who work on a part-time basis appeared to be most satisfied with their chosen careers.

In addition to graduates being employable, they are also entering a wide array of career opportunities. This finding is consistent with a previous study conducted by Robinson and Garton (2006) who found that agricultural education graduates were entering a variety of careers. Specifically, the largest portion of graduates is enrolled in graduate school. Outside of those attending graduate school, the next largest portion of graduates employed in the workforce were those who entered careers in management, sales, and “other.” Because the “other” category serves as a “catch-all” for all careers not detected as one of the thirteen identified categories, it brings further credence to the fact that graduates are entering a wide variety of careers. The career path containing the fewest amount of graduates is service-oriented careers (i.e. support staff, educational training, financial services, and food services).

This study revealed that 80% of COA graduates worked between 30 – 59 hours per week and were satisfied with their chosen career. Hughes (1937) maintained, in his theory of career success, that an individual's salary was an objective variables which would indicate job satisfaction. Over 85% of the graduates earned salaries ranging from \$20,000 – \$44,999 per year. Graduates who were most satisfied with their salary earned \$35,000 – \$39,999 annually, followed by those who earned less than \$20,000 per year and whom worked part-time. Holistically, when comparing graduates across the college, those with degrees in food science and nutrition and general agriculture earned the highest salaries, while animal science and forestry majors earned the lowest salaries. The largest number of graduates surveyed earned salaries less than \$20,000 per year, followed by those who earned \$30,000 – \$34, 999 annually. In all, graduates across the college agreed to be satisfied with their current salary regardless of how much or little they earned. Because graduates were satisfied with their jobs regardless of salary, Hughes' (1937) theory of career success is not entirely supported.

Fisheries and wildlife graduates were most satisfied with their chosen career field, while food and science nutrition graduates were least satisfied with their chosen career. General agriculture and food science and nutrition graduates earned the highest salaries, yet were least satisfied with their chosen careers. Heslin (2005) stated that most people relate their career success to their salary. This study found that not all graduates who earned high salaries were satisfied with their chosen career. In all, nine academic degree programs had graduates with greater satisfaction than the overall mean level of satisfaction.

Graduates who entered industry as scientists were most satisfied with their chosen occupation. Graduates with support staff positions as well as those serving as research assistants were undecided about their level of job satisfaction. Graduates who entered careers in financial services, teaching, graduate school, educational training (industry), sales, management, communications, food services, production agriculture, and "other" all agreed to be satisfied with their career path.

Implications

An implication could be that graduates employed part-time enjoy their flexibility and freedom and are thus more satisfied with their career choice as compared to the graduates who are employed full-time. Boverie and Kroth (2000) stated that today's employees seek fun and time away from work. It could be implied that graduates who earn less than \$20,000 per year, and work part-time, focus less on salary and more on the quality of the career in which they hold.

Heslin (2005) stated that career success can be attributed to one's salary. Yet, the graduates who earned the most were the least satisfied. This finding begs the question, "Why?" Could it be higher paying jobs come with added pressure to perform? Is there a higher sense of stress associated with these careers for graduates?

It has been well established that one of the purposes of higher education is to prepare graduates for employment (Cole & Thompson, 2002; Evers, Rush, & Berdrow, 1998; Martin, Milne-Home, Barrett, Spalding, & Jones, 2000; McLaughlin, 1995; Peddle, 2000) and life after college (Kember & Leung, 2005; Martin et al., 2000). In their theory of phsycological work, Dawis and Lofquist (1984) suggested that employees require "compensation for work performance and additional conditions of work such as a safe environment, a comfortable place to work, congenial co-workers, a competent supervisor, and an opportunity to achieve" (p. 56). It could be implied that these areas are being addressed with the graduates in this study.

Dawis and Lofquist (1984) further stated that "work is an interaction between an individual and a work environment in which each has requirements of the other. The work environment requires certain tasks to be performed and the individual brings skills to perform the tasks" (p. 56). Upon reviewing the findings of this study, it can be implied that this Midwestern land-grant institution's COA is adequately preparing graduates for life after college and that its graduates have adequate skill sets and are generally satisfied with all aspects of their careers.

Recommendations

In an effort to bring awareness to service-oriented careers, faculty at this institution should encourage service learning opportunities for their students. The financial stability of jobs within a career can oftentimes be a crucial component in recruiting and retaining students. Therefore, it is recommended that faculty share this information with current students who are making decisions about accepting a job in a specific field or discipline. Further, faculty should share this information with prospective students who are considering enrolling in respective academic programs in an effort to provide a job forecast in an effort to improve students' decision making process.

It is recommended that prospective students considering a degree in agriculture be alerted that roughly 75% of agriculture graduates at this institution attained full-time employment and were generally satisfied with their chosen career. Further, current students in the COA should be notified that their older colleagues have secured employment or are continuing their education and are generally satisfied with their chosen careers.

Additional research should seek to determine why graduates with higher salaries were less satisfied with their jobs. The findings of this research might shed light on the balance needed between having a high paying job and being satisfied with the job, especially for future graduates who will be entering the workforce.

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Employability and Job Satisfaction of College of Agriculture Graduates at the University of Kentucky

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Abstract

The purpose of the study was to track College of Agriculture (COA) graduates (n = 57) at the University of Kentucky to determine their employability status, identify which employability skills they perceived to be needed in the workplace, and assess their overall level of job satisfaction. Specifically, the study sought to identify the level of importance of the employability skills to graduates' work and the level of competence graduates perceived themselves to possess while performing the employability skills at work. The study revealed graduates with industry positions most often entered careers associated with management, sales, teaching, and research. Over 20% of responding graduates indicated they were enrolled in graduate school. The Borich (1980) needs assessment model was used to assess the data concerning the employability skills most in demand. It was revealed that, by combining the perceived importance construct with the perceived competence construct on the various employability skills, visioning and motivation were most in need of curriculum enhancement, while coordination, interpersonal relations, and decision making were least in need of curriculum enhancement. Specifically, graduates perceived 14 of the 16 employability skill constructs to be more important than their ability to perform them. Overall, graduates are satisfied with their career.

Introduction

According to the document, Employment Opportunities for College Graduates in the U.S. Food, Agricultural, and Natural Resources Systems (2005), the demand for graduates with degrees in agriculture remains high. The report indicated that by 2010, an estimated 52,000 new job openings will have emerged in agriculture over a five year time span with the greatest opportunities and needs in the areas of management and business, scientific and engineering, agricultural and forestry production, and education, communication, and governmental agencies (Employment Opportunities, 2005). However, only a little over 49,000 graduates will be qualified to fill the openings, thus, creating a void in the workplace.

Further contributing to the void is the fact that not all graduates will be prepared and deemed "employability ready" by the time they enter the workplace. Peddle (2000) noted entry-level graduates have not acquired the necessary skills needed for the workplace (Peddle, 2000). While there is much speculation as to what defines a "quality" graduate, a need for graduates to possess general, employability skills becomes imperative. Because it is becoming increasingly more important for graduates to be able to transfer the knowledge they learn in the college classroom and apply it to the workplace (Candy & Crebert, 1991), graduates should possess the employability skills demanded in industry (Billing, 2003).

Several studies have focused on the employability skills graduates of agriculture programs need to be successful. In a study to identify the competencies employers seek in college of agriculture graduates from the University of Nebraska-Lincoln, Andelt, Barrett, and Bosshamer (1997) found that communications skills were of most importance. In addition, the ability to listen and speak clearly was determined to be two of the most important aspects of communication skills. According to Andelt, et al. (1997) employers felt as though employability skills such as problem solving and teamwork would need to continue to improve in the future of the graduate employees.

Graham (2001) conducted a three-year study to determine the preparation of entry-level agriculture graduates for employment as perceived by employers and found that employers placed a strong emphasis on the skill areas of teamwork, employability, dedication, and initiation. In terms of communication skills, employers rated listening as the most important. Character traits such as honesty, dependability, and integrity were also valued by the employers in this study.

More recently, Robinson, Garton, and Vaughn (2007) surveyed College of Agriculture, Food and Natural Resources graduates and their immediate supervisors at the University of Missouri. They concluded problem solving, decision-making, organization and time management, risk taking, listening, creativity, innovation, and change, lifelong learning, and motivation were the skills entry-level graduates most lacked. These skills represented the areas needed for curriculum enhancement. In contrast, written communication was the skill least in need of curriculum enhancement.

While identifying needed skills is crucial, it is also important to determine how competent students are at performing the skills needed in the workplace. Radhakrishna and Bruening (1994) sought to determine the skills and experiences deemed necessary for agribusiness graduates in Pennsylvania. They found that students and employees of agribusiness graduates alike agreed the employability skills identified were more important than the graduates' ability to perform them.

One means for gaining competence in employability skills is through work experience (Knight & Yorke, 2003). Typically, employers prefer to employ people who have had work experience and can demonstrate what they have learned as a result of their work experience. Work experience can be improved by incorporating entrepreneurship modules to the curriculum, receiving better career advice, and completing portfolios that inform employers of what they learned because "It could be objected that higher education is primarily about developing advanced understanding of worthwhile subject matter, not about employability" (p. 8).

The bottom line for graduates is being able to transfer the skills and knowledge learned in the classroom to the workplace setting. However, making the transition from higher education to the workforce can be difficult. Crebert, Bates, Bell, Carol-Joy, and Cragnolini (2004), stated "the transition from university to employment often brings insecurity and unease" (p. 48). Graham and McKenzie (1995) concluded that the transition process from higher education to the workforce is difficult. One reason this transition is difficult is because graduates are not fully prepared for what industry demands of its employees. Graduates lack the readiness needed to perform to the standards of the employers (Crebert, et al., 2004).

A possible reason graduates struggle to adjust and fit in is because they have a misconception of what the workplace entails. Graham and McKenzie (1995) suggested graduates' perceptions about their employment are too high. "Many new graduates expect higher earnings, higher levels of appointment and higher status in their first job than the market can offer them" (Crebert et al., 2004, p. 60). Therefore, it is imperative to assess the level of job satisfaction of graduates and assist in preparing them for realistic expectations concerning the workplace.

Job satisfaction is the perception people have about their jobs (Dawis & Lofquist, 1984; Martin, 2002; Rowden, 2002) and is imperative ". . . in determining whether or not graduates remain in their chosen career" (Garton & Robinson, 2006) p. 32). Martin, Milne-Home, Spalding, and Jones (2000) concluded "there is . . . a need for institutions to monitor graduate satisfaction, better prepare them for employment, and explore the relationship between these two dimensions" (p. 203). Graduate satisfaction is important because ". . . satisfied alumni tend to supply jobs to new graduates who studied at their institution" (Schmidt et al. as cited in Martin et al., 2000, p. 200).

Theoretical Framework

Bandura's (1977) Self-Efficacy Theory served as the theoretical lens for this study. Bandura (1993) stated "efficacy beliefs influence how people feel, think, motivate themselves, and behave" (p. 118). Further, "Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (Bandura, 1994, p. 71). Bandura (1993) contended that general task accomplishment was dependent upon one's self-efficacy, and that a personal efficacy in employability skills either allows or hinders one from advancing in a chosen career field (1997).

Bandura (1994) identified four main sources of his self-efficacy theory: mastery experiences, vicarious experiences, social (verbal) experiences, and somatic and emotional states in judging one's competencies (physiological arousal). The first source is mastery experiences. Bandura stated that people develop a stronger sense of self-efficacy when they are able to master certain tasks and experiences. Depending on the task, mastery experiences should require various amounts of time and effort to accomplish.

Experiencing vicarious learning is the second source of developing one's sense of self-efficacy. Watching and observing others, or having a certain task demonstrated by a model, is an effective means for learning and developing one's efficacy. Likewise, observing an ineffective model or an effective model that fails at completing the task can lead to a lower sense of self-efficacy.

The third source of self-efficacy is experiencing productive social or verbal percussions. When people are positively reinforced that they are succeeding at accomplishing a task, their sense of self-efficacy is greatly enhanced. However, Bandura warns it is easier to decrease self-efficacy through social percussion than increase it; especially if it is implied that the individual does not possess the skills or expertise needed to complete the task.

Lastly, the fourth source to developing self-efficacy is based upon how people react to certain situations that arise in their performance of accomplishing the task at hand. This is known as the somatic and emotional state. Relieving stressors can increase one's sense of self-efficacy as a result of this domain.

Not only does one's perceived self-efficacy help determine what people believe they can accomplish in the way of skills, it also plays a factor in the decisions people make, such as the career they will enter. Bandura (1994) opined

> Career choice and development are but one example of the power of self-efficacy beliefs to affect the course of life paths through choice-related processes. The higher the level of people's perceived self-efficacy the wider the range of career options they seriously consider, the greater their interest in them, the better they prepare themselves educationally for the occupational pursuits they choose, and the greater is their success. Occupations structure a good part of people's lives and provide them with a major source of personal identity (p. 75).

Andelt, Barrett, and Bosshamer (1997) recommended that colleges should seek to identify and survey its employers every three to five years in an effort to determine the skills needed for college graduates as they begin their careers. To that end, a need exists to track graduates in their employment and determine which careers they entered into, if they are satisfied, and if they perceive themselves to be competent and efficacious in performing the employability skills demanded in the workplace.

Purpose of the Study

The purpose of the study was to track College of Agriculture (COA) graduates (n = 57) at the University of Kentucky (UK) to determine their employability status, identify which employability skills they perceived to be needed in the workplace, and assess their overall level of job satisfaction. Specifically, the study sought to identify the level of importance of the employability skills as it relates to graduates' jobs, the level of competence graduates' perceive themselves to possess at performing the employability skills while conducting their work, and the amount of discrepancy that exists between the two in hopes of enhancing the COA curriculum.

Objectives

1. Describe the demographics (gender, academic major) of the graduates.
2. Describe graduates' employment status.
3. Identify the career paths of graduates.
4. Assess graduates' perceptions of the importance of the employability skill constructs needed in industry.
5. Assess graduates' perceptions of their competence level at performing the employability skill constructs needed in industry.
6. Prioritize the employability skill constructs, according to graduates, in need of curriculum enhancement using the Borich needs assessment model.

7. Describe graduates' level of job satisfaction.

Methods and Procedures

The design of the study was survey research. The data were analyzed using descriptive statistics. The population for this study consisted of all UK COA graduates from January 2005 to May 2006 (*N* = 594). It was determined that a random sample of 235 was needed to approximate the population (Krejcie & Morgan, 1960). A 67-item questionnaire was adapted from Evers, Rush, and Berdrow (1998) with responses ranging from 0 – no importance (or competence) to 3 – major importance (or competence). The Borich (1980) needs assessment model was employed to determine where curriculum enhancement could occur by accounting for both constructs (importance and competence) simultaneously. The instrument was reviewed by a panel of experts, in a previous study, for face and content validity and resulted in a Cronbach's alpha of .94.

The questionnaire consisted of four sections, with job satisfaction and demographics comprising two of the sections. The Brayfield-Rothe (1951) job satisfaction instrument, as modified by Warner (1973) was employed for the job satisfaction section. This section consisted of 14 questions on job satisfaction and dissatisfaction factors and employed a five-point Likert scale ranging from 1 - strongly disagree to 5 - strongly agree. The reliability for the job satisfaction section was established through prior research resulting in a Cronbach's alpha coefficient of .94 for the summated scale (Cano & Miller, 1992).

To assess the objectives in the study, modes of central tendency and variability consisting of frequencies, percentages, means, and standard deviations were used. In addition, the Borich (1980) needs assessment model was employed to address objective 6. Graduates' were collapsed into one of the following categories: sales, management, communications, government agencies, production agriculture, scientists, research assistants, teachers, support staff, financial services, food services, educational trainers (industry), graduate school students, and production associates based upon responses to their chosen career paths.

The Dillman (2004) Tailored Design Method was used to collect data. The frame for the graduates was accessed through the Associate Dean's office in the COA. Specifically, three complete contacts were made to graduates encouraging them to participate in the study. Postcards announcing the forthcoming questionnaire were mailed two weeks before the Christmas holiday in the hope that if the postcard was sent to the graduates' former home address, he/she might be home for the Christmas holiday and retrieve it. In addition to alerting the participants about the study and the fact that they would be receiving a questionnaire in the future, the postcard also encouraged the graduates to respond back to the researcher to update their contact information if need be.

After allowing sufficient time for the postcard to reach its intended audience, and for the graduates to respond with a more accurate address, the complete questionnaire package which consisted of a cover letter, questionnaire, and pre-paid return envelope were mailed. A follow-up postcard was mailed to non-respondents two weeks after the initial mailing of the complete package. A second complete package was mailed to non-respondents two weeks after the follow-up postcard. Because the response rate for the first two attempts was below 20%, a third and final contact consisting of a postcard, followed two weeks later by a final complete package, was mailed. The data collection process began in December 2006 and ended in May 2007. With each contact, recipients were instructed to complete the questionnaires and return them to the researcher in the pre-paid, stamped envelope included. In all, 57 participants responded for a 24% response rate. While the researcher recognizes that this response rate is low, proper attempts were made and sustained for five months in an effort to maximize the responses. However, it is strongly cautioned that generalizations not occur beyond the scope of this study.

A contributing factor to the low response rate could be due to the fact that University of Kentucky graduates had not been surveyed in the recent past, and as such, correct addresses were difficult to obtain. Because of the low response rate, it was vital to control for non-response error. Non-response error was accounted for by comparing early and late respondents (Ary, Jacobs, & Razavieh, 2002) because late respondents tend to approximate non-respondents (Miller & Smith, 1983). Specifically, the first 25% (n = 14; early respondents) of respondents were compared to the last 25% (n = 14; late respondents) of respondents. This represented the extreme ends of the spectrum concerning early and late respondents, allowing for the greatest amount of possible discrepancy. Early respondents were compared to late respondents on their perceptions of the importance of the 16 employability skill constructs as their overall level of job satisfaction. T-tests were conducted to determine if any statistical significance existed in these phenomena with these two groups. The t-tests resulted in no statistical difference. Because there were no statistical differences, the groups were deemed to be similar; thus, the results hold true for and can be generalized back to the sample.

Findings

Objective one sought to describe the demographics (gender, academic major) of the graduates. In terms of gender, 34 (60%) of the respondents were male and 23 (40%) were female (Table 1).

Table 1
Demographics of Responding College of Agriculture Graduates by Academic Major (n = 57)

	Male		Female	
Academic Major	*f*	%	*f*	%
Agricultural Biotechnology	3	8.8	2	8.7
Agricultural Economics	8	23.5	0	0.0
Agricultural Education	2	5.9	2	8.7
Agricultural Communications	1	2.9	3	13.0
Animal Science	5	14.7	6	26.1
Forestry	1	2.9	2	8.7
Family Studies	0	0.0	1	4.3
Individualized Agricultural Studies	1	2.9	0	0.0
Landscape Architecture	2	5.9	0	0.0
Natural Resources	2	5.9	2	8.7
Plant and Soil Sciences	1	2.9	1	4.3
Production Agriculture	1	2.9	0	0.0
Public Service Leadership	4	11.8	4	17.4
Total	34	100	23	100

The academic major with the greatest response from graduates was animal science (41%), followed by public service leadership (29%), and agricultural economics (24%). The lowest response rates came from graduates with degrees in individualized agricultural studies (3%), production agriculture (3%), and family studies (4%).

Objective 2 sought to determine the employment status of graduates. Over 90% of graduates were either employed full-time or were enrolled in graduate school (Table 2). The remaining 9% of graduates were either unemployed, employed part-time, caring for family, or had another status of employment not identified (i.e., internship).

Table 2
Employment Status of College of Agriculture Graduates (n = 56)

Employment Status	*f*	%
Employed full-time	41	73.2
Attending graduate or professional school	10	17.9
Unemployed, seeking employment	2	3.6
Employed part-time	1	1.8
Caring for family full-time	1	1.8
Other	1	1.8

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

Objective 3 sought to identify the career paths of graduates. Almost 80% of graduates were involved in management (24%), graduate school (22%), sales (13%) teaching (9%) and research (9%) related careers (Table 3). Only 2% of graduates are entering careers in horticulture, communications, production agriculture, financial services, and as production associates.

Table 3
Career Paths of College of Agriculture Graduates (n = 55)

Rank	Career Choice	*f*	%
1.	Management	13	23.6
2.	Graduate School	12	21.8
3.	Sales	7	12.7
4.	Teaching	5	9.1
4.	Research	5	9.1
6.	Veterinarian	4	7.3
7.	Support Staff	2	3.5
7.	Government Agencies	2	3.5
9.	Horticulture	1	1.8
9.	Communications	1	1.8
9.	Production Agriculture	1	1.8
9.	Financial Services	1	1.8
9.	Production Associate	1	1.8

Table 4 was constructed to address objectives 4, 5, and 6. Specifically, objective 4 sought to assess graduates' perceptions of the importance of the employability skill constructs needed in industry. Per the table, graduates perceived the employability skill constructs motivation (M = 2.69, SD = .41), listening (M = 2.59, SD = .48), and problem solving and analytic (M = 2.55, SD = .39) to be most important to their jobs in the workplace, respectively. In contrast, graduates perceived written communications (M = 2.04, SD = .79), coordination (M = 2.04, SD = .82), and visioning (M = 1.99, SD = .99) to be least important to their jobs in the workplace.

Table 4
Graduates' Perceptions of the Importance of the Employability Skills and their Competence at Performing the Skills (n = 57)

	Importance[a]		Competence[b]		
Employability Skill Constructs	*M*	*SD*	*M*	*SD*	MWDS[c]
1. Visioning	1.99	.99	1.74	.85	.95
2. Motivation	2.69	.41	2.40	.40	.88
3. Problem Solving and Analytic	2.55	.39	2.31	.44	.68
4. Organization and Time Management	2.49	.42	2.27	.39	.63
5. Oral Communication	2.32	.66	2.19	.52	.59
6. Creativity, Innovation, and Change	2.23	.64	2.09	.64	.55
7. Lifelong Learning	2.51	.50	2.36	.47	.54
8. Written Communication	2.04	.79	2.04	.62	.48
9. Ability to Conceptualize	2.14	.67	2.01	.67	.46
10. Supervision	2.12	.80	2.06	.70	.44
11. Managing Conflict	2.22	.72	2.14	.60	.40
12. Risk Taking	2.15	.69	2.04	.62	.39
13. Listening	2.59	.48	2.53	.44	.30
14. Coordination	2.04	.82	2.08	.78	.23
15. Interpersonal Relations	2.52	.45	2.50	.44	.13
16. Decision Making	2.31	.45	2.15	.46	-.45

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

Objective 5 sought to assess graduates' perceptions of their competence level at performing the employability skill constructs needed in industry. Per the table, graduates felt most competent at performing the listening (M = 2.53, SD = .44) employability skill construct followed by interpersonal relations (M = 2.50, SD = .44) and motivation (M = 2.40, SD = .40), respectively. In contrast, graduates felt least competent at performing the employability skill constructs: ability to conceptualize (M = 2.01, SD = .67), written communication and risk taking (M = 2.04, SD = .62), respectively, and visioning (M = 1.74, SD = .85).

Objective 6 sought to prioritize the employability skills, according to graduates, in need of curriculum enhancement using the Borich needs assessment model. A discrepancy score was calculated by taking the summated mean importance rating minus the summated mean competence rating of each employability skill. A weighted discrepancy score was then calculated by multiplying the discrepancy score by the mean importance rating of each independent employability skill. Lastly, a mean weighted discrepancy score was calculated by taking the sum of the weighted discrepancy score for each employability skill and dividing by the number of observations (n = 57).

Visioning (MWDS = .95) was the skill possessing the greatest mean weighted discrepancy score. In addition to visioning, seven employability skills possessed mean weighted discrepancy scores greater than .50, including motivation (MWDS = .88), problem solving and analytic (MWDS = .68), organization and time management (MWDS = .63), oral communication (MWDS = .59), creativity, innovation, and change (MWDS = .55), and lifelong learning (MWDS = .54). The four employability skills that rated the lowest, all with mean weighted discrepancy scores equal to or less than .30, included listening (MWDS = .30), coordination (MWDS = .23), interpersonal relations (MWDS = .13), and decision making (MWDS = -.45).

Table 5
Graduates' Perceptions of the Importance of the Employability Skills and their Competence at Performing the Skills (n = 57)

Category	Employability Skill	MWDS
I	Visioning	.95
	Motivation	.88
II.	Problem Solving and Analytic	.68
	Organization and Time Management	.63
	Oral Communication	.59
	Creativity, Innovation, and Change	.55
	Lifelong Learning	.54
III.	Written Communication	.48
	Ability to Conceptualize	.46
	Supervision	.44
	Managing Conflict	.40
	Risk Taking	.39
	Listening	.30
IV.	Coordination	.23
	Interpersonal Relations	.13
	Decision Making	-.45

To prioritize the skills for curriculum enhancement, four categories were defined as a result of the mean weighted discrepancy scores. Category I was comprised of the highest discrepancy scores and consisted of all employability skills with a MWDS greater than .80 (Table 5). Category II was comprised of more moderate discrepancy scores which consisted of all employability skills with a MWDS ranging from .50 to .79. Category III was comprised of the lower discrepancy scores which consisted of all employability skills with a MWDS ranging from .30 to .49. Category IV was comprised of the items that had a negligible amount of discrepancy which consisted of all employability skills with a MWDS below .30. The items with the greatest need for curriculum enhancement were identified in category I because of they possessed the highest discrepancy scores.

The items with the greatest need for curriculum enhancement were identified in category I because of they possessed the highest discrepancy scores. The two employability skill constructs comprising category I consisted of visioning (MWDS = .95) and motivation (MWDS = .88). Five employability skill constructs had a more moderate discrepancy score and comprised category II, indicating a more moderate need for curriculum enhancement. The five constructs in category II were: problem solving and analytic (MWDS = .68), organization and time management (MWDS = .63), oral communication (MWDS = .59), creativity, innovation, and change (MWDS = .55), and lifelong learning (MWDS = .54).

Six employability skill constructs comprised category III due to possessing lower discrepancy scores, which indicated a lower need for curriculum enhancement. The six consisted of: written communication (MWDS = .48), ability to conceptualize (MWDS = .46), supervision (MWDS = .44), managing conflict (MWDS = .40), risk taking (MWDS = .39), and listening (MWDS = .30).

Three employability skill constructs fell into category IV and were perceived by graduates to possess negligible discrepancy scores. The three constructs consisted of: coordination (MWDS = .23), interpersonal relations (MWDS = .13), and decision making (MWDS = -.45).

Objective 7 sought to determine the overall level of job satisfaction of graduates. On the whole, graduates perceived to be satisfied (*M* = 3.80) with their job (Table 6).

Table 6
Graduates' Overall Level of Job Satisfaction (n = 49)

Variable	*M*	*SD*
Level of Job Satisfaction	3.80	.53

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

Conclusions

More male graduates responded to the study than did females graduates. Graduates with degrees in animal science had the most respondents, while graduates with degrees in individualized agricultural studies, production agriculture, and family studies had the least amount of respondents. Nearly half of the responding graduates are involved in careers involving management, sales, and teaching, while over 20% are enrolled in graduate school. Nearly three-fourths of all responding graduates are employed on a full-time basis. Overall, graduates agree to be satisfied with their jobs.

In terms of the employability skill constructs needed in the workplace, graduates perceived motivation to be most important to their job, while they perceived visioning to be the least important skill needed at their job. Graduates perceived themselves to be most competent at performing the listening employability skill, while they are least competent at performing visioning. It is important to note that although the visioning skill was rated at the bottom of both scales (importance and competence), due to the amount of discrepancy, it was included in category I and was perceived to be a skill with the highest need of curriculum enhancement.

In explaining his Self-Efficacy Theory, Bandura (1994) stated that "Perceived self-efficacy is defined as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (p. 71). Therefore, it can be concluded that graduates do not have a strong belief in their capabilities to perform visioning and motivation in the workplace and therefore have a low sense of self-efficacy in these two areas.

When plotting responses of graduates onto the quadrant analysis model, two employability skill constructs were deemed to possess a high need for curriculum enhancement – visioning and motivation. While motivation was a skill Robinson, Garton, and Vaughn (2007) identified as a need area for entry-level graduates, visioning was not. Constructs perceived to possess a moderate need for curriculum enhancement comprised quadrant II. These constructs included problem solving and analytic, organization and time management, oral communication, creativity, innovation, and change, and lifelong learning. Written communication, ability to conceptualize, supervision, managing conflict, risk taking and listening were all deemed a low need for curriculum enhancement and was represented in quadrant III. Three skill constructs were deemed negligible in terms of curriculum enhancement and were represented in quadrant IV. These constructs consisted of coordination, interpersonal relations, and decision making.

In all, graduates rated 14 of the 16 employability skill constructs higher on importance than their perceived competence level to perform them, with written communication and coordination being the exceptions. This finding is consistent with Radhakrishna and Bruening's (1994) conclusion that entry-level employees deem employability skills more important than their ability to perform the skills. Based on these findings, it can be concluded that responding COA graduates at this institution possess competence at performing the written communication and coordination skill constructs.

Implications and Discussion

Could it be that visioning is a learned trait best experienced through vicarious means and that because these graduates are entry-level employees, they have simply not had enough time to experience what it means to be a visionary on their jobs? Maybe these graduates have not been afforded an opportunity yet to observe a "visionary model" (Bandura, 1994). As such, graduates may have a lower sense of efficacy toward performing the visioning skill because of this lack of experience. Also, in the somatic and emotional domain of the self-efficacy theory, Bandura (1994) stated that relieving stressors can increase one's overall sense of self-efficacy. Could it be that a reason motivation is in demand is because these graduates are not adjusting well to their new environment (Crebert, et al., 2004) and are experiencing a number of stressors in their job and are thus not functioning well in these stressful situations? In addition, Bandura (1994) stated that mastery experiences lead to higher senses of self-efficacy. Would additional time and experience on the job present additional opportunities for these graduates to master visioning and motivation and thus have a positive effect on their self-efficacy beliefs with performing these two skills?

Recommendations for Practice

Based on the findings of this study, if UK COA faculty wanted to improve the curriculum, they could do so by focusing on the areas with the greatest amount of discrepancy – visioning and motivation. It is recommended that faculty identify creative ways to assist current students with enhancing their visioning and motivation skill sets. Additionally, attention should be paid to the skills included in the various components of the quadrant analysis model. If faculty are willing to take this study and its findings at face value, then it is recommended that all quadrants be addressed in sequence. Therefore, faculty should modify the existing COA curriculum by including the skill constructs represented in quadrant I. Once all skill constructs in quadrant I have been adequately addressed in the curriculum, skill constructs in quadrant II should be addressed, and then III. Because all 16 of the employability skill constructs were perceived to be of at least moderate importance, they should all be retained in the curriculum.

The findings of this study should be shared with UK COA faculty as a means to improve graduate employability. Current students should be exposed to the employability skill constructs most in demand in the workplace and should thus have an opportunity to learn about how to improve their own skill sets as a result. In addition, the findings should be shared with industry professionals in an effort to build and sustain rapport and maintain open lines of communication between industry professionals and higher education institution representatives.

Recommendations for Further Research

Because of the relatively low response rate, this study should be replicated on a yearly basis to further validate the findings. It is recommended the researcher consider altering the method employed for collecting data. For example, an in-depth interview with the accepting sample might have yielded better responses and insight into the skills in question. Additionally, case studies should be considered as a research tool for collecting data. Using the case study method would allow the researcher to follow graduates at various points throughout their first two years in their profession. Again, this might enrich the data garnered by adding breadth and depth as opposed to the design used in this study.

While this study revealed baseline data for the COA at the University of Kentucky as a whole, future research should consist of additional focused census studies for each academic department represented in the COA. This would bring about a higher level of clarity per each department as to the exact skill(s) in need and thus would allow for adequate enhancements to be made to all curricula.

Bandura (1994) emphasized that people develop a stronger sense of self-efficacy when they are able to master certain tasks and experiences. Therefore, a longitudinal study with these same graduates should be conducted in ten years to determine if graduates remain deficient in the same skills or if other skill deficiency areas have originated.

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External Factors Influencing Choice of Academic Major: A Comparison of Agricultural and Non-Agricultural Students

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Abstract

The purpose of this study was to examine the external factors that influence the selection of college major by students entering agricultural and non-agricultural degree programs at Texas Tech University in the fall of 2007. Chapman's (1981) Model of Student College Choice served as the theoretical framework for this study. The target population for this study was identified as first time college students entering into the College of Agricultural Sciences and Natural Resources. In order to achieve the purpose of this study, a nonequivalent control group of non-agricultural students was established. This study's instrument was adapted from a study by Wildman (1997) which evaluated factors of influence upon selection of an agricultural major. Items recorded in this study included demographics and external factors influencing selection of major. For external factors a ten-point Likert-type scale was utilized. Means and standard deviations were used to describe these data. Agricultural and non-agricultural participants in this study were very similar in terms of age, class rank, state residence, and ethnicity. However with home residence and gender, these two groups of students were more dissimilar in nature. Overall 31 of 37 external influence items had higher means scores for agricultural students than for non-agricultural students.

Introduction/Theoretical Framework

Nationally, post-secondary institutions hold an interest to attract the best and brightest students, and colleges of agriculture continually seek new and innovative ways to appeal to audiences such as these (Wildman & Torres, 2001). According to Washburn, Garton, and Vaughn (2002), colleges of agriculture traditionally spend vast amounts of time, energy, and finances in the recruitment of students and the marketing of programs. Yet efforts such as these are not based on empirical research, and consequently research is warranted to identify most effective recruitment strategies. Bobbitt (2006) furthered this idea in stating "Information should be continually gathered to identify current trends and the information students need so that recruitment efforts may continue to be successful" (p. 175). The relevance of this line of inquiry was also noted by Cole and Thompson (1999) who stated the following:

> Determining the information students use to make college and major decisions and the importance they attach to that information as well as determining the level of knowledge students possess about various programs within colleges or majors may assist in future recruitment and retention efforts. (p. 15)

Chapman (1981) provided a model looking at influences affecting potential students' selection of which college to attend. This model identified variables related to student characteristics, student backgrounds, external influences, and student's general expectations of college life. It served as the theoretical framework for this study. Chapman cited external variables associated with student's choice of which college to attend as significant persons, fixed college characteristics, and college efforts to communicate with students. Friends, family, and high school personnel can all be significant external influences in the decision process students utilize to select a specific college. "Location, costs, campus environment, and the availability of desired programs are included in this model as relatively fixed college characteristics" (p. 495). In continuation of Chapman's work associated with external influences upon college choice, he affirmed one of the initial steps a college can take in addressing enrollment issues is to study the ways it identifies and recruits potential students. Chapman also declared, through efforts to communicate with students, this is one of the most easily influenced variables colleges can modify or adjust.

Many agricultural studies have evaluated the impact external influences can have upon students' decisions to enroll in colleges of agriculture with somewhat mixed results. Wildman (1997) defined prior experiences in agriculture to include students working on a farm, ranch, or wildlife reserve along with various summer agricultural jobs, and also working with domestic and wild animals. Other agricultural experiences included were outdoor activities, hunting and fishing, and the 4-H and FFA. Research on these factors showed over half of agricultural students at New Mexico State University believed them to be very influential upon their selection of an agricultural major. An additional influence Wildman associated with prior exposure was relatives involved in agriculture. Participants showed relatives to be moderately influential although 41.4% classified relatives in agriculture as "very influential."

Dyer, Breja, and Wittler (2000), who studied college agriculture students at two Midwestern Land Grant universities, found that students with prior agricultural experiences were more likely to complete degree programs within colleges of agriculture. Their research classified students with prior experiences as students who had completed high school agriculture courses, were former members of 4-H and/or FFA, and lived in a rural setting. They believed these prior agricultural experiences were one of the best predictors of student retention within colleges of agriculture.

Chapman (1981) identified friends, family, and high school personnel as all being significant sources of influence in students' selection of a particular college to enroll. Jackman and Smick-Attisano concluded "Students' choice of college is influenced by some significant individual such as a family member (most likely a parent) or someone associated with the students' high school or potential college choice" (p. 49). Other research studies within colleges of agriculture have also assessed the impact of such people upon a student's decision to enroll in a college of agriculture.

According to Bobbitt (2006), the group of people with the most influence on college-choice decision of students entering the College of Agricultural Sciences and Natural Resources at Texas Tech University was a parent or guardian closely followed by a friend in college. At the University of Missouri, Washburn et al. (2002) found parents and guardians, along with other relatives and graduates of an institution or department, to be the three greatest groups of influence for students college-wide. Cole and Thompson (1999) determined that almost half of

Oregon State University students within the College of Agriculture viewed parents to be a source of valued information. This was in contrast to Oregon State Universities' findings in the College of Health and Human Performance, where only 10% of students indicated the value of parents in the college choice process.

To go along with findings from the College of Health and Human Performance at Oregon State, Wildman and Torres (2001) found dissimilar results to the previous agricultural studies. In their findings of New Mexico State students, Wildman and Torres identified parents, friends, and family as "Not Influential" (p. 50). Instead, this research identified professionals in agricultural fields and personal role models as being more influential in the college choice process for students. Yet, participants of the research by Wildman and Torres also classified Extension professionals and high school agriculture teachers, counselors, and other personnel as non-influential.

Just as mixed results were identified regarding the level of influence parents, family, and friends have upon the choice of a student to select an agricultural major; mixed findings have been found regarding high school personnel. As noted, Wildman and Torres (2001) determined agriculture teachers to be a non-influence in the college choice process with similar results being found by Rocca and Washburn in 2005. However, Cole and Thompson (1999) identified high school teachers of agriculture to be valuable in the recruiting process as they appeared to be promoting college programs.

In 2007, a study by Rocca and Washburn supported Cole and Thompson's (1999) findings with agriculture teachers. They determined that agriculture teachers proved especially influential among former FFA members enrolled in college agriculture programs. They highlighted this result with the following: "Agriculture teachers should be made aware that among all high school personnel, they have the greatest potential to influence their students' college choice. Agriculture teachers should also be the targets of recruitment materials and information from colleges of agriculture" (p. 11).

In evaluation of other significant persons influencing students to enroll agricultural programs, Boone, Newcomb, Reisch, and Warmbrod (1989) identified high school guidance counselors as a valuable source of information for Ohio college students. They concluded colleges of agriculture need to be more aware of the guidance counselor's potential role, and should develop activities to educate counselors about the many career opportunities agriculturally related fields can present. Conversely, Rocca and Washburn (2005) found dissimilar results regarding counselors as agriculture students at the University of Florida identified high school counselors as having a low level of influence in the college decision process. Still, Cole and Thompson (1999) determined Extension personnel to have a low level of influence in college selection by students, but recommended in-service for Extension staff on college recruitment information that is available and how it could be used. They believed education toward this group could be beneficial in attracting former 4-H members to colleges of agriculture.

Finally, in educational efforts toward people of influence, Washburn et al. (2002) indicated that direct contact by colleges of agriculture with college alumni could prove beneficial to students in the college information gathering stage. Rocca and Washburn (2005) indicated that direct contact by colleges and departments with parents and guardians might be beneficial to colleges of agriculture and natural resources. They furthered this idea by stating research should be conducted to determine what college or university features are most important to parents for their children's college choice. Bobbitt (2006) added "Care should be taken to not only recruit students to the university, but also to recruit their parents or guardians" (p. 174).

While previous studies have revealed some of the challenges along with potential audiences that colleges of agriculture should evaluate in order to sustain increased enrollment numbers, many studies have looked directly at most effective recruitment efforts. In reference to Rocca and Washburn (2007), it was found with former FFA members enrolled within a college of agricultural science that 75% of this group had participated in student activity events on campus while in high school. This was in contrast to the college agricultural students with no FFA background of which only 23% had been on the university's campus for student activities in high school. To further these results, Rocca and Washburn showed that other campus recruitment programs were used by nearly 50% of the FFA group compared to fewer than 30% of the students who were not former FFA members. It was concluded from these findings that "In working with College of Agriculture administration, the need for support of FFA events on campus is evidenced by these findings" (Rocca & Washburn, p. 11). Bobbitt (2006) found 79% of entering college students considered a campus visit the most influential recruitment tool in their selection of college.

In a comparison of high school students and transfer students entering the College of Agricultural and Life Sciences at the University of Florida, Rocca & Washburn (2005) determined that at least one-half of these students reported gathering college choice information from the Internet. Results showed that for high school students entering the college, three of the top five sources they utilized dealt with web-based information. This was even more of a factor for college transfer students whose top three items reported were web based information. Bobbitt (2006) found websites also proved beneficial in the recruitment of agriculture students. In this study it was shown that all entering students in agriculture and natural resources used websites to gather college information. Bobbitt also determined that program information on a college website was the most important source of information for entering minority students and second most important for non-traditional agriculture students from urban areas or who had no prior agricultural experience.

In a look at recruitment materials other than websites, Bobbitt (2006) determined that over 50% of students used printed publications for college choice decision. This was unlike mass media resources of TV, radio, newspaper, or magazine advertisements which proved to be the least utilized sources for students entering a college of agriculture and natural resources. Similar results were identified by Wildman and Torres (2001) who showed that a vast majority of agriculture and natural resource students relied on TV, radio, newspaper, or magazine advertisements very little or not at all when selecting a college major.

In relation to college or departmental people of influence, research also shows that contact by college personnel can be a key influence for students enrolling within colleges of agriculture. Rocca and Washburn's 2005 study of agricultural students rated personal contact with college representatives as highly useful even though only one third of students indicated such contact had been made. Recommendations were made from this study to make college faculty and staff aware of this finding on the role they can play in student recruitment. Also highlighted was the value in faculty participation in student recruitment activities. Bobbitt's 2006 study supported this recommendation by reporting 77.5% of students considered a personal conversation with a professor a factor in selecting the particular agricultural college. While a variety of factors have been shown to be useful resources in recruiting students into colleges of agriculture, personal contact and individual people may appear more important in selection of a college major.

Purpose and Objectives

The purpose of this study was to examine the external factors that influence the selection of college major by students entering agricultural and non-agricultural degree programs at Texas Tech University in the fall of 2007. In order to guide this study the following research objectives were developed:

1. Describe demographic characteristics of first year students majoring in agricultural and non-agricultural degree programs.
2. Determine if a difference existed between agricultural and non-agricultural students on the identified external influences of prior exposure to major, people of influence, and college or departmental factors.

Population

The target population for this study was identified as first time college students entering into the College of Agricultural Sciences and Natural Resources at Texas Tech University in fall 2007. The accessible population for this study was all entering freshman who attended a New Student Orientation (NSO) session in the summer of 2007 and selected an academic major in the College of Agricultural Sciences and Natural Resources. At Texas Tech University, NSO is a required activity which all freshman students must attend prior to enrolling in fall classes. Accessing freshman agriculture students at the summer NSO sessions allowed for a census of this particular group.

In order to achieve the purpose of this study, a nonequivalent control group was also established from a convenience sample of freshman students enrolled in IS1100: Tech Transition. IS 1100 is a one-hour course designed to introduce freshman students to university life at Texas Tech. This course is open and available to all freshman at Texas Tech University and is offered at variety of times and locations. While this group of students was not selected based upon chance, they were considered appropriate to the study due to two key student characteristics. First, these students were freshman enrolled at Texas Tech University for the first time in fall 2007. Second, this group of students represented a variety of academic majors from multiple colleges at Texas Tech University.

Instrumentation

This study's instrument was adapted from a study by Wildman (1997) which evaluated factors of influence upon selection of an agricultural major by students at New Mexico State University. This instrument was divided into three sections although this paper will only address sections one and three which are related to thts paper's objectives as the reported research was simply part of a larger study.

Section one of this study's instrument measured external factors influencing selection of an academic major and was subdivided into the following: prior exposure to college major (11 items), people of influence (13 items), and college or departmental factors (14 items). For each of these three sub-sections, students were asked how influential the following factors were when making decisions of which major to choose upon entering college. A ten-point Likert-type scale was utilized to record students' perceptions of each factor. If a student believed a specific factor was "very influential" he or she marked a number ten or at least a number closer to ten on the Likert-type scale. If a student perceived a factor to be "not influential" they marked a number one or at least a number closer to one on the Likert-type scale.

Part three of the questionnaire sought demographic information, again in a multiple choice and fill in the blank type of manor. Ten total questions were asked which were related to gender, age, class rank, home state, permanent residence, home state, ethnicity, and selected academic major. Age was collected as a precautionary measure as Chapman's (1981) Model of Student College Choice is limited to describing the pattern of influences affecting traditional age (18-21) prospective students.

Wildman (1997) established content and face validity of this instrument by a panel of experts which included New Mexico State University faculty and graduate students along with the College of Agriculture and Home Economics' Survey Review Committee. To establish reliability, Wildman (1997) performed a test-retest on a pilot group of students (n=25) over section one on external factors. Following test-retest administration, paired questions were analyzed to produce percent agreement calculations. The acceptable percent agreement was determined *a priori* at a minimum level of 75%. The percent agreements ranged from 75% to 100% for this section of the instrument. Demographics, the third section, was not tested for reliability as this information was assumed to be constant over time.

This survey of incoming students was administered in booklet form to both agricultural and non-agricultural students, and participants recorded their responses directly on the instrument. Students were verbally told the purpose of this study and were asked to participate. Also, the students were notified the study was voluntary. Participant's responses were entered in Microsoft Excel prior to being moved to Statistical Package for Social Sciences (SPSS) Version 14.0.

Results

A total of 393 students participated in this study. Of this 206 students had declared agricultural majors within the College of Agricultural Sciences and Natural Resources, while 187 students had declared non-agricultural majors in eight other colleges at Texas Tech University.

Of agricultural students in this study, 61.2% (n = 126) were male and 38.8% (n = 80) were female while 49.3% (n = 82) of non-agricultural students were male and 56.1% (n = 105) were female. From the agricultural group of students, 87.6% (n = 177) marked ethnicity as White/Non-Hispanic as did 84.6% (n = 152) of the non-agricultural students. Other ethnicities reported by students included Hispanic, Native American, Black/African American, Asian/Pacific Islander and other. The vast majority of students in this study listed state residence as in-state with 92.6% (n = 188) of agricultural students, and 93.5% (n = 174) of non-agricultural students reporting this.

In terms of permanent or home residence, the largest representation of agricultural students indicated coming from metropolitan areas (37.6%, n = 76). Rural-farm had the second highest representation for agricultural students at 30.2% (n = 61), and was followed by small city/town at 24.3% (n = 49), and rural non-farm at 7.9% (n = 16). Non-agricultural students also indicated metropolitan area (68.4%, n = 128) as the most represented home residence although by a greater margin. Small city/town (18.2%, n = 34) was represented next and was followed by rural-farm at 10.2% (n = 19), and rural-non farm at 3.2% (n = 6).

For this study all student ages ranged from 18 years up to 20 years. In terms of class rank the mean percentage included students being in the top 23.4% (n = 393) of their high school graduating class. Agricultural students came in at an average of being in the top 22.6% (n = 206) of their class and non-agricultural students came in the top 24.2% (n = 187) of their particular group of graduates.

Objective two of this study looked to determine if a difference existed between agricultural and non-agricultural students on external influences upon selection of academic major. For the purpose of this study external influences were grouped into three main categories which included: prior exposure to major, people of influence, and college or departmental factors. Means and standard deviations were used to describe these data.

Exposure to major was measured on 11 items in section one of this study's instrument. For agricultural students, the five highest rated items under this category were personal work experience (M = 7.44, SD = 6.64), related hobbies (M = 7.33, SD = 3.18), high school coursework (M = 6.78, SD = 5.44), related clubs or organizations (M = 6.75, SD = 3.53), and relatives in a similar field (M = 6.54, SD = 3.47). The remaining items under exposure to major for agricultural students were newspaper articles (M = 4.46, SD = 2.68), internet sources (M = 4.43, SD = 2.76), technical journals (M = 4.42, SD = 2.80), television programs (M = 4.41, SD = 2.62), non-technical magazines (M = 4.32, SD = 2.63), radio broadcasts (M = 3.67, SD = 2.54).

The five highest rated items for non-agricultural students were high school courses (M = 6.61, SD = 2.90), related hobbies (M = 5.90, SD = 3.58), relatives in a similar field (M = 5.65, SD

= 3.59), internet sources (*M* = 5.50, *SD* = 2.95), and personal work experience (*M* = 5.43, *SD* = 3.66). The other items with lower mean scores were related clubs or organizations (*M* = 4.84, *SD* = 3.52), television programs (*M* = 4.69, *SD* = 2.95), non-technical magazines (*M* = 4.42, *SD* = 2.84), newspaper articles (*M* = 4.11, *SD* = 2.77), technical journals (*M* = 3.71, *SD* = 2.72), and radio broadcasts (*M* = 3.38, *SD* = 2.45). Table 1 compares mean scores and rank order for exposure to major by agricultural and non-agricultural majors. Agricultural students indicated higher mean scores on 8 of 11 items.

Table 1
Perceived Differences on External Influences

	Agriculture (*n* = 206)			Non-Agriculture (*n* = 187)		
Prior Exposure to Major	Rank	*M*	*SD*	Rank	*M*	*SD*
Personal work experience	1	7.44	6.64	5	5.43	3.66
Related hobbies	2	7.33	3.18	2	5.90	3.58
High School courses	3	6.78	5.44	1	6.61	2.90
Related clubs or organizations	4	6.75	3.53	6	4.84	3.52
Relatives in similar field	5	6.54	3.47	3	5.65	3.59
Newspaper articles	6	4.46	2.68	9	4.11	2.77
Internet sources	7	4.43	2.76	4	5.50	2.95
Technical journals	8	4.42	2.80	10	3.71	2.72
Television programs	9	4.41	2.62	7	4.69	2.95
Non-technical magazines	10	4.32	2.63	8	4.42	2.84
Radio broadcasts	11	3.67	2.54	11	3.38	2.45

The second factor evaluated under external influences was people of influence (13 items). For agricultural students, mean scores greater than five were produced for items of parent or guardian (*M* = 6.86, *SD* = 2.8), professional in a similar field (*M* = 6.32, *SD* = 3.47), personal role model (*M* = 6.16, *SD* = 8.02), high school agri-science teacher (*M* = 5.71, *SD* = 3.73), friend in high school (*M* = 5.30, *SD* = 3.13). Other mean scores produced by agricultural majors ranged from 4.96 (*SD* = 3.41) to 3.26 (*SD* = 2.74). These items included friend in college (*M* = 4.96, *SD* = 3.41), high school science teacher (*M* = 4.86, *SD* = 3.17), extension professional (*M* = 4.57, *SD* = 3.5), sister or brother (*M* = 4.41, *SD* = 3.24), other high school teachers (*M* = 3.81, *SD* = 3.22), high school counselor (*M* = 3.52, *SD* = 3.01), and high school principal (*M* = 3.26, *SD* = 2.74).

With non-agricultural majors, mean scores greater than five were produced for items of parent or guardian (*M* = 7.03, *SD* = 2.72), professional in a similar field (*M* = 6.05, *SD* = 3.43), other relatives (*M* = 5.3, *SD* = 3.11), and personal role model (*M* = 5.23, *SD* = 3.71). The next five highest mean scores ranged from 4.90 (*SD* = 2.94) to 3.94 (*SD* = 2.97). These five items were friend in high school (*M* = 4.90, *SD* = 2.94), other high school teachers (*M* = 4.42, *SD* = 4.33), friend in college (*M* = 4.33, *SD* = 3.05), high school science teacher (*M* = 4.08, *SD* = 3.23), and sister or brother (*M* = 3.94, *SD* = 2.97). Remaining items from this list were high school counselor (*M* = 3.37, *SD* = 2.82), high school principal (*M* = 2.68, *SD* = 2.58), Extension professional (*M* = 2.40, *SD* = 2.39), and high school agri-science teacher (*M* = 1.99, *SD* = 2.20).

For agricultural majors, higher mean scores were found on 9 of 13 items. Parent or guardian was the most significant person of influence by both groups of agricultural students and non-agricultural students. Parent or guardian, was one of the two items where non-agricultural students had a higher mean score (*M* = 7.03, *SD* = 2.72) as compared to agricultural students (*M* = 6.86, *SD* = 2.80). Table 2 compares mean scores and rank order for people of influence by agricultural and non-agricultural majors.

Table 2
Perceived Influence of Individual Persons

	Agriculture (*n* = 206)			Non-Agriculture (*n* = 187)		
People of Influence	Rank	*M*	SD	Rank	*M*	SD
Parent or guardian	1	6.86	2.8	1	7.03	2.72
Professional in similar field	2	6.32	3.47	2	6.05	3.43
Personal role model	3	6.16	8.02	4	5.23	3.71
High School agri-science teacher	4	5.71	3.73	13	1.99	2.2
Other relatives	5	5.62	3.26	3	5.3	3.11
Friend in high school	6	5.3	3.13	5	4.9	2.94
Friend in college	7	4.96	3.41	7	4.33	3.05
High School science teacher	8	4.86	3.17	8	4.08	3.23
Extension professional	9	4.57	3.5	12	2.4	2.39
Sister or brother	10	4.41	3.24	9	3.94	2.97
Other high school teachers	11	3.81	3.22	6	4.42	3.46
High School counselor	12	3.52	3.01	10	3.37	2.82
High School principal	13	3.26	2.74	11	2.68	2.58

College or departmental factors was the final category under external influences. The five highest rated items for college or departmental factors influencing agricultural majors were friendly college atmosphere (*M* = 7.22, *SD* = 2.87), teaching reputation in college (*M* = 7.04, *SD* = 6.45), faculty's friendliness (*M* = 6.96, *SD* = 3.00), teaching reputation in department (*M* = 6.57, *SD* = 3.03), and departmental clubs or activities (*M* = 6.23, *SD* = 3.34). Personal visit with college representatives (*M* = 5.61, *SD* = 3.55), activities on TTU campus (*M* = 5.51, *SD* =3.27), and TTU internet sources (*M* = 5.36, *SD* = 3.17) also showed mean scores greater than five. College or departmental factors rounding out the list for agricultural students were departmental scholarships (*M* = 4.87, *SD* = 3.39), informational pamphlets (*M* = 4.71, *SD* = 2.84), college alumni (*M* = 4.67, *SD* = 3.47), high school visits from TTU representatives (*M* = 4.56, *SD* = 3.56), and advertisements about major (*M* = 4.44, *SD* = 3.03).

Friendly college atmosphere (*M* = 5.7, *SD* = 3.23), teaching reputation of department (*M* = 5.48, *SD* =3.4), teaching reputation of college (*M* = 5.33, *SD* = 3.15), TTU internet sources (*M* = 4.91, *SD* = 3.40), and faculty's friendliness (*M* = 4.88, *SD* = 3.08) were the five highest rated items by non-agricultural participants. Remaining items included informational pamphlets (*M* = 4.76, *SD* = 3.26), personal visit with college representatives (*M* = 4.64, *SD* = 3.26), activities on TTU campus (*M* = 4.20, *SD* = 3.06), advertisements about major (*M* = 4.11, *SD* = 3.31), departmental clubs or activities (*M* = 4.02, *SD* = 2.89), college alumni (*M* = 3.36, *SD* = 3.08), high school visits from TTU representatives (*M* = 3.08, *SD* = 2.91), and departmental scholarships (*M* = 2.96, *SD* = 2.86).

Table 3 compares mean scores and rank order for college or departmental factors by agricultural and non-agricultural majors. Agricultural students indicated higher mean scores on 12 of 13 items. The range of scores for agricultural students was from 7.22 (*SD* =2.87) to 4.44 (*SD* = 3.03). Non-agricultural students had a range of scores from 5.70 (*SD* = 3.23) to 3.08 (*SD* = 2.86). The only item which was found to have higher mean scores for non-agricultural students was informational pamphlets (*M* = 4.76, *SD* = 3.08). The mean score found on this item for agricultural students was 4.71 (*SD* = 2.84).

Table 3
Perceived Influence of College or Departmental Factors

	Agriculture (*n* = 206)			Non-Agriculture (*n* = 187)		
College or Departmental Factors	Rank	*M*	SD	Rank	*M*	SD
Friendly college atmosphere	1	7.22	2.87	1	5.7	3.23
Teaching reputation college	2	7.04	6.45	3	5.33	3.4
Faculty's friendliness	3	6.96	3	5	4.88	3.15
Teaching reputation department	4	6.57	3.03	2	5.48	3.4
Departmental clubs/activities	5	6.23	3.34	10	4.02	3.08
Personal visit with college reps.	6	5.61	3.55	7	4.64	3.26
Activities on TTU campus	7	5.51	3.27	9	4.11	3.26
TTU Internet resources	8	5.36	3.17	4	4.91	3.31
Departmental scholarship	9	4.87	3.39	13	2.96	2.89
Informational pamphlets	10	4.71	2.84	6	4.76	3.08
College alumni	11	4.67	3.47	11	3.36	2.91
HS visits from TTU reps.	12	4.56	3.56	12	3.08	2.86
Advertisements about major	13	4.44	3.03	8	4.2	3.06

Conclusions

Agricultural and non-agricultural participants in this study were very similar in terms of age, class rank, state residence, and ethnicity. However with home residence and gender, these two groups of students were more dissimilar in nature. While metropolitan area represented home for the greatest percentage of students, almost twice as many non-agricultural students (68%) came from this environment as did agricultural students (38%). Disparity was also found for students from rural-farms as three times as many agricultural students (30%) indicated this as home as did non-agricultural students (10%).

The agricultural students in this study were predominantly male (61%) as compared to non-agricultural participants who were predominantly female (56%). With ethnicity, the majority of both agricultural and non-agricultural participants were classified as White/Non-Hispanic. However, the non-agricultural students showed slightly more ethnic diversity at 15.6% minority enrollments as compared to 12.4% for agricultural participants. In relation to state residence agricultural and non-agricultural students were virtually identical to one another. With agricultural respondents in this study, 93% were in-state students. Of non-agricultural respondents, 94% were also from in-state.

With the external influence of exposure to major, agricultural students rated five of the items significantly higher than all other items. These top five items were personal work experience, related hobbies, high school course work, related clubs or organizations, and relatives in a similar field. The lower rated items included newspaper articles, internet sources, technical journals, television programs, non-technical magazines, and radio broadcasts.
For non-agricultural students, the five items with the highest means for exposure to major were high school courses, related hobbies, relatives in a similar field, internet sources, and personal work experience. Personal work experience was ranked fifth for non-agricultural students as opposed to first for the agricultural group.

Parent or guardian was the most significant person of influence among agricultural and non-agricultural students and was one of only two groups of people rated higher by non-agricultural students as compared to agricultural students. This finding was consistent with findings from Bobbitt (2006), Washburn et al. (2002), and Thompson and Cole (1999). Other groupings of people agricultural students rated to have means scores over five other than parents were professionals in a similar field, personal role model, high school agri-science teacher, other relatives, and friend in high school. Other than agri-science teacher these groupings were in the top five most influential people for non-agricultural students.

Agricultural students had higher mean scores on 12 of 13 items under college or departmental factors and at a fairly significant rate. Although friendly college atmosphere had the highest mean for both groups, the mean for agricultural students on this item was 7.22 (*SD* = 2.97) as compared to 5.7 (*SD* = 3.23) for non-agricultural majors. Also, most items were similar in terms of rank with the exception of departmental clubs or activities which was ranked fifth for agricultural participants and tenth for non-agricultural participants. From these results, a stronger college or departmental connection may exist for agricultural majors than for non-agricultural majors.

Overall 31 of 37 external influence items had higher means scores for agricultural students than for non-agricultural students. With agricultural participants, 19 items had a mean score of 5.0 or more. Twelve items were found to have a mean score greater than 5.0 for non-agricultural students.

Discussion

Agricultural students in this study came from a variety of settings with representations of students from both urban and rural environments. From this it appears that the College of Agricultural Sciences and Natural Resources at Texas Tech University has been effective in attracting both students from small towns and rural farms along with students from metropolitan areas. However with indications of rural populations declining in numbers in many areas, the College of Agricultural Sciences and Natural Resources will need to continue to grow numbers of metropolitan students in the program without sacrificing recruitment of students from rural settings. With this in mind, the College of Agricultural Sciences and Natural Resources will need to continue to focus recruitment efforts toward multiple communities along with multiple audiences of students which will represent multiple ethnicities along with both males and females.

From findings relative to external influences and selection of major, it appears a stronger connection exists between the items measured in this study and agricultural students as opposed to the non-agricultural participants overall. Particularly, these agricultural students may have had more exposure to their major, people who work in a similar type field, and the college of agriculture specifically. From this it appears that this college of agriculture is attracting students who have strong agricultural backgrounds. Furthermore, it appears this college of agriculture is doing an affective job in communicating with students.

Recommendations

1. This study looked at external factors associated to how students selected their initial major upon entering college for the first time in fall 2007. Continual research should be conducted to see how this audience may vary in terms of academics, retention, and persistence through their selected academic majors.

2. Agricultural respondents in this study were predominantly White/Non-Hispanic males who were traditionally aged college students from in-state. Opportunities should be explored which might increase numbers of students who are female, from ethnic minorities, non-traditional age groups, and who are from out-of-state. Why more of these students are not entering this particular college of agriculture should be evaluated.

3. Exposure to major was a factor upon how students initially selected their academic major. For colleges of agriculture to grow, ways to expose more students to agricultural majors and careers should be developed. This may include expansion and promotion of already established youth organizations associated to agriculture to new audiences of students or development of new programs aimed at all age groups of students. Also, agricultural work experience appeared to be highly related to selection of an agricultural major, possible internships for high school students in various agricultural areas should also be developed.

4. Parent or guardian, was identified as the most influential person for how students selected their academic major. This group should be made aware of educational opportunities in agriculture and at this particular institution. Also this type of contact should be made with agricultural professionals, agri-science teachers, alumni, Extension agents, and high school counselors. Although Extension professionals and high school counselors were rated low in this study for level of influence, education towards these two groups might increase their impact upon agricultural students.

5. Agricultural participants rated college or departmental factors higher on all but one item as compared to non-agricultural students. Perhaps, a stronger connection exists between agricultural students and their college than in other colleges. Agricultural student's high

perceptions of a friendly college atmosphere, the college's teaching reputation, and of departmental clubs or organizations should be promoted to potential students.

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Concurrent Research Session D

Theme: Teacher Education and School-based Agricultural Education Programs

Chair: Dr. Vern Luft, University of Nevada-Reno

Facilitator: Dr. Wendy Warner, California Polytechnic State University

Investigating Student Achievement in Mathematics: The Effect of an Integrated Agriculture and Mathematics Curriculum

Dr. Scott Burris, Texas Tech University
Aaron Bednarz, Texas Tech University
Dr. Steve Fraze, Texas Tech University

Abstract

An integrated curriculum allows students the opportunity to understand key concepts through application in a variety of settings (Conroy & Walker, 2000). The purpose of this study is to determine the effect of an integrated course on student achievement in mathematics. A pretest-posttest control group design was used to examine the differences students' math scores between the eighth grade and ninth grade year. The target population for the study was ninth grade math-risk students in "a designated educational region" of Texas during the 2005-06 school year. The sample consisted of math-risk students in ten schools; five traditional schools and five schools using a newly developed integrated course teaching algebra concepts in the context of agriculture. There was no significant difference found between school types on math scores. Students who are not involved in any form of math remediation had smaller gains in their scale score than students who are involved in a remediation program.

Introduction and Theoretical Framework

The No Child Left Behind Act of 2001 requires states to develop and implement a statewide yearly assessment measuring student's progress and understanding of the state curriculum (United States Department of Education, 2003). The Texas Assessment of Knowledge and Skills (TAKS) test is the measurement of student achievement used to determine achievement in Texas. Students are expected to reach proficiency level of achievement in the areas of reading/language arts, mathematics, and science before graduating from high school. Within the state, it is evident that students are struggling to reach levels of proficiency in these areas. In Region 8 of Texas, 68.7% of ninth grade students failed the mathematics TAKS test (Lair & Williams, 2007).

Students who have unsuccessful experiences in high school or fail to obtain a degree find themselves working minimum wage jobs (Trexler & Barrett, 1992). A primary concern for teachers is to ensure that all students have a positive educational experience in order to successfully complete high school. Through an integrated curriculum, teachers can help students have a successful experience in high school. An integrated curriculum allows students the opportunity to understand key educational concepts through application in a variety of settings (Conroy & Walker, 2000).

Agri-science is an example of an integrated curriculum. Agri-science has been defined as science applied through agriculture (Malpiedi, 1989). In an integrated science and agriculture curriculum, students are introduced to both science and agriculture concepts. The integration allows for students to apply the concepts to real-life settings. Through application, students create a stronger understanding of concepts. Application of content also allows for students to create an understanding of how concepts are beneficial. "The integration of academic principles into agriculture and natural resources can provide the context necessary for student in the 21st century to understhand the world they live in" (Balschweid, Thompson, & Cole, 2000, p. 36).

Not only does the agriculture curriculum allow for application of science concepts, it also provides a context for applying mathematic concepts in the classroom and laboratory. Young, Edwards, and Leising (2007) concluded a math-enhanced agricultural power and technology curriculum showed a positive effect on math achievement. Shinn, et al (2004) concluded mathematics achievement could increase through appropriate instructional strategies and "a contextualized curriculum that connects new ideas and skills to students' past knowledge and experiences" (p. 23).

Region 8 of the Texas Education Agency has implemented a new course called Agricultural Algebraic Extensive Exploration (A^2E^2). The A^2E^2 is an integrated agriculture and mathematics curriculum that allows students to apply mathematic concepts in an agricultural setting (Derrick, n.d.). According to the Texas Education Agency (2006), in 2003, 68.7% of the eighth grade students in Region 8 did not achieve at a mastery level of performance on the mathematics TAKS test. The A^2E^2 course was implemented in the school year 2003-2004 at three schools and has since grown to thirty-two of the forty eight districts in Region 8. The mathematics TAKS test scores have increased to 81% mastery in 2006 (Texas Education Agency, 2006). Is it a possibility that the A^2E^2 course is the contributing factor allowing for students to have increased test scores?

The A^2E^2 course is designed for ninth grade students who were unsuccessful in mastering the eighth grade TAKS test and are enrolled in Algebra I. A^2E^2 is designed to assist math-risk students who are struggling in understanding concepts by creating the opportunity for the application of algebra concepts to real world settings. Math-risk students are students who have performed below the standard on the preliminary administration (8th grade) of the TAKS math test. The A^2E^2 course creates learning opportunities through a block scheduling that allows for students to spend the first half of the class learning algebra concepts and the second half of the class applying those concepts to real-world, agricultural topics.

The theoretical framework for this study was Kolb's Experiential Learning Theory (ELT). Kolb defined ELT as "the process whereby knowledge is created through the transformation of experience. Knowledge results from the combination of grasping and transforming experience" (Kolb, 1984, p. 41).

Kolb's ELT is a four-stage learning cycle that allows for immediate (concrete) experiences to provide basis for observations and reflections by the learner (Kolb & Chapman, 2003). As an educator, ELT is a particularly unique theory because it is able to contribute to a variety of learning styles while creating the opportunity for an application of the curriculum and development of a deeper understanding of how it works. ELT is a continuous cycle that is depicted in Figure 2.1. Each phase of the cycle builds upon the lessons or concepts learned from the previous and allows for a stronger understanding of concepts students are faced with.

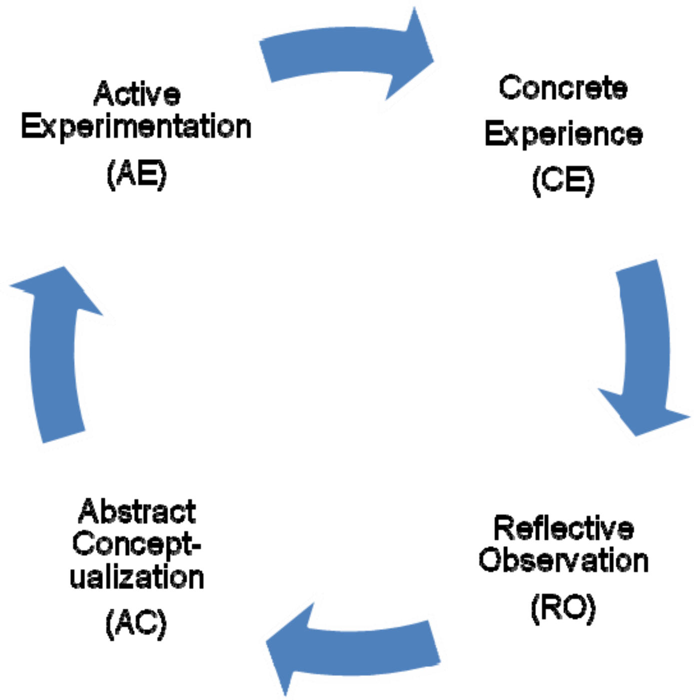

Figure 1: Kolb's Experiential Learning Theory (Kolb & Fry, 1975)

The cycle begins with concrete experience (CE). CE can be a wide range of experiences including, observations, primary text reading, field work, trigger films, examples, and laboratories. CE is followed in the cycle with reflective observation (RO). During RO students begin to reflect on their experience and the effects it has on them personally. Students at this point can achieve this through the use of a journal, log, discussion, or rhetorical questions. After RO students begin applying their newly acquired knowledge in the abstract conceptualization (AC) phase of the cycle. While in this portion of the cycle, students learn how to construct new processes of performing the task at hand. Students attain AC through written papers, model building, projects, or analogies. After AC students move towards active experimentation (AE) and use simulations, case studies, field work, or projects to develop a personal understanding of the methods of how to complete the activity. The AE phase of the cycle leads students back to CE, which allows for questioning and new knowledge to be found (Atherton, 2005).

Driscoll (1994) provided a conceptual framework for distinguishing theories of instruction from theories of learning. Driscoll stated that while the two must be compatible, they represent different views of learning outcomes. According to the model (Figure 1), learning theories attempt to explain the interaction of required learning conditions and outcomes of learning. A foundational assumption is that learning occurs when conditions are ripe. In contrast to learning theories, instructional theories account for "a deliberate arrangement of learning conditions to promote the attainment of some intended goal" (Driscoll, p. 332).

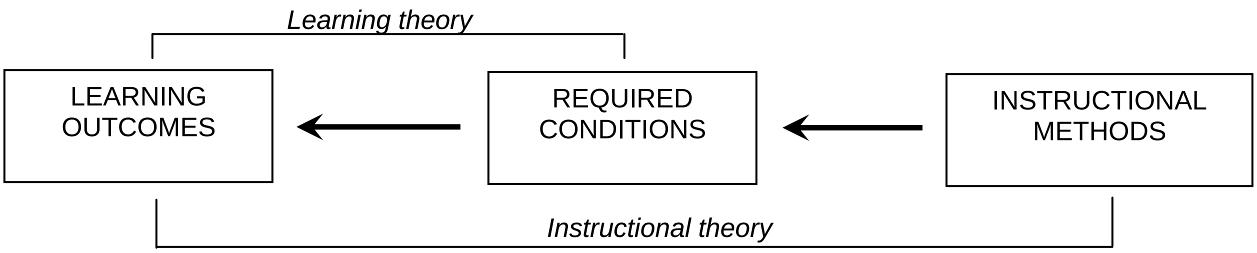

Figure 2. Relationship between Instructional Theory and Learning Theory (adapted from Driscoll, p. 332)

The framework of experiential learning has been used extensively to research agriscience programs at both the high school and university levels of education. Roberts (2006), in a philosophical examination of the experiential learning theory, discussed experiential learning as a process or context in which learning occurs. The process of experiential learning is discussed as cyclical and requires the initiative of the learner to begin the cycle. Roberts also described similarities between experiential learning, problem-solving, and inquiry-based learning.

Inquiry-based learning has been frequently used in science classrooms to increase student achievement and attainment of subject matter (Parr & Edwards, 2004). Their findings determine that the use of a learning cycle, as in experiential learning, can develop the scientific reasoning abilities of students. The learning environment has great effect on student achievement in the classroom. A learning environment conducive to sustained inquiry presents the greatest promise for the improvement of learning (Abraham, 1997). A sustained inquiry classroom is created through the use of a learning cycle approach to teaching such as experiential learning.

While academic educators are being accused of not applying concepts to real-world situations, vocational educators are receiving criticism for having a curriculum that is too specific in training students (Grubb, Davis, Lum, Plihal, & Morgaine, 1991). This problem can be addressed through the integration of academic and vocational curriculums. Researchers have determined that through the integration of curriculums teachers are able to increase students' abilities to think critically, solve problems, and understand concepts. Students are then able to apply those concepts to real-world situations, and increase achievement (Lankard, 1992; Mabie & Baker, 1996). Hoachlander (1999) stated that the prominent way for students to achieve mastery of skills and knowledge is through the application of concepts to real-world situations.

Research has been conducted to find different possibilities to address the issue of low-achieving students in all courses. Low-achieving students are capable of learning much more than what is typically demanded from them (Porter, Archbald, & Tyree, 1991). Researchers have also found that in creating a meaningful understanding for students concerning the curriculum increases motivation of students that results in an increase of student achievement. A meaningful understanding of the curriculum for students can be described as an understanding of the benefits of learning material, applying the material, and knowing the job market helps student develop motivation (Singh, Granville, & Dika, 2002; Porter et al. 1991). Berry (2002) supports these researchers in saying that students should be able to connect mathematics to their daily lives.

Miller and Gliem (1994) researched the abilities of agricultural science teachers to solve agriculturally related mathematics problems. Their research determined that how students are taught mathematics and problem-solving skills might have a greater influence on student abilities to solve mathematical problems.

Edwards (2004), in a review of literature, found that the development of academic curriculum into vocational courses is one strategy we can use improve student achievement. A^2E^2 is a form of an integrated course in which students study Algebra I concepts in the context of agriculture to increase student achievement and understanding in mathematics.

Purpose and Objectives

The purpose of this study is to determine the effect of an integrated course on student achievement in mathematics. The following objectives were developed to guide the study:

1. Identify the demographic characteristics of math-risk of ninth grade students.
2. Describe math-risk ninth grade students according to their eighth grade and ninth grade mathematics TAKS scale score.
3. Compare math scores of students enrolled in an A^2E^2 course with those not enrolled in an A^2E^2 course.
    a. H_0: There are no significant differences between A^2E^2 students and traditional students on math TAKS test.
    b. H_0: There are no significant differences between A^2E^2 students and traditional students on gain score.
4. Explore mathematics TAKS progress by demographic and school characteristics.

Methods and Procedures

The research project was conducted using a causal-comparative research design. In causal-comparative research, the researcher attempts to discover the effect a variable has on given groups or individuals. This type of research is often referred to as *ex post facto* because the treatment has already occurred (Frankel & Wallen, 2006). A pretest-posttest control group design was used to examine the differences students' math scores between the eighth grade and ninth grade year.

The target population for the study was ninth grade math-risk students in Region 17 of Texas during the 2005-06 school year. Five schools incorporated A^2E^2 into their curriculum during 2005-2006 school year. The A^2E^2 treatment group consisted of 9th grade math-risk students in each of those five schools. To form a comparison group, five additional schools were selected. These schools were matched to each of the treatment schools on the characteristics of school size, rural/urban classification, minority enrollment, SES composition, and school classification on standardized testing.

The 2005-06 school year was the most recent year for which standardized math scores were available at the time of the study. From the ten schools selected, data were available for 36 (n = 36) students in AE programs and 49(n = 49) students in traditions programs for a total sample size of 85 students (N = 85).

Prior to data collection, permission was obtained from superintendents of participating school districts. The lead administrator was asked to provide the most appropriate contact person; in most cases the principal or counselor. The contact person was asked to provide appropriate information for each ninth grade student the met the criteria for math-risk.

For each student, the contact person provided the scale score on the math portion of the state standardized assessment during the 8^{th} grade administration (pretest) as well as the same score on the 9^{th} grade administration (post-test). The contact person reported additional information on each student including enrollment in a math remediation class, gender, ethnicity, and socio economic status.

Data were reported by the contact person on a report form generated by the researcher. A coding system was utilized to allow test scores to be matched with student demographic data and still maintain the confidentiality of the students. Data collected was analyzed using Statistics Package for Social Science (SPSS) 15.0 for Windows.

Findings

Objective 1 sought to identify the demographic information of math-risk students in the ninth grade. The demographic information collected from databases at the school districts yielded the information presented in Table 1. The table presents information of A^2E^2 students, traditional students, and a summary of all students. A slight majority (56%) of A^2E^2 students were female. Conversely, a slight majority (55%) of traditional students were male. Seventy-eight percent of A^2E^2 students were minorities compared to 73% of traditional students. Over 80% of each group qualified for free/reduced lunch program indicating low SES. While A^2E^2 is considered a form of TAKS remediation, just over two thirds of traditional students were reportedly in some form of TAKS remediation.

Table 1
Demographic Characteristics of Math-risk Ninth Grade Students

	A^2E^2 (n = 36)		Traditional (n = 49)		Total (N = 85)	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Gender						
Male	16	44.4	27	55.1	43	49.4
Female	20	55.6	22	44.9	42	48.3
Ethnicity						
African American	2	5.6	5	10.2	7	8.0
Hispanic	26	72.2	22	44.9	48	55.2
Native American			9	18.4	9	10.3
White	8	22.2	13	26.5	21	24.1
Free/Reduced Lunch						
Qualify	30	83.3	41	83.7	71	81.6
Not Qualify	6	16.7	8	16.3	14	16.1
Math Remediation						
Yes	36	100.0	35	71.4	71	81.6
No	*		14	28.6	14	16.1

Note. A^2E^2 is a form of math remediation.

Objective 2 sought to describe math-risk ninth grade students according to their eighth grade and ninth grade mathematics TAKS scale score. Table 2 displays a summary of the scores on the mathematics TAKS test during the 8th grade and 9th grade administrations. In eighth grade, students had a mean of 1988.61 with a standard deviation of 66.24 on the mathematics TAKS test. Their mean score (M = 2022.00, SD = 105.50) and standard deviation increased for students on their ninth grade test.

Table 2

Traditional, A^2E^2, and Total Scale Scores on Mathematics TAKS Test

	8th Grade		9th Grade	
	M	SD	M	SD
Total (N = 85)	1988.61	66.24	2022.00	105.50
Traditional (n = 49)	2001.00	61.80	2036.20	108.88
A^2E^2 (n = 36)	1971.75	69.16	2002.67	98.91

Students in the A^2E^2 course had a mean score of 1971.75 on the mathematics TAKS test and a standard deviation of 69.16 during their eighth grade year. After being enrolled in the A^2E^2 course, students had a mean score of 2002.67 and a standard deviation of 98.61 for their ninth grade year. Traditional students had a higher mean score (*m* = 2001.00) and a lower standard deviation (*SD* = 61.8) than A^2E^2 students on their eighth grade test. Their ninth grade scores revealed a higher mean score (*m* = 2036.20) as well as a higher standard deviation (*SD* = 108.88) than the A^2E^2 students.

Objective 3 was to examine the difference between students enrolled in A^2E^2 and students not enrolled in A^2E^2 (Table 3). An independent samples *t*-test was used to compare the means of the A^2E^2 students to traditional student on their ninth grade mathematics TAKS test. The findings are expressed in Table 4.3. The research hypothesis for this objective states that students who are enrolled in an A^2E^2 course will score differently on the mathematics TAKS test than students who are not enrolled in an A^2E^2 course (H_1: $x_{A^2E^2} \neq x_{traditional}$). The null hypothesis states that there is no difference on the mathematics TAKS test between students enrolled in the A^2E^2 course and those not enrolled in the A^2E^2 course (H_0: $x_{A^2E^2} = x_{traditional}$). The alpha level was set *a priori* at α = .05. Traditional students (*n* = 49) scored a mean of 2036.20 (*SD* = 108.88) on the mathematics TAKS test, while students enrolled in an A^2E^2 course (*n* = 36) scored a mean of 2002.67 (*SD* = 108.88). The calculated *t*-value (t_{83} = 1.46) was not significant (*p* = .15) at α = .05. The null hypothesis was accepted. There was no significant difference between school types on math TAKS.

Table 3

Comparison of Ninth Grade Mathematics TAKS Score by School Type

School Type	Frequency (*f*)	Mean (*M*)	Standard Deviation (*SD*)	*t*	*p*
Traditional	49	2036.20	108.88	1.46	.15
A^2E^2	36	2002.67	98.91		

For each group, change scores were calculated to represent the increase in math comprehension from the 8th grade administration to the 9th grade administration (Table 4). In independent samples t-test was used to compare the means gain score of A^2E^2 students to traditional students. The research hypothesis states that students who are enrolled in an A^2E^2 course will have a different change in score than students not enrolled in an A^2E^2 course (H_1: $x_{A^2E^2} \neq x_{traditional}$). The null hypothesis states that students enrolled in A^2E^2 will have the same change in mathematics scale score as students not enrolled in A^2E^2 (H_0: $x_{A^2E^2} = x_{traditional}$). The alpha level was set *a priori* at α = .05. Traditional students (*n* = 49) change in mathematics TAKS scale score was 35.20 (*SD* = 95.20), while students enrolled in an A^2E^2 course (*n* = 36) change in mathematics TAKS scale score was 30.92 (*SD* = 95.85). The calculated *t*-value (t_{83} = .21) was not significant (*p* = .84) at α = .05. The null hypothesis was accepted. There was no significant difference between school types on change in math TAKS.

Table 4
Comparison of Changed Mathematics TAKS Score by School Type

School Type	Frequency (*f*)	Mean (*M*)	Standard Deviation (*SD*)	*t*	*p*
Traditional	49	35.20	95.20	.21	.84
A^2E^2	36	30.92	95.85		

Objective 4 sought to explore mathematics TAKS progress by demographic and school characteristics. Pearson product-moment correlations were used to examine mathematics TAKS scale scores, gender, and socio-economic status. Table 5 reveals the relationships found from the correlation. The relationship between ninth grade mathematics TAKS score and gender had a positive, negligible ($r = .05$) correlation. According to Miller (1994), this eliminates the need for further work attempting to establish causality. Ninth grade mathematics TAKS score and socio-economic status had a negative, low ($r = -.21$) correlation. The coefficient of determination (r^2) was calculated as 4.41%. The coefficient of determination allows the researcher to better describe the amount of variability within the variables. Although gender and socio-economic status have the largest correlation ($r = .31$), they are not significant due to the nature of the variables as they are not free to vary together.

Table 5
Pearson Product-Moment Correlation of Mathematics TAKS Scale Score, Gender, and Socio-Economic Status

	1	2	3
1. 9th Grade Mathematics TAKS Score	1	.05	-.21*
2. Gender[a]		1	.31*
3. Free/Reduced Lunch[b]			1

Note. [a]Gender Coding: 0 = Male; 1 = Female. [b]Socio-Economic Status: 0 = Not Qualify;1 = Qualify. *$p \leq .05$

Conclusions / Implications / Recommendations

Objective 1 sought to identify the demographic information of "math-risk" students in the ninth grade. The demographic information yielded important information to be considered when designing coursework for math-risk students. Seventy-three percent of the math-risk students were minorities (African American, Hispanic, and Native American). A large majority (81.6%) of the sample have low socio-economic status (SES). It is important to note that 81.6% of the sample is receiving a form of math remediation which will show to be important for students later in the chapter. Gender was shown to not be an indication of a math-risk student. Math-risk students are as likely to be male as female. Further research should focus on variables other than gender as an indication of success on standardized test.

The strong representation of diverse ethnicities in public school systems creates a need for our curriculum and coursework to become culturally diverse. In doing so, students will have opportunities to make real-life connections to concepts. The SES of math-risk students may be an indication of the need to increase funding for this group of students to allow for more teachers and teaching tools for the application of concepts. This is supported by the findings of Lankard, 1992; Mabie & Baker, 1996; & Lee, 1997.

While it is inspiring to see that the majority of students struggling with their education are receiving help and assistance through the use of remediation curriculums and tutorials, it is alarming to see that a percentage of the traditional programs were not providing any form of math remediation. Schools should continue to assist all students in reaching higher levels of achievement. Schools should also further develop programs to help students who are not performing at expectations

Objective 2 was to describe math-risk ninth grade students according to their eighth grade and ninth grade mathematics TAKS scale score. Students enrolled in A^2E^2 are not achieving to the extent of those enrolled in traditional programs. However, even though students in A^2E^2 were lower achieving, their scores changed similarly to those who were not in A^2E^2. This indicates A^2E^2 is as effective as other forms of math remediation in increasing student achievement in mathematics.

Students who are not involved in any form of math remediation had smaller gains in their scale score than students who are involved in a remediation program. This supports the conclusions for Objective 1 that remediation needs to be provided for all students.

Objective 3 was to examine the difference between students enrolled in A^2E^2 and students not enrolled in A^2E^2. The researcher investigated the students' ninth grade mathematics TAKS scale scores and the change in scores from eighth grade to ninth grade. According to the independent samples *t*-test, there are no significant differences between A^2E^2 and non-A^2E^2 on the ninth grade mathematics TAKS test. Change in scores from eighth to ninth grade were also investigated and no significant difference was found as well.

It is plausible the lack of difference in the ninth grade scores and the change in scores is a result of other forms of math remediation. It was indicated that seventy-one percent of non-A^2E^2 students receive a form of math remediation. This supports the conclusions of Objective 2 determining that A^2E^2 is as effective as other forms of math remediation.

Objective 4 sought to explore mathematics TAKS progress by demographic and school characteristics. It was determined that SES explained 4.41% (r = -.21) of the variability of students' mathematics TAKS score. The negative direction of the correlation, a function of coding, indicates that as students qualified for the free/reduced lunch program, their TAKS scores decreased. This relationship may highlight an area in which improvements can be made to our current efforts to promote academic achievement. Furthermore, this also indicates there are many other variables making an impact on students' mathematics TAKS scores.

Further researcher should be conducted investigating the cultural bias in our existing curriculum and testing. The findings from this study suggest that minority students have a more difficult experience finding success in mathematics. Existing curriculum should celebrate diversity by implementing interest approaches or activities that represent a wide variety of cultures, allowing students to become more engaged with the material. Further, investigation should be conducted towards teacher diversity and the approach taken to teach concepts in the curriculum. It is a possibility that the method chosen by the teacher is building a barrier and a lack of interest from the students due to presentation of materials or the interest approach.

Research projects should be developed to investigate other forms of math remediation and their effect on student's achievement regarding the mathematics TAKS test. This research project investigated a single type of math remediation. Schools using other forms of math remediation had similar effects on student achievement. In investigating these other forms of math remediation answers could be found to expand the A^2E^2 course to become significantly different and significantly effective as a form of math remediation.

A^2E^2 needs to be explored to determine how it can be expanded to make a greater impact on student achievement. It is the belief of the researcher that the course is effective when there is an opportunity to fully develop lesson plans and activities that allow for students to apply concepts learned in the classroom. The exploration of A^2E^2 could be achieved through replicating this study and expanding it to include a qualitative research aspect as well as a larger population.

A qualitative study should also investigate the amount of time spent preparing for the course by the teachers. This qualitative aspect could allow for an interview of the students. This would create the opportunity to determine what students are learning that is not measured by the mathematics TAKS test. Students could have the opportunity to voice their opinions of the A^2E^2 course and how it could be expanded.

Further research should be conducted investigating other variable impacting math performance. Research project could be conducted investigating a number of different variables that could play a role in helping students increase their scores. An example of a variable that could have an affect on student success is class size. Smaller schools typically have smaller classroom sizes due to the lack of students. Smaller classrooms may allow for students to gain more one-on-one time with teachers allowing for immediate guidance as needed.

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Personal Teaching Efficacy, General Teaching Efficacy and Content Efficacy: A Comparison of First and Fifth Year Agriculture Teachers

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Abstract

The purpose of this study was to compare first and fifth year agriculture teachers' on general teaching efficacy, personal teaching efficacy, and content efficacy. Teacher efficacy has been defined as a two dimensional construct composed of personal teaching and general teaching efficacy. Personal teaching efficacy involves a teachers' evaluation of their own capability to bring about student learning. General teaching efficacy reflects the degree a teacher believes other educators can control the learning environment despite influences such as family background, IQ and school conditions (Gibson & Dembo, 1984). Content efficacy is the level of confidence an agriculture teacher possesses in agribusiness and economics, plant and soil science, animal science, agricultural mechanics and technology, and natural resources and environmental science. The sample consisted of first and fifth year agriculture teachers in Texas during the 2006-07 school year. A total of 129 first year teachers and 68 fifth year teachers were identified and 141 teachers responded yielding a 71% response rate. Personal teaching and general teaching efficacy were measured by the short form of the teacher efficacy scale (Woolfolk & Hoy, 1990). A researcher developed instrument was used to measure content efficacy.

Introduction

According to the National Research Agenda for Agricultural Education and Communication (Osborne, n.d.), research priority area 4 for Agricultural Education in Schools is to "prepare an provide an abundance of fully qualified and highly motivated agriscience educators at all levels" (p. 20). The agenda specifically calls for efforts to "identify and analyze variables that contribute to teacher success" (p. 20). This study contributes to the work of the National Research Agenda by investigating teacher efficacy during a critical period in teacher development.

Researchers have agreed teaching efficacy is complex and difficult to understand (Knobloch, 2001; Tschannen-Moran, 2000). Bandura (1997) first defined self efficacy as a belief in one's capability to execute the actions necessary to achieve a certain level of performance. Gibson and Dembo (1984) defined teacher efficacy as a multi-dimensional construct composed of two independent dimensions: personal teaching efficacy and general teaching efficacy. Personal teaching efficacy involves a teachers' evaluation of their own capability to bring about student learning. General teaching efficacy reflects the degree to which a teacher believes educators can control the learning environment despite influences such as family background, IQ and school conditions.

Self efficacy, as described by the personal and general efficacy sub-scales, fails to recognize the contribution of content efficacy to overall teacher efficacy. Knowledge in subject matter has been found to be an important characteristic of effective teachers (Roberts & Dyer, 2004). Complicating the issue of subject matter knowledge within agricultural education is the fact agriculture teachers teach a variety of subjects. Those subjects could range from plant and soil science to agricultural mechanics and beyond. Prior research has investigated perceptions of content specific knowledge to determine teachers' in-service needs. However, little work has been done to determine the role subject matter knowledge plays in teacher efficacy.

Bandura (1977) suggested efficacy is strongly influenced by experience. Much of the research on teacher efficacy has been focused either in pre-service teaching and the student teaching experience or across the entire career cycle. Little research has been done, and particularly in agricultural education, to explore differences in or changes in teaching efficacy during the early years of in-service teaching.

Huberman (1989) proposed The Teacher Career Cycle Model, describing different career stages encountered by teachers throughout their careers. The model includes the influence of personal or organizational environmental conditions upon the career development of the teacher. The initial phase of the model is described as the discovery and survival phase, which lasts from one to three years. Individuals in this stage focus upon learning how to teach, deciding what to teach, navigating through the teaching environment, learning how to manage students and self, and developing an overall sense of efficacy. Between years four and six of teaching, career teachers enter into the second phase, stabilization. In this phase, teachers commit to teaching and are less inclined to focus on other occupational ambitions. Teachers in this stage typically believe they possess greater pedagogical mastery and focus upon the educational needs of students.

Previous studies have found teacher efficacy to be stable throughout various career stages in teaching. However, these researchers have typically grouped large intervals of teaching experience together. Pigge and Marso (1993) defined early career teachers as teachers with 5 to 19 years of experience. Teachers in the middle of their career were defined as teachers with 20 to 29 year of teaching experience. Teachers late in their career were those who had thirty or more years of teaching experience. DeMesquitat and Drake (1994) broke teachers up into four groups. Group one had 1 to 8 years teaching experiences. Group two had 9 to 14 years of teaching experience. Group three consisted of teachers with 15 to 18 years of teaching experience. Group four had teachers with 19 to 37 years of teaching experiences. Broad groupings fail to detect differences among teachers in Huberman's survival phase and stabilization phase. These are critical phases for the retention of teachers. As many as 15% of new teachers leave the profession during the first or second year (Darling-Hammond, 1997). As many as half of all teachers reportedly leave by the end of their sixth year (Marso & Pigge, 1997).

There has been developing interest in investigating teacher efficacy at the pre-service and student teaching phase. Watters and Ginns (1995) found that general teaching efficacy beliefs are most likely to change when students are exposed to vicarious learning experiences or social persuasion, such as coursework. According to Woolfolk Hoy and Hoy (1990), actual teaching experiences during the student teaching practicum have a great impact on personal teaching efficacy and general teaching efficacy. Hoy (2000) found that efficacy rose during teacher preparation, but decreased with actual teaching experiences. Roberts, Harlin, and Ricketts (2006) found teaching efficacy levels of student teachers increased during the four week classroom instruction, decreased to their lowest levels in the middle of the 11- week field experiences, and then increased to their highest levels at the end of the 11- week field experiences. Knobloch (2006) found student agriculture teachers entered their student teaching experiences already feeling efficacious, and their sense of efficacy did not change at the end of the student teaching experience. Knobloch (2001) recommended more research on the development of teaching efficacy, specifically during the "beginning years" (p 128) of teaching.

Knobloch and Whittington (2003) examined teacher efficacy related to career commitment of novice agriculture teachers. Teachers with higher career commitment were more efficacious after the first 10 weeks of school and were more likely to persist in the face of difficulties they experienced during the first 10 weeks of school. Teachers in both low and high career commitment groups had the same teacher efficacy at the first week of the school year. Glickman and Tamashiro (1983) examined efficacy, ego development, and problem solving between first year, fifth year, and former teachers. They found no significant differences on efficacy between first and fifth year teachers. Former teachers however scored lower than first and fifth year teachers in measures of efficacy and ego development.

The consequences of teacher efficacy are that greater efficacy leads to greater effort and persistence, which lead to better performance (Tschannen-Moran, Woolfolk Hoy, & Hoy, 1998). Teacher performance, influenced by the performer's sense of efficacy, becomes the source of future efficacy believes. Over time this process stabilizes into an enduring set of efficacy beliefs. This raises the question of whether there is a difference in the level of personal teaching, general teaching and content efficacies due to teaching experience.

Purpose and Objectives

The purpose of this study was to compare first and fifth year agriculture teachers' on general teaching efficacy, personal teaching efficacy, and content efficacy. The objectives of this study were as follows:

1. Describe the demographic characteristics of first and fifth year Texas agriculture teachers.

2. Compare personal teaching efficacy and general teaching efficacy of first year and fifth year teachers.

3. Compare content efficacy of first year and fifth year teachers.

Methods

The population of this study was first and fifth year agriculture teachers in Texas. The accessible sample was first and fifth year agriculture teachers during the 2006 – 2007 school year. First year and fifth year agriculture teachers were selected because of their differences according to the Teacher Career Cycle Model (Huberman, 1989). According to Huberman, first year teachers are in the survival phase while fifth year teachers are in the stabilization phase. Finding from this study represent an accepting sample. Caution should be used in generalizing the findings beyond the sample studied.

A frame was developed for first and fifth year Texas agriculture teachers from the 2006-2007 membership list of the Vocational Agricultural Teachers Association of Texas. The list was thoroughly analyzed; duplicate entries and entries that did not apply to the study were deleted and other known first year and fifth year teachers were added. The target population was identified as 197 individuals; 129 first year teachers and 68 fifth year teachers.

Data were collected using an electronic questionnaire. The instrument consisted of three sections. Section one measured general teaching efficacy and personal teaching efficacy, section two measured content efficacy and section three measured demographic characteristics. For tracking purposes, participants were randomly given a three digit code. The first question on the instrument was a mandatory open-ended question asking for the individual's unique code that was provided in each email correspondence.

General teaching efficacy and personal teaching efficacy were measured using a modified version of the Teacher Efficacy Scale (Gibson & Dembo, 1984) that was used by Woolfolk and Hoy in 1990. Woolfolk and Hoy modified the original scale by only using the 16 questions that produced an adequate reliability and four more items that referred to the adequacy of the teacher's pre-service program. Participants were asked to rate their level of agreement on the 20, five-point Likert-type scale items, one being strongly disagree and five being strongly agree. This instrument contained seven items that measured general teaching efficacy and nine items that measured personal teaching efficacy. The alpha coefficients of reliability were previously reported as.77 for the personal teaching efficacy and .72 for general teaching efficacy. Post hoc reliability analysis resulted in similar reliability coefficients for first year teachers (personal teaching = .74, general teaching. = .67) and fifth year teachers (personal teaching = .71, general teaching = .75).

Section two of the instrument contained 14 researcher developed items. These 14 items were five-point Likert-type scale items used to measure technical content knowledge. The Texas certification exam in agriculture content is comprised of five domains. Each domain represents a subject area and contains technical competencies for that domain. For each of the 14 items, teachers were asked to rate their confidence in the ability to teach the technical competencies for each of the five domains in the Texas certification exam framework. Participants rated their ability on a five point scale with one being not confident and five being complete confidence. Items were developed using the Texas Education Agency Preparation Manual—Agricultural Science and Technology 6-12.

Content domains measured were: agribusiness and economics, plant and soil science, animal science, agricultural mechanics and technology, and natural recourses and environmental science. The certification exam and the competencies listed were designed by a committee of state center staff, representatives from professional educator organizations, content experts, and members of the business community (TEA, 2006). Therefore, the items used in this section of the survey were validated by the panel of teacher educators and experts in the agriculture field responsible for creating the exam. This section of the instrument was pilot tested using the 17 spring 2007, student agriculture teachers at Texas Tech University on May 7, 2007. The pilot test yielded a Cronbach's alpha of .85. After data collection, the content efficacy reliability was determined to be .93 for first year teachers and .87 for fifth year teachers. The final section of the instrument collected demographic data to describe the participants in the study. The items included age, gender, ethnicity, level of education and certification method.

Subjects were contacted via email. Participants who could not be contacted electronically were sent a letter containing an invitation to participate and the link to the survey. Data collection was conducted May 15th through June 22nd. A total of five contacts were made. The contacts included the initial invitation to participate, three thank you/follow up reminders, and a final notice. This produced 141 useable instruments for an overall response rate of 71%; 71% (n = 92) of first year teachers and 72% (n = 49) of fifth year teachers.

To control for non-response, a comparison was made between early respondents and late respondents. Typically, individuals who responded to the last stimulus would be called late respondents. Linder, Murphy, and Briers (2001) recommend to "back up" (p. 52) to use responses from multiple stimuli until a minimum of 30 late respondents is reached. To accomplish this goal, respondents who completed the instrument prior to May 30th were considered early respondents, while those who completed the instrument on or after May 30th were considered late respondents. An independent samples t-test showed no significant difference among early and late respondents for first year teachers. Fifth year teachers also showed no significant difference between early and late respondents on personal, general, and content efficacy.

Data were analyzed using SPSS. Measures of central tendency and variability were used to describe teacher characteristics. Cohen's d, a measure of effect size, was calculated to analyze the difference between first year teachers and fifth year teachers on the dependent variables. According to Fraenkel and Wallen (2003) effect size is a "technique for assessing the magnitude of a difference between the means of two groups" (p. 257).

Findings

The first objective sought to describe the demographic characteristics of first and fifth year agriculture teachers. The average age of first year teachers (n = 83) was 28 (SD = 7.35) and ranged from 21 to 56 (see Table 1). Fifth year teachers (n = 45) had a mean age of 32 (SD = 6.65) and ranged from 26 to 52.

Table 1

Age of First and Fifth Year Agriculture Teachers

Teaching Experience	Mean (*M*)	Median (*Mdn*)	Standard Deviation (*SD*)	Range
First Year (*n* =83)	27.93	25	7.35	21-56
Fifth Year (*n* = 45)	32.44	30	6.65	26-52

A summary of the remaining teacher characteristics is displayed in Table 2. Males (51%) and females (49%) were equally represented among first year teachers while fifth year teacher were represented by a majority of males (63 %).

Table 2

Summary of Demographic Characteristics for 1st and 5th Year Teachers

	1st Year Teachers (*n* = 84)		5th Year Teachers (*n* = 46)	
	f	%	*f*	%
Gender				
Male	43	51.2	29	63.0
Female	41	48.8	17	37.0
Ethnicity				
Caucasian	74	90.2	42	93.3
Hispanic	6	7.3	2	4.4
Black	1	1.2	1	2.2
Other	1	1.2	0	0.0
Education				
Bachelors Degree	66	78.6	29	63.0
Masters Degree	18	21.4	17	37.0
Certification				
Traditional	56	66.7	32	69.6
Post-baccalaureate	12	14.3	5	10.9
Emergency	10	11.9	6	13.0
Masters	6	7.1	3	6.5

With regard to ethnicity, both experience groups were found to have a strong majority of Caucasian teachers. However, first year teachers had a slightly higher percent of Hispanic teachers (7%) as compared to fifth year teachers (4%). A bachelor's degree was the highest level of education reported for the majority for first (79%) and fifth year teachers (63%). The remainder of the first (21%) and fifth (37%) year teachers reported having a master's degree. Traditionally certified teachers made up 67% of first year teachers and 70% of fifth year teachers. The remaining 33% of first year teachers and 30% of fifth year teachers acquired teaching credentials by an alternative certification method.

Objective two sought to compare personal teaching efficacy and general teaching efficacy of first year and fifth year teachers (see Table 3). The mean score for personal teaching efficacy of first year teachers was 3.60 (*SD* = .62). General teaching efficacy was rated lower by first year teachers with a mean score of 3.01 (*SD* = .67). Consistent with the first year teachers, the fifth year teachers rated personal teaching efficacy higher than general teaching efficacy. However, the fifth year group had higher mean scores on both personal teaching efficacy (*M* = 3.70) and general teaching efficacy (*M* = 3.08). Effect sizes were calculated to assess the magnitude of the difference between the two groups. The value of Cohen's *d* for personal teaching efficacy was .18 and for general teaching efficacy was .10. In both cases the size of the effect is considered small (Field, 2005).

Table 3

A Comparison of First Year and Fifth Year Teachers on Personal Teaching Efficacy and General Teaching Efficacy

	1st Year Teachers (n = 84)		5th Year Teachers (n = 46)			
Characteristic	*M*	*SD*	*M*	*SD*	*Effect Size*	*Cohen's Index*
Personal Teaching Efficacy	3.60	.62	3.70	.45	.18	Small
General Teaching Efficacy	3.01	.67	3.08	.67	.10	Small

[b]1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree

The third objective sought to compare content efficacy of first year and fifth year teachers (see Table 4). The mean for first year teachers on overall content efficacy was 3.74 (*SD* = .67). Additionally, content efficacy was broken down into five technical domains. First year teachers were most confident in animal science (*M* = 4.24, *SD* =.80), followed by agricultural business and economics with a mean of 3.70 (*SD* = .79). Plant and soil science (*M* = 3.63, *SD* = .71), environmental science (*M* = 3.62, *SD* = .89), and agricultural mechanics and technology (*M* = 3.48, *SD* = .93) were the subjects first year teachers were least confident in performing.

Table 4

A Comparison of First Year and Fifth Year Teachers on Overall Content Efficacy and Content Efficacy by Domain

	1st Year Teachers (n = 84)		5th Year Teachers (n = 46)			
Characteristic	*M*	*SD*	*M*	*SD*	*Effect*	*Cohen's Index*
Overall Content Efficacy	3.74	.62	3.87	.45	.24	Small
Animal Science	4.24	.80	4.34	.58	.14	Small
Ag Business & Economics	3.70	.79	3.84	.56	.20	Small
Plant & Soil Science	3.63	.71	3.71	.48	.13	Small
Environmental Science	3.62	.89	3.70	.64	.10	Small
Ag Mechanics & Technology	3.48	.93	3.77	.72	.35	Medium

1 = not confident, 2 = slightly confident, 3 = somewhat confident, 4 = confident, 5 = very confident

The mean for overall content efficacy for fifth year teachers was 3.87 (*SD* = .45). Similar to first year teachers, the fifth year teachers were most confident in animal science (*M* = 4.34, *SD* = .58) and agricultural business and economics (*M* = 3.84, *SD* = 56). Fifth year teachers were least confident in agricultural mechanics (*M* = 3.77, *SD* = .72), plant and soil science (*M* = 3.71), and environmental science (*M* = 3.70, *SD* = .64). Effect sizes were calculated to assess the magnitude of the differences between the two groups on content domains. Cohen's *d* values ranged from .10 to .35. The effect size for agricultural mechanics and technology was medium. All other effect sizes were small.

Conclusions/Recommendations/Implications

Kantrovich (2007) reported that nationally males outnumbered females 3:1 among secondary agriculture teachers. Males also outnumbered females among the fifth year teachers in this study, although by a smaller margin. About two-thirds of the fifth year teachers were male. First year teachers, however, were more balanced in gender with 51.2 % of the sample being male. This gender equity is similar to other findings of first year teachers in Texas. Burris and Keller (2007) found 53% of first year agriculture teachers in 2006 were male. These findings indicate a trend shift in gender distribution. It is apparent that agricultural education has arrived at a balance between genders. It is not clear if this equal distribution will be stable over time or if the trend will continue toward larger percentages of female teachers. The gender distribution of new teachers should be continually monitored.

Burris and Keller (2007) reported 19% of first year teachers in 2006 had earned a master's degree. This study found a higher percentage of first year teachers (27%) having a master's degree. Additionally, 37% of fifth year teachers reported having a master's degree. This discrepancy between groups could possibly reflect a higher retention of teachers with a master's degree. Likewise, the difference may reflect the outcome of continued education by those who earned there masters degree during those first five years of teaching.

Camp, Broyles, and Skelton (2002) reported that 13% of agriculture teachers nationally were certified by methods other than an undergraduate degree in agricultural education. This study found a higher number of teachers being certified by some means other than a traditional undergraduate degree in agricultural education. Alternative certification methods accounted for 33% of first year teachers and 30% of fifth year teachers. This utilization of alternative certification methods may provide some additional explanation for the discrepancy in level of education as some choose to certify post-baccalaureate.

The purpose of this study was to compare first and fifth year agriculture teachers on general teaching efficacy, personal teaching efficacy, and content efficacy. For both groups, personal teaching efficacy was perceived to be higher than general teaching efficacy. Teachers tended to be more confident in their own skills to bring about student learning than in the ability of teachers in general to bring about change. Fifth year teachers had a higher sense of personal teaching efficacy and general teaching efficacy than first year teachers, although the effect of experience was small. The results of this study provide further evidence that efficacy beliefs are stable even among teachers at different career stages (DeMesquitat & Drake, 1994; Pigge & Marso, 1993).

This does raise questions as to the relationship between teacher efficacy and career commitment. What role does teacher efficacy play in decisions to leave the profession? In addition, it would be valuable to look at first and fifth year teachers' efficacies throughout the school year instead of just at the end of the year. Perhaps the reason the effect was small was because the first year teachers were surveyed at the end of their first year of teaching and have already reached a saturation point of the successes and failures that compose an individuals efficacy beliefs. Practitioners should continue to focus on building and maintaining efficacy beliefs during the pre-service stage.

Similar patterns existed in the findings of content efficacy, with fifth year teachers having a higher sense of efficacy on each of the content domains as well as overall content efficacy. Again, effects were small with the exception of agricultural mechanics and technology (medium). The order of their confidence in the domains differed. First year teachers were more confident in animal science, agribusiness and economics, plant and soil sciences, environmental sciences, followed by agricultural mechanics. Fifth year teachers were more confident in animal science, agribusiness and economics, agricultural mechanics and technology, plant and soil science, followed by environmental sciences.

Several studies have found differences among beginning and experienced teachers in-service needs, however, those studies have found that technical agricultural knowledge and skill competencies were ranked lower in priority when compared to competencies in the areas of instruction, program planning, development and evaluations, and program administration (Garton & Chung, 1997; Layfield & Dobbins, 2000).

Possible variables in determining an individual's technical content efficacy could be the institution and technical agriculture coursework completed. The agricultural institutions in Texas have various course requirements. It is recommended that future research should consider this variable. Additionally, the number of teachers in a program may have an impact on specific content efficacy. Teachers in multi-teacher programs may have flexibility to be more focused, whereas teachers in single teacher programs may be required to exhibit competence in multiple content areas.

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The Delta Conference – Participant Perceptions of Learned Instructional Strategies and Techniques

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Abstract

The Delta Conference is known as an event having profound impact on teachers' thinking and performance in the field. Many of the specialized techniques and strategies focused on, while at Delta, challenge teachers to manipulate delivery philosophy and practice to enhance student learning and engagement. This descriptive study sought to determine Delta Conference participant perceptions related to specific instructional strategies and techniques learned while attending the conference. The study surveyed a census of participants (N=45) who attended the 2007 Delta Conference. Two objectives were developed, and data gathered, regarding demographic characteristics and participant perceptions concerning skill development and current utilization related to writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language. Results indicated overwhelming positive support for the skills and techniques developed from activities engaged in during the 2007 Delta Conference. The authors called for continuation of strategies currently employed by program coordinators, and for continuation of the program for teacher development. Additionally, support for Delta from Team AgEd; communication of results of this study and other program impacts to local, state, and national educational administration; and continued research focusing on student learning is recommended.

Introduction and Conceptual Framework

Just as agricultural commodities must be consumed to feed the body, so must agricultural educators consume continuing education and professional development opportunities to feed the mind. Without proper "nutritional" professional development and technical updates, an agricultural educator may lose the "muscle" and physique built and conditioned in his or her teacher education program. Similarly, professional development opportunities for inservice teachers are served up in myriad ways: week-long, all-you-can-eat buffets of a variety of topics; two or three day conferences combining association meetings intermingled with topics of state or national importance; and the ever-popular fad "diets" of single-day, educational innovation of the moment instructional meetings. What commonality does each of these delivery systems share? Many professional development programs are delivered in a "one-shot" mode whereby teachers are provided instruction to fit a predetermined time span, and then teachers are sent home and left to their own devices.

Among other identified needs (Joerger & Boettcher, 2000; Myers, Dyer, & Washburn, 2005), high quality professional development is paramount to the retention of teachers in the profession.

As recently as 2006, the American Association of Agricultural Educators' teacher supply and demand survey (Kantrovich, 2007) indicated an expected gap of 251 agricultural education teaching positions nationally for the fall 2007 semester. With such a shortage continuing to besiege agricultural education's teaching ranks, innovative, engaging, and practical application professional development opportunities must become a permanent part of the menu!

Joerger and Boettcher (2000) assessed the nature and impact of teaching events and assistance on beginning agricultural education teachers in Minnesota. Interestingly, critical events with beginning teachers included notably high self-confidence in teachers' own teaching ability, experiencing satisfaction after successfully implementing classroom activities, and watching students experience success in the classroom. Their findings and recommendations indicated a continued need to explore the "nature, impact, and occurrence of desired forms of assistance and the events experienced by beginning teachers of agricultural education" (p. 13).

Conklin, Hook, Kelbaugh, and Nieto (2002) conducted a comprehensive needs assessment of extension professionals and found that 92% of respondents preferred a face-to-face delivery system and that, among other choices, 69% of respondents preferred a web-based professional development delivery system. Additionally, 53% of extension professionals preferred an electronic (Email) form of coaching and/or mentoring. While coordinators met the users' desire to have face-to-face delivery (93%), web-based delivery systems and electronic coaching methods were clearly underutilized (12% and 25%, respectively).

Greiman, Walker, and Birkenholz (2005) reported a common theme of isolation for agricultural teachers in the induction year. Teachers strongly desired the benefit of a support system before the school year began to assist with better understanding of classroom, departmental, and pedagogical management concerns. Teacher mentors, however well-intended as change facilitators for new teachers, are ill-equipped to focus on their mentoring duties as they must center their efforts on readying their own classroom for each new academic year.

The *Concerns Based Adoption Model* (Hall & Hord, 2001) contends that change, especially in the educational genre where teachers often operate in isolation, is often a two to four year process (Figure 1). Simply introducing teachers to a new educational product or process, and then returning the teacher to his or her classroom, often forces the innovation to be deemed a failure because the teacher lacks time, motivation, and support to implement the change. As such, having continued support and encouragement from a change facilitator with understanding of the agricultural educators' needs is paramount to preventing teacher attrition.

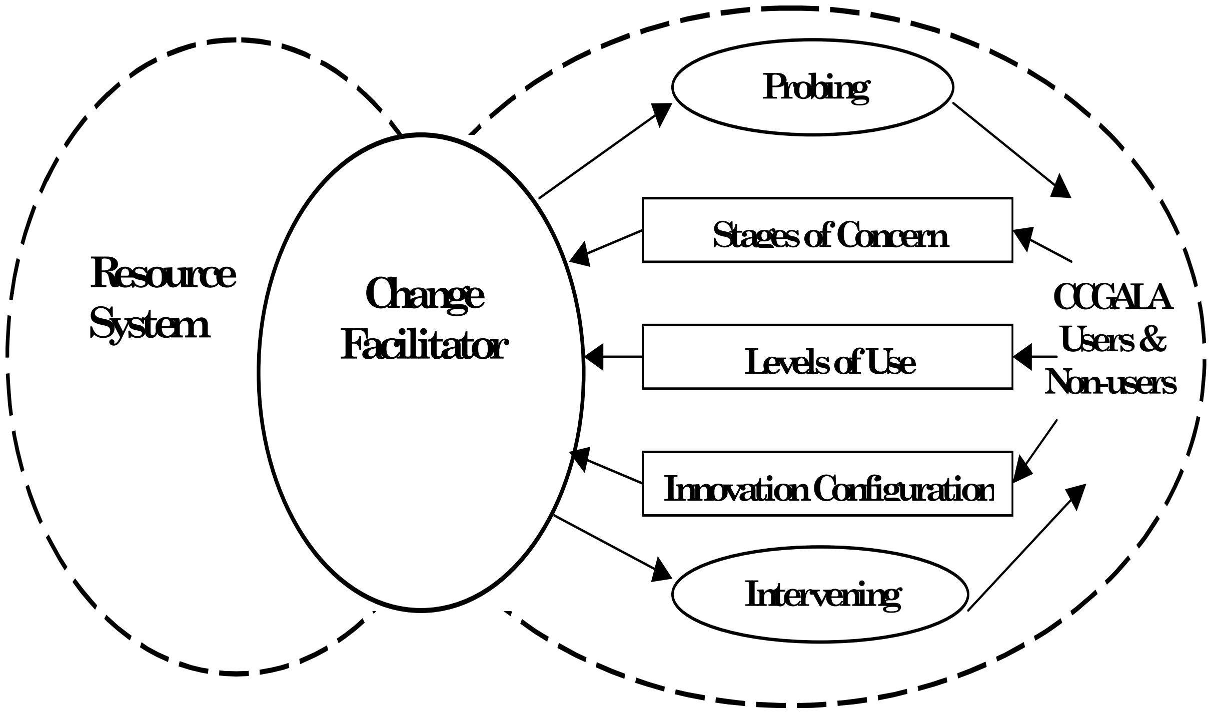

Figure 2-4. Concerns Based Adoption Model (Hall & Hord, 2001)

Hall and Hord characterized principals, teachers, professional development facilitators, and other district personnel in an educational system, as *change facilitators* serving as key factors in the success or failure of an educational innovation (1987). Specifically, these individuals are those who, "for brief or extended periods, assist various individuals and groups in developing the competence and confidence needed to use a particular innovation" (p. 11).

Related to continuing mentorship and facilitation of change when agricultural teachers are entering and attempting to sustain themselves in the profession, is the need for change facilitator support (Ingersoll, 2001) and regular, sustained encouragement for teachers when they are engaged in the educational change process (Hall & Hord, 2001).

In essence, teacher retention and continued survival in the agricultural education field is dependent upon, among other criterion, a professional development delivery system that addresses the teachers' concerns, rather than seeking to provide a one-time workshop or "train the trainer" session. The 2007 Delta Conference not only continued with the successful face-to-face delivery techniques utilized in initial Delta Conference offerings, but expanded the delivery system to include continued coaching, encouragement, and cross-participant conversations via an electronic portal reserved only for Delta Conference participants, mentors, and facilitators.

Purpose and Objectives

The purpose of this study was to measure 2007 Delta Conference participant perceptions concerning skill development and current utilization of instructional techniques and strategies learned while attending the Delta Conference. Participants offered perceptive data concerning skill and technique development in writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language one semester following their Delta experience.

The objectives of this study were to:

1. Describe 2007 Delta Conference participants based upon selected demographic characteristics; and
2. Determine participant perceptions concerning skill development and current utilization related to writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language.

Methodology

The population of this descriptive study consisted of agricultural educator participants of the 2007 Delta Conference (N = 45). A census was utilized to gather data from as many participants as possible. Participants were contacted via personal and school email, which were collected through the conference application process.

The instrument was developed using a combination of demographic and Likert-type questions. Questions for the instrument were developed utilizing pre-determined conference goals and prescribed outcomes as guidelines. . The Delta Conference sought to develop specific skills related to teachers' ability to develop and deliver brain-based and engaging lessons. As a part of this effort, and developed into specific constructs of the instrument, were the development of behavioral objectives, the development and delivery of interest approaches, the utilization of contextual sets/bridges, the delivery of effective directions, the utilization of E-Moments, the utilization of inclusive language and the integration of LifeKnowledge concepts into technical lessons. Participants responded to questions using a four-point, Likert-type scale for level of agreement or disagreement for each statement. The four points of the Likert-type scale were: "Strongly Disagree," "Disagree," "Agree," and "Strongly Agree" for the areas concerning writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language.

Content and face validity of the instrument were established through a panel of experts from the study's sponsoring academic department and conference officials. This study, which was a portion of a larger study, focused primarily on participants' perceptions concerning skill development and current utilization of instructional techniques and strategies learned while attending the Delta Conference. The instrument contained seven sections, each focusing on the instructional techniques and strategies previously mentioned. Cronbach's alpha was utilized to measure the instrument's reliability and yielded an alpha range of $\alpha = .683$ to $\alpha = .970$ for the established sections and an overall reliability estimate of $\alpha = .928$.

All instrumentation and materials were distributed according to Dillman's *Mail and Internet Survey's Design Method* (Dillman, 2000). The instrument was created, distributed, and data collected utilizing the Vovici EFM Continuum web survey development tool. Questionnaires were distributed to all participants on December 3, 2007, and data collection was completed January 28, 2008. During this time, participants received three reminder emails and one personal follow-up phone call. It was imperative to collect data from participants one complete semester following participation in the Delta Conference. The overall response rate for the study was 86.7%.

Exported responses from participants were coded and analyzed using the SPSS 14.0 for Windows. Data were analyzed in the form of percentages, counts, means, and standard deviations. Demographic data identifying gender, years of teaching experience, average class size, and size of campus were also collected and analyzed.

Findings

Objective One

The demographic data for the 2007 Delta Conference participants were analyzed. The mean teaching experience of respondents in years was 5.10 (SD = 5.29), with a range including 1 year of experience through 24 years of experience. Of the conference participants who responded, 30.6% were male and 69.4% were female. Respondents indicated a mean class size of 17.2 (SD = 6.28), with a range including a minimum of five students to a maximum of 28 students. Finally, information was requested concerning student population size.

Table 1 indicates the percentage of participants teaching on campuses with varying population sizes. Campuses offering agricultural courses were represented as ordinal data choices in increments of 100 students.

Table 1
Percentage of Participants Teaching on Campuses With Varying Population Sizes

Campus Population	% Indicated
0-100 Students	10.3
100-200 Students	10.3
200-300 Students	17.2
300-400 Students	10.3
400-500 Students	10.3
500+ Students	41.4

Interestingly, the largest portion of participants was teaching at campuses with five hundred or more students. Other participants were distributed fairly equally across the other ranges of campus size.

Objective Two

Agricultural education teachers who participated in the 2007 Delta Conference were asked to provide their perceptions concerning skill and technique development in writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language. Tables 2 through 7 offer participant responses to the Likert-type questions concerning each area indicated above. In each question set, teachers were asked to indicate level of agreement or disagreement to each statement.

Table 2 details participant perceptions concerning utilization of behavioral objectives in planning student learning. Behavioral objectives allow teachers to organize content while creating measurable and observable student learning outcomes (Bloom, 1956).

Table 2
Perceptual Likert-Type Questions Focusing on Writing Behavioral Objectives

Individual Questions	Percentage			
	SA	A	D	SD
My experience at the Delta Conference taught me how to write effective behavioral objectives.	55.3	36.8	7.9	0
The time allotted to practice writing behavioral objectives at the Delta Conference was key to my understanding of how to write them.	39.5	52.6	7.9	0
I write behavioral objectives more frequently because of my experiences at the Delta Conference.	36.8	52.6	7.9	2.6
My ability to write effective behavioral objectives has made me a better designer of learning for my students.	50.0	44.7	5.3	0
My ability to write effective behavioral objectives has made me a better teacher in my classroom and laboratories.	60.5	34.2	5.3	0

More than 90% of agricultural education teachers attending the 2007 Delta Conference agreed or strongly agreed to all statements relating to the development of behavioral objectives in designing lessons. Overwhelmingly, teacher participants indicated the conference taught them how to write effective behavioral objectives, the time allowed to practice writing objectives was beneficial, they write behavioral objectives more frequently, and that they are better lesson designers and better teachers due to their experiences with writing behavioral objectives.

Table 3 examines participant perceptions of the utility of interest approaches in teaching. The interest approach (anticipatory set/focus) is designed to motivate students to learn before delivery of a lesson's content while focusing student attention on the topic at hand (Moore, 1974).

Table 3
Perceptual Likert-Type Questions Focusing on Creating Interest Approaches

Individual Questions	Percentage			
	SA	A	D	SD
My experience at the Delta Conference taught me how to create an Interest Approach.	63.2	34.2	2.6	0
The time allotted to practice creating an Interest Approach at the Delta Conference was key to my understanding of how to create them.	52.6	39.5	7.9	0
I utilize Interest Approaches more frequently because of my experiences at the Delta Conference.	47.4	47.4	5.3	0
My ability to create an Interest Approach has caused my students to better engage in my lessons.	50.0	50.0	0	0
My ability to create an Interest Approach has made me a better teacher in my classroom and laboratories.	47.4	50	2.6	0

Participants consistently agreed to all statements concerning creation of an interest approach, time spent practicing, frequency of utilization, student engagement, and perceived teaching quality. With regard to improved student engagement because of their ability to create an interest approach, participants indicated no level of disagreement.

Table 4 highlights participant perceptions concerning the utilization of contextual sets/bridges. Setting context or creating contextual bridges is a technique utilized in order to orient students to learning and the progress of the lesson. Conducted before, during, and after lessons, contextual sets/bridges offer students a guide to what they have learned, what will be next, why the information is relevant to them, and how they are to perform in the learning situation (Deporter, Reardon, & Singer-Nourie, 1998).

Table 4
Perceptual Likert-Type Questions Focusing on Setting Context

Individual Questions	Percentage			
	SA	A	D	SD
My experience at the Delta Conference taught me how to implement Contextual Sets/Bridges.	60.5	39.5	0	0
The time allotted to practice delivering Contextual Sets/Bridges at the Delta Conference was key to my understanding of how to use them.	57.9	42.1	0	0
I utilize Contextual Sets/Bridges more frequently because of my experiences at the Delta Conference.	52.6	44.7	2.6	0
My ability to use Contextual Sets/Bridges has caused my students to remain engaged in my lessons.	47.4	50.0	2.6	0
My ability to use Contextual Sets/Bridges has made me a better teacher in my classroom and laboratories.	55.3	42.1	2.6	0

When examining their ability to orient students in a given lesson, participants indicated vigorous levels of agreement. As a learned concept, and considering time to hone setting context for students, all participants strongly agreed or agreed. Teachers also indicated high levels of agreement to frequency of use, student engagement, and perceived quality of teaching when reflecting upon contextual sets/bridges.

Table 5 explains participant perceptions of effective direction utilization. Directions in teaching become effective if a series of salient and succinct information is provided to the learner in a fashion that positions mind before body, and outlines parameters for time and checking for understanding (Deporter, Reardon, & Singer-Nourie, 1998).

Table 5
Perceptual Likert-Type Questions Focusing on Delivering Effective Directions

Individual Questions	Percentage SA	A	D	SD
My experience at the Delta Conference taught me how to deliver Effective Directions.	78.9	21.1	0	0
The time allotted to practice delivering Effective Directions at the Delta Conference was key to my understanding of how to use them.	68.4	28.9	2.6	0
I utilize Effective Directions more frequently because of my experiences at the Delta Conference.	71.1	28.9	0	0
My ability to deliver Effective Directions has caused my students to know exactly what is required for an activity.	68.4	31.6	0	0
My ability to deliver Effective Directions has made me a better teacher in my classroom and laboratories.	71.1	28.9	0	0

Respondents offered high levels of agreement to statements focusing on the delivery of effective directions. Respondents tended to strongly agreed to what each statement concerning effective directions communicated.

Table 6 focuses on participant perceptions of E-Moments, or engaging moments. E-Moments are educational strategies designed to engage students by utilizing a combination of chunking, rehearsal, pattern recognition, and emotional involvement designed from sound theoretical principles in education (Reardon & Derner, 2004).

Table 6
Perceptual Likert-Type Questions Focusing on Utilizing E-Moments

Individual Questions	Percentage SA	A	D	SD
My experience at the Delta Conference taught me how to utilize E-Moments in a learning environment.	68.4	31.6	0	0
The time allotted to practice utilizing E-Moments at the Delta Conference was key to my understanding of how to implement them.	73.7	23.7	2.6	0
I utilize E-Moments more frequently because of my experiences at the Delta Conference.	60.5	36.8	2.6	0
My ability to utilize E-Moments has caused my students to truly learn concepts I have taught.	63.2	36.8	0	0
My ability to utilize E-Moments has made me a better teacher in my classroom and laboratories.	65.8	34.2	0	0

Once again, participants offered high levels of agreement across all statements focusing on the utilization of E-Moments. With respect to participants' perceptions regarding improved student learning and improved teaching quality, when implementing E-Moments, 100% of respondents strongly agreed or agreed.

Table 7 includes participant responses concerning perceptions of inclusive language. Using inclusive language while teaching is a process of purposefully choosing words and crafting speech to create a welcoming and encouraging environment for students devoid of conflict between the student and teacher. Appropriate language may also be utilized to increase engagement and effectively convey meaning (Deporter, Reardon, & Singer-Nourie, 1998).

Table 7
Perceptual Likert-Type Questions Focusing on Inclusive Language

Individual Questions	Percentage			
	SA	A	D	SD
My experience at the Delta Conference taught me how to use Inclusive Language in a learning environment.	44.7	55.3	0	0
The time allotted to practice Languaging at the Delta Conference was key to my understanding of how to implement it.	39.5	60.5	0	0
I utilize Inclusive Language more frequently because of my experiences at the Delta Conference.	50.0	50.0	0	0
My ability to utilize Inclusive Language has created a more learner friendly environment for my students.	47.7	52.6	0	0
My ability to use Inclusive Language has made me a better teacher in my classroom and laboratories.	54.1	45.9	0	0

Responding participants consistently agreed to all statements concerning the use of inclusive language, time spent practicing, frequency of utilization, creation of a student friendly environment, and perceived teaching quality enhancement. Interestingly, no participant disagreed to any of the statements focusing on the use of inclusive language.

Conclusions and Recommendations

Objective One

A large percentage of the 2007 Delta Conference participants were female, while approximately one-third were male. As a whole, participants were not seasoned teachers. This may explain why so many were willing to adopt and sustain the use of new teaching strategies and techniques (Bellah & Dyer, 2007). The varying range of class size indicates that participants are having success with the learned techniques and strategies in an array of class sizes. This finding highlights the flexibility of the techniques and strategies learned by participants. Finally, although larger schools were heavily represented in the current study, it should be noted that participants were distributed equally across the other school sizes. This indicates that the learned strategies and techniques have the potential to work well in agricultural education programs and their respective campuses regardless of student population size.

It is the recommendation of the authors that the findings be approached with caution because the representative data denote only one Delta Conference class. Multiple classes should be studied over extended periods in order to establish stability in the current findings.

Objective Two

Participants issued overwhelmingly positive support for the skills and techniques developed in writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language. Participants consistently indicated that experiences at the conference developed or enhanced their ability to engage in writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language. Central to the Delta Conference mission is the concept of practice, or rehearsal, of a strategy or technique, receiving feedback, then practicing again. Consistently, participants perceived the time to practice the concepts learned as ample.

Results of this study also indicated the frequency of a technique's use was increased and carried into individual participants' teaching in the field. One of the most important findings was related to participant perceptions of students' benefit from the use of a technique, as well as the perceived enhancement of teacher quality. Participants believed themselves to be performing at a higher level, which translated to increased student learning, from their perspective. Finally, a finding of lesser connotation was noted by the researchers due to the traditional nature of the skills to which it related. Both the writing of behavioral objectives and creation of interest approaches/focus/anticipatory sets received slightly lower levels of agreement as compared to the latter techniques, which may be viewed as more novel. The researchers postulate that participants possessed higher levels of prior knowledge related to writing of behavioral objectives and creation of interest approaches/focus/anticipatory sets because these are skills typically learned during preservice activities. However, when focusing on the level of positive response to statements made about writing behavioral objectives and creation of interest approaches/focus/anticipatory sets, the increase in perception, assuming participants' prior exposure to these content areas, is noteworthy.

Once again, it is the recommendation of the authors that the findings be approached with caution because the representative data characterize only one Delta Conference class. Multiple classes should be studied over extended periods to establish stability in the current findings. However, the overwhelming positive response to the strategies and techniques learned by participants would be difficult to dismiss. Therefore, the authors recommend the continued utilization of the techniques and strategies teachers engage in during the conference. Also, continued promotion of the Delta Conference to all secondary and middle school agricultural educators and continued support of the program is recommended. Post-secondary teacher preparation programs may improve pre-service delivery of content by utilizing delivery methods similar to those experiences enveloped in the Delta Conference. State and national structures within Team AgEd are encouraged to secure funding and replicate the conference regionally and nationally. Finally, it is the recommendation of the authors to teacher education institutions to implement strategies allowing pre-service teachers to see a model of what is expected in their own classrooms, practice it in their pre-service experience and then receive direct feedback on their performance. This methodology adopted by the Delta Conference has produced change in teachers with experience and should be utilized with pre-service teachers.

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The Delta Conference – Participant Utilization of Instructional Strategies and Techniques Pre and Post Conference

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Abstract

The Delta Conference is a specialized professional development event focusing on student engagement through teacher development. As with any professional development activity, a certain level of knowledge may transition into teacher application, while the rest is lost at the conclusion of the activity. This descriptive study sought to determine sustainability of each of the primary educational concepts taught at the Delta Conference one semester post-conference. The study surveyed a census of participants (N=45) who attended the 2007 Delta Conference. Two objectives were developed, and data were gathered, regarding demographic characteristics and participant pre- and post-conference utilization of writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, utilizing inclusive language, and integrating LifeKnowledge™ into technical agricultural lessons. Results indicated a shift in teacher classroom behaviors, reportedly attributable to individual experiences at the 2007 Delta Conference, and that participants continued to engage in high levels of utilization one semester post-conference. The authors called for continuation of the program for teacher development; additional support of Delta from Team AgEd; communication of results of this study and other program impacts to local, state, and national educational administration; and continued research focusing on student learning.

Introduction and Conceptual Framework

Just as agricultural commodities must be consumed to feed the body, so must agricultural educators consume continuing education and professional development opportunities to feed the mind. Without proper "nutritional" professional development and technical updates, an agricultural educator may lose the "muscle" and physique built and conditioned in his or her teacher education program. Similarly, professional development opportunities for inservice teachers are served up in myriad ways: week-long, all-you-can-eat buffets of a variety of topics; two or three day conferences combining association meetings intermingled with topics of state or national importance; and the ever-popular fad "diets" of single-day, educational innovation of the moment instructional meetings. What commonality does each of these delivery systems share? Many professional development programs are delivered in a "one-shot" mode whereby teachers are provided instruction to fit a predetermined time span, and then teachers are sent home and left to their own devices.

Among other identified needs (Joerger & Boettcher, 2000; Myers, Dyer, & Washburn, 2005), high quality professional development is paramount to the retention of teachers in the profession.

As recently as 2006, the American Association of Agricultural Educators' teacher supply and demand survey (Kantrovich, 2007) indicated an expected gap of 251 agricultural education teaching positions nationally for the fall 2007 semester. With such a shortage continuing to besiege agricultural education's teaching ranks, innovative, engaging, and practical application professional development opportunities must become a permanent part of the menu!

Joerger and Boettcher (2000) assessed the nature and impact of teaching events and assistance on beginning agricultural education teachers in Minnesota. Interestingly, critical events with beginning teachers included notably high self-confidence in teachers' own teaching ability, experiencing satisfaction after successfully implementing classroom activities, and watching students experience success in the classroom. Their findings and recommendations indicated a continued need to explore the "nature, impact, and occurrence of desired forms of assistance and the events experienced by beginning teachers of agricultural education" (p. 13).

Conklin, Hook, Kelbaugh, and Nieto (2002) conducted a comprehensive needs assessment of extension professionals and found that 92% of respondents preferred a face-to-face delivery system and that, among other choices, 69% of respondents preferred a web-based professional development delivery system. Additionally, 53% of extension professionals preferred an electronic (Email) form of coaching and/or mentoring. While coordinators met the users' desire to have face-to-face delivery (93%), web-based delivery systems and electronic coaching methods were clearly underutilized (12% and 25%, respectively).

Greiman, Walker, and Birkenholz (2005) reported a common theme of isolation for agricultural teachers in the induction year. Teachers strongly desired the benefit of a support system before the school year began to assist with better understanding of classroom, departmental, and pedagogical management concerns. Teacher mentors, however well-intended as change facilitators for new teachers, are ill-equipped to focus on their mentoring duties as they must center their efforts on readying their own classroom for each new academic year.

The *Concerns Based Adoption Model* (Hall & Hord, 2001) contends that change, especially in the educational genre where teachers often operate in isolation, is often a two to four year process (Figure 1). Simply introducing teachers to a new educational product or process, and then returning the teacher to his or her classroom, often forces the innovation to be deemed a failure because the teacher lacks time, motivation, and support to implement the change. As such, having continued support and encouragement from a change facilitator with understanding of the agricultural educators' needs is paramount to preventing teacher attrition.

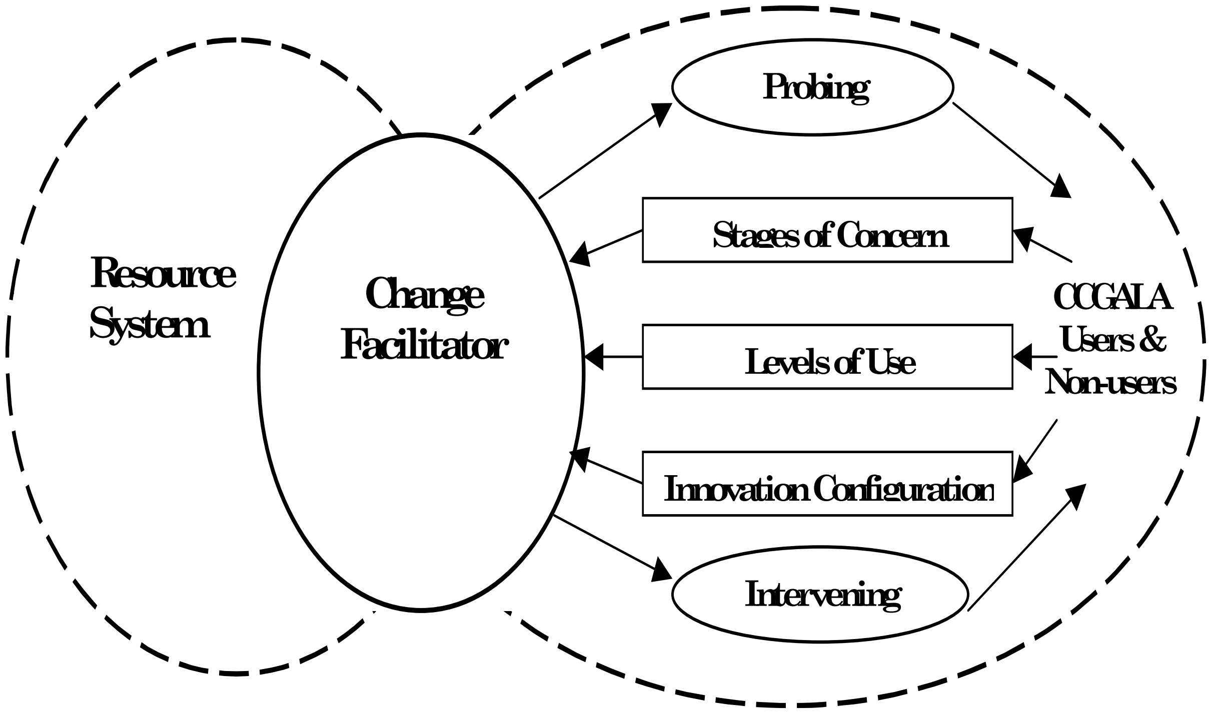

Figure 2-4. Concerns Based Adoption Model (Hall & Hord, 2001)

Hall and Hord characterized principals, teachers, professional development facilitators, and other district personnel in an educational system, as *change facilitators* serving as key factors in the success or failure of an educational innovation (1987). Specifically, these individuals are those who, "for brief or extended periods, assist various individuals and groups in developing the competence and confidence needed to use a particular innovation" (p. 11).

Related to continuing mentorship and facilitation of change when agricultural teachers are entering and attempting to sustain themselves in the profession, is the need for change facilitator support (Ingersoll, 2001) and regular, sustained encouragement for teachers when they are engaged in the educational change process (Hall & Hord, 2001).

In essence, teacher retention and continued survival in the agricultural education field is dependent upon, among other criterion, a professional development delivery system that addresses the teachers' concerns, rather than seeking to provide a one-time workshop or "train the trainer" session. The 2007 Delta Conference not only continued with the successful face-to-face delivery techniques utilized in initial Delta Conference offerings, but expanded the delivery system to include continued coaching, encouragement, and cross-participant conversations via an electronic portal reserved only for Delta Conference participants, mentors, and facilitators.

Purpose and Objectives

The purpose of this study was to measure 2007 Delta Conference participant utilization of instructional techniques and strategies before, and six months following, the conference. Participants offered data focusing on usage of writing behavioral objectives, creating an interest approach/focus/anticipatory set for lesson plans, setting context, delivering effective directions, utilizing E-Moments, utilizing inclusive language, and integrating LifeKnowledge™ into technical agricultural lessons one semester following the Delta Conference experience.

The objectives of this study were to:

1. Describe 2007 Delta Conference participants based upon selected demographic characteristics; and
2. Determine participant pre and post conference utilization of writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, utilizing inclusive language, and integrating LifeKnowledge™ into technical agricultural lessons.

Methodology

The population for this descriptive study consisted of agricultural educator participants in the 2007 Delta Conference (N = 45). A census was utilized to gather data from as many participants as possible. Participants were contacted via personal and school email, which were collected through the conference application process.

The data collection instrument was developed using a combination of demographic and Likert-type questions. Instrument questions were developed utilizing pre-determined conference goals and prescribed outcomes as guidelines. The Delta Conference sought to develop specific skills related to teachers' ability to develop and deliver brain-based and engaging lessons. As a part of this effort, and developed into specific constructs of the instrument, were the development of behavioral objectives, the development and delivery of interest approaches, the utilization of contextual sets/bridges, the delivery of effective directions, the utilization of E-Moments, the utilization of inclusive language and the integration of LifeKnowledge concepts into technical lessons. Participants responded to questions using a four-point, Likert-type scale for level of pre- and post-conference utilization. The four points of the Likert-type scale indicating usage were: "Daily," "Weekly," "Monthly," and "Never" for the areas concerning writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, utilizing inclusive language, and integrating LifeKnowledge™ into technical agricultural lessons.

Content and face validity of the instrument were established by a panel of experts from the study's sponsoring academic department and by conference officials. This study, which was a portion of a larger study, focused primarily on participant utilization of instructional techniques and strategies before, and six months following, the conference. The instrument contained seven sections, each focusing on the pre- and post-conference utilization of instructional techniques and strategies previously mentioned. Cronbach's alpha was utilized to measure the instrument's reliability and yielded an overall alpha of $\alpha = .813$.

All instrumentation and materials were distributed according to Dillman's *Mail and Internet Survey's Design Method* (Dillman, 2000). The instrument was created, distributed, and data were collected utilizing the Vovici EFM Continuum web survey development tool. Questionnaires were distributed to all participants on December 3, 2007, and data collection was completed January 28, 2008. During this period, participants received three reminder emails and one personal follow-up phone call. It was imperative to collect data from participants one complete semester following their participation in the Delta Conference. The study yielded an overall response rate of 86.7%.

Exported responses from participants were coded and analyzed using the SPSS 14.0 for Windows. Data were analyzed as parameters in the form of percentages, counts, means, and standard deviations. Demographic data identifying gender, years of teaching experience, average class size, and size of campus were also collected and analyzed.

Findings

Objective One

The demographic data for the 2007 Delta Conference participants were analyzed. The mean teaching experience of respondents in years was 5.10 (SD = 5.29), with a range including one year of experience through 24 years of experience. Of the conference participants who responded, 30.6% were male and 69.4% were female. Respondents indicated a mean class size of 17.2 (SD = 6.28), with a range including a minimum of five students to a maximum of 28 students. Finally, information was requested concerning school population size.

Table 1 highlights the percentage breakdown of teacher participants' campus populations. Campus population, indicated by students available to enroll in agricultural education courses, was represented as ordinal data choices in increments of 100 students.

Table 1
Percentage of Participants Teaching on Campuses with Varying Population Sizes

Campus Population	% Indicated
0-100 Students	10.3
100-200 Students	10.3
200-300 Students	17.2
300-400 Students	10.3
400-500 Students	10.3
500+ Students	41.4

Interestingly, the largest portion of participants was teaching at campuses with five hundred or more students. Other participants were distributed relatively equal across the other ranges of campus size.

Objective Two

Agricultural education teachers who participated in the 2007 Delta Conference were asked to provide their perceptions concerning pre- and post-conference utilization of writing behavioral objectives, creating interest approaches/focus/anticipatory sets, setting context, delivering effective directions, utilizing E-Moments, and utilizing inclusive language. Tables 2 through 8 offer participant responses to the Likert-type questions concerning each area indicated above. In each question set, teachers were asked to indicate level of agreement or disagreement to each statement.

Table 2 details both pre- and post-conference utilization of behavioral objectives in planning student learning. Behavioral objectives allow teachers to organize content while creating measurable and observable student learning outcomes (Bloom, 1956).

Table 2
Pre and Post Conference Utilization - Writing Behavioral Objectives

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	18.4	26.3	44.7	10.5
Post-conference utilization	47.4	44.7	7.9	0

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

The percentage of participants engaging in the creation of behavioral objectives for lessons increased following the conference. Participants indicated a 29% increase in the creation of behavioral objectives on a daily basis and an increase of 18.4% on a weekly basis in the six months following the conference.

Table 3 examines participant utilization of interest approaches in teaching both before and after attending the Delta Conference. The interest approach (anticipatory set/focus) is designed to increase student awareness, motivation, and receptivity to learning before a lesson's content delivery, while focusing attention on the topic at hand (Moore, 1974).

Table 3
Pre and Post Conference Utilization – Interest Approaches

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	21.1	44.7	23.7	10.5
Post-conference utilization	60.5	34.2	5.3	0

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

Participant utilization of an interest approach to gain students' attention increased noticeably six months following the conference. While 66.4% of participants indicated using interest approaches on a daily or weekly basis before conference, post conference utilization realized an increase of 28.3% to the final utilization rate of 94.7% on a daily or weekly basis.

Table 4 highlights pre and post conference utilization of contextual sets/bridges. Setting context, or creating contextual bridges, is a technique utilized to orient students to learning and where they are in the progress of the lesson. Conducted before, during, and after lessons, contextual sets/bridges offer students a guide to what they have learned, what will be next, why the information is relevant to them, and how they are to perform in the learning situation (Deporter, Reardon, & Singer-Nourie, 1998).

Table 4
Pre and Post Conference Utilization – Contextual Sets/Bridges

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	21.1	44.7	23.7	10.5
Post-conference utilization	60.5	34.2	5.3	0

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

Teachers indicated that, before the Delta Conference, 26.3% of participants never utilized contextual setting or bridging to orient student learning during lessons. Participants indicated that 60.5% engaged in the daily use of setting context, while 34.2% reported setting context, on a weekly basis, six-months following the Delta Conference.

Table 5 explains pre- and post-conference utilization of effective directions. Directions in teaching become effective if a series of salient and succinct information is provided to the learner in a fashion that positions mind before body, and outlines parameters for time, and checking for understanding (Deporter, Reardon, & Singer-Nourie, 1998).

Table 5
Pre and Post Conference Utilization – Delivering Effective Directions

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	2.6	36.8	34.2	26.3
Post-conference utilization	73.7	23.7	2.6	0

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

Noteworthy findings concerning Delta Conference participants' use of effective directions before and after the experience include daily usage of effective directions increasing 71.1%, from 2.6% before conference, to 73.7% six months post-conference. In addition, 26.3% of participants self-reported never using effective directions before the conference. No participant indicated never using effective directions during the 2007 fall semester.

Table 6 focuses on pre- and post-conference utilization of E-Moments, or engaging moments. E-Moments are educational strategies designed to engage students by utilizing a combination of chunking, rehearsal, pattern recognition, and emotional involvement, all designed from sound theoretical principles in education (Reardon & Derner, 2004).

Table 6
Pre and Post Conference Utilization – E-Moments

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	2.6	26.3	47.4	23.7
Post-conference utilization	34.2	60.5	5.3	0

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

Nearly 25% of participants never utilized E-Moments before attending Delta. Post-conference data indicate a 31.6% increase in daily usage and a 34.2% increase in weekly usage. No participant indicated never using E-Moments following their experience at the Delta Conference.

Table 7 includes participant responses concerning the pre- and post-conference utilization of inclusive language. The use of inclusive language while teaching is a process of purposefully choosing words and crafting speech to create a welcoming and encouraging environment for students devoid of conflict between the student and teacher. Appropriate inclusive language may also be utilized to increase engagement and effectively convey meaning (Deporter, Reardon, & Singer-Nourie, 1998).

Table 7
Pre and Post Conference Utilization – Inclusive Language

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	7.9	26.3	50.0	15.8
Post-conference utilization	65.8	28.9	2.6	2.6

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

Responding participants indicated a 57.9% increase in the utilization of inclusive language on a daily basis following the conference. The percentage of participants utilizing inclusive language on a weekly basis remained steady, while the percentage of monthly users declined from pre- to post-conference. Finally, participants indicating they never utilized inclusive language fell from 15.8% to 2.6% based on pre- and post-conference data.

Table 8 details the pre and post conference integration of LifeKnowledge™. LifeKnowledge™, an initiative of the National FFA Organization, was developed so FFA members actualize the mission of the organization through a specially designed program of study in leadership (National FFA Organization, 2007).

Table 8
Pre and Post Conference Utilization – LifeKnowledge™ Integration

Individual Questions	Percentage			
	D	W	M	N
Pre-conference utilization	2.6	10.5	44.7	42.1
Post-conference utilization	28.9	50.0	18.4	2.6

Note. (D)aily, (W)eekly, (M)onthly, (N)ever

Participants increased integration of LifeKnowledge™ concepts on a daily and weekly basis following their experiences. Pre-conference estimates indicated that 42.1% of participants had never integrated LifeKnowledge™ concepts into a lesson. However, following Delta, only 2.6% of participants indicated not engaging in LifeKnowledge™ integration.

Conclusions and Recommendations

Objective One

A large percentage of the 2007 Delta Conference participants were female, while approximately one-third were male. As a whole, participants were not seasoned teachers. This may explain why so many were willing to adopt and sustain the use of new teaching strategies and techniques (Bellah & Dyer, 2007). The varying range of class size indicates that participants are having success with the learned techniques and strategies in an array of class sizes. This finding highlights the flexibility of the techniques and strategies learned by participants. Finally, although larger campuses were heavily represented in the current study, it should be noted that participants were distributed equally across the other campus sizes. This indicates that the learned strategies and techniques have the potential to work well in agricultural education programs and their respective campuses regardless of student population size.

It is the recommendation of the authors that the findings be approached with caution because the representative data denote only one Delta Conference class. Multiple classes should be studied over extended periods to establish stability in the current findings.

Objective Two

Data collected and represented in objective two indicate a notable shift in teacher classroom behaviors reportedly attributable to individual experiences at the 2007 Delta Conference. Teacher participants indicated increases of daily and weekly creation of behavioral objectives. Primary development of skill in creating behavioral objectives for lesson planning has traditionally occurred in the preservice experience. This finding begs questions related to time and delivery method of basic planning concepts and why such lessons typically taught in the preservice experience potentially do not stick.

The utilization of interest approaches/anticipatory sets/focuses yielded similar results. This teaching strategy is typically introduced at the preservice level; however, following reinforcement, practice, and coaching while at the Delta Conference, the largest percentage of usage shifted from weekly to daily (60.5%) usage regarding this valuable concept.

While not a traditional concept of planning and teaching, setting context for student learning experienced similar results to that of interest approach usage. The concept of setting context is an important daily practice (Deporter, Reardon, & Singer-Nourie, 1998) to aid in student comprehension, and use of this concept experienced an increase from 26.3% daily pre-conference use to 60.5% of participants using it on a daily basis.

The delivery of effective directions tends to be a new concept for most Delta participants; however, participants widely adopted and indicated sustained use one semester following the conference. Before conference, only 2.6% indicated daily usage of effective directions, while post-conference results indicated 73.7% daily usage of this instructional technique. This finding is not surprising due to the influential nature of the technique in creating efficiency for the teacher and clarity for the students, while engaging in specific activities (Deporter, Reardon, & Singer-Nourie, 1998).

E-Moments were being used prior to the Delta Conference. More than 76% of participants were using these specialized teaching techniques on a daily, weekly or monthly basis; however, post-conference results indicated an increase of 31.6% increase in daily usage and a 34.2% increase in weekly usage. This finding indicates that teachers are engaging students' multiple intelligences and learning styles at higher cognitive levels and at a notably increased rate.

The utilization of inclusive language tends to be a very specialized technique requiring much practice. Many participants struggle with learning this technique due to ingrained language patterns a person develops throughout life. However, through practice and coaching provided at the conference, daily usage of inclusive language use increased from 7.9% to 65.8% six-months following the conference.

Finally, LifeKnowledge™ integration experienced considerable increases in usage. Participants indicated increases of 2.6% to 28.9% on a daily basis, and 10.5% to 50.0% on a weekly basis. Teacher participants never integrating LifeKnowledge™ fell from 42.1% before conference to 2.6% following conference. Students may be benefiting from an increased usage of leadership concepts by their teachers in technical agriculture lessons; therefore, continued research in the use of this technique should be pursued with respect to student experiences.

Data indicated a substantial change in sustained usage of techniques learned while at the 2007 Delta Conference. The authors recommend the continuation of all instructional techniques and strategies currently utilized at the Delta Conference. It is also recommended to continue promotion of the Delta Conference to all secondary and middle school agricultural educators and continued support of the program. State and national structures within Team AgEd are encouraged to secure funding and replicate the conference regionally and nationally. It is also important to communicate the findings of this study to educational administrators on the local, state, and national level. Post-secondary teacher preparation programs may improve pre-service delivery of content by utilizing delivery methods similar to those experiences enveloped in the Delta Conference. The authors also suggest that those involved in inservice delivery to agricultural educators as well as other teachers heed the findings of this study and implement the methodologies utilized by the Delta Conference in order to realize similar results. Finally, the authors recommend continued research focusing on the impact of teacher usage of the studied instructional strategies and techniques on individual student learning. The Delta Conference provides much promise for pedogological practices in agricultural education, but more investigation must be conducted with future Delta classes in order to provide consistent results.

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Concurrent Research Session E

Theme: Agricultural Leadership

Chair: Dr. Brenda Seevers, New Mexico State University

Facilitator: Dr. Ben Swan, University of Idaho

College or University Student Organizations: Which are More Effective at Developing Leaders?

Lori L. Moore, Assistant Professor, University of Idaho
Wyatt R. Prescott, Graduate Assistant, University of Idaho
Kimberly A. Gardner, Warehouse Supervisor, Del Monte Foods

Abstract

This study sought to examine student perceptions of the effectiveness of college and university student organizations on their leadership development. All current undergraduate students in the College of Agricultural and Life Sciences (CALS) were invited to participate in the study. Usable responses were obtained from 158 of the 794 undergraduates for a response rate of 19.9%. The majority of participants indicated they believed CALS organizations have contributed to their leadership awareness (n=89, 59.3%) and behaviors (n=78, 52.4%). When asked to rate the effectiveness of CALS organizations at contributing to their leadership abilities and skills, the most frequent response was a 4 (n=44, 29.9%) on a scale from 1 to 5. The majority of participants also indicated that university organizations have contributed to their leadership awareness (n=101, 70.6%) and behaviors (n=96, 67.1%). When asked to rate the effectiveness of university organizations at contributing to their leadership abilities and skills, the most frequent response was a 5 (n=41, 28.9%) on a scale from 1 to 5. Overall, participants indicated university-wide organizations were more effective at contributing to their leadership development.

Introduction and Theoretical Framework

For several decades now, there has been a noted lack of leadership skills in American undergraduate students. Love and Yoder (1989) found representatives of the agricultural industry have been criticizing such a lack of leadership skills since as early as 1980. McKinley, Birkenholz, and Stewart (1993) noted that while employers require college degrees for individuals to be employed in leadership positions, the number of college graduates possessing leadership characteristics and abilities continues to dwindle.

In 1981, the Connecticut Mutual Life Insurance Company initiated a survey to investigate the extent to which traditional American values have remained prevalent in contemporary society. As part of the survey, 1700 business, government and professional leaders were asked What are the obstacles to leadership in America? Their responses to 'Our educational system does not provide people with leadership skills' was quite interesting: 48% responded that it was a very important obstacle, 38% responded that it was a somewhat important obstacle, and only 15% responded that it was not important as an obstacle to leadership in America.

Astin and Astin (2000) noted that leadership development should be a critical part of the college experience. Similarly, Love and Yoder (1989) identified leadership development as one of seven educational outcomes for undergraduates in colleges of agriculture.

A survey of leadership literature suggests that leadership can be learned and developed

(Bass, 1990a; Bennis, 1994; Kouzes & Posner, 1997). Like other disciplines, theory suggests, that leadership learning can take place through three primary sources: trial and error (Thorndike, 1913), observation of others (Bandura, 1986), and education. Connors and Swan (2006) identified three areas within higher education in which leadership development can occur: within a course, an academic department, and through experiential leadership.

For many years, leadership development in undergraduates was seen as an indirect result of their education. In other words, leadership skills were developed in the non-curricular and extra-curricular activities in which students participated, perhaps through experiential leadership, including trial and error, or observing others. The theoretical framework for this study is rooted in the Social Learning Theory of Bandura (1986) and the Connectionism Theory of Thorndike (1913). Bandura's theory posits that the behavior of an individual can change after observing another's behavior. Thorndike's theory posits that learning takes place through trial and error. In the context of this study, an individual's participation in collegiate student organizations can enhance the development of their leadership awareness and behaviors through trial and error and observing others.

The leadership development of undergraduates should include intentional leadership education such as formal leadership courses, but the impact of student organizations and activities should not be ignored. Based on the findings of their study, McKinley et al. (1993, p. 83), recommended that "students should be motivated to increase their levels of participation and involvement in activities and organizations" and " Further research should be conducted to identify other activities which influence leadership development of agriculture students". Bass (1990b) stated,

> Whatever the education or training effort, its effectiveness in improving leadership depends first on identifying what needs improvement then on demonstrating or helping the training or students discover how to change his or her perceptions, cognitions, attitudes, and behavior (pp. 817-818).

Studies have documented the leadership development needs of undergraduates (Gardner, 2007; Litzenberg & Schneider, 1987; Maricle, 2003; Schumaker & Swan, 1993) and have explored the impact of formal leadership courses and experiential leadership (see Connors and Swan, 2006). Additional research such as Park and Dyer (2005) has been conducted to identify positional leaders within a College of Agriculture and then describe their prior leadership experiences and the impact of FFA and 4-H participation, but little research has been conduced that examines the perceptions of all undergraduates, not just those in leadership positions, related to the impact of various student organizations and activities on their leadership development.

Purposes and Objectives

This study, conducted as part of a larger study, sought to describe perceptions of current College of Agricultural and Life Sciences (CALS) undergraduates related to college and university student organizations. The specific research objectives of this study were to:

1. Identify which CALS organizations current undergraduates are involved in;
2. Describe the extent to which current CALS undergraduates believe CALS organizations impact their leadership development;
3. Identify which university-wide organizations CALS students are active in; and
4. Determine the extent to which current CALS undergraduates believe university-wide student organizations impact their leadership development.

Methods and Procedures

Population and Sample

The population for this study consisted of all undergraduate students pursuing a bachelor's degree in CALS. A total of 794 undergraduates were identified and included in the population frame for this study. Responses were obtained from 204 of the 794 undergraduates. A total of 46 responses were deemed by the researchers as unusable, yielding usable responses from 158 of the 794 undergraduates for a total response rate of 19.9%.

Instrumentation

A single researcher-developed instrument was used to collect data for this study. The survey instrument consisted of 11 questions including closed-ended, open-ended, multiple-response, and likert-type questions. The instrument was reviewed by a panel of experts for content and face-validity prior to its use.

Data Collection and Analysis

The instrument was administered via a web-based survey. The first page of the survey functioned as an informed consent page and included a description of the study, defined participation in the study as voluntary, and described any potential risks associated with participation. By clicking on the "next" button at the bottom of the page, respondents gave their consent to participate in the study. The second page of the study consisted of the 11 questions included on the instrument. To accomplish objective one, the first question listed all of the CALS approved student organizations and asked students to indicate all organizations they were active in at the time of the survey. To accomplish objectives two and four, students were asked to indicate whether or not they believed the CALS organizations and then the university-wide organizations contributed to their leadership awareness and a separate question if they contributed to their leadership behaviors. Participants were also asked to rate the effectiveness of each type of student organization at contributing to their leadership development on a scale from 1 to 5 with 1 = not effective and 5 = extremely effective. To accomplish objective three, an open-ended question was included on the survey asking students to list all university-wide organizations they were active in at the time of the survey including, but not limited to, student government, Greek system, student activities, living groups, etc.

The web-based instruments were administered following the Tailored Design Method by Dillman (2000). Up to five contacts were made for each participant included in the population frame using Survey Monkey. When responses were received, participants were removed from the database for future contacts. In this study, nonresponse error was addressed by comparing early responders to late responders for statistical differences (Ary, Jacobs, & Razavieh, 1996; Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). Late responders were defined as the later 50% of the respondents (Lindner et al.). No statistical differences where found when comparing the early responders to the late responders.

Descriptive statistics such as frequencies and percentages were used to accomplish the objectives of this study.

Results/Findings

Objective one sought to identify which organizations current undergraduates are involved in within the CALS. Table 1 shows the frequency of responses to the question about which CALS student organizations participants were active in. Of the 158 participants, almost three quarters (*n*=113, 71.5%) selected at least one CALS student organization. Two student organizations, the Pre-Vet Club and Collegiate FFA had the most frequent responses (*n*=18, 15.9%) followed closely by the CALS Ambassadors (*n*=17, 15.0%). Five CALS student organizations, ASABEB (Biosystems), Collegiate 4-H, International Textile and Apparel Association, Livestock and Meats Teams, and the Soil Stewards, received the lowest frequency of responses (*n*=2, 1.8%) while still showing student participation. There were two student organizations, the Aldrich Entomology Club and the Soil and Site Evaluation Team, listed as CALS student organizations on the survey that received no responses for participation.

Table 1.
Participants' indication of clubs within the College of Agricultural and Life Sciences in which they are active in (n=113)

Provided Organizations	*f*	%
Collegiate FFA	18	15.9
Pre-Vet Club	18	15.9
Ambassadors	17	15.0
PAAEYC-SA	16	14.2
Student Idaho Cattle Association	16	14.2
Agriculture Student Affairs Council (AgSAC)	15	13.3
Phi Upsilon Omicron	14	12.4
Agribusiness Club	9	8.0
Microbiology, Molecular Biology, and Biochemistry Club	9	8.0
American Associations of Family and Consumer Sciences (AAFCS)	8	7.1
Block and Bridle Club	8	7.1
ASABE (ASM)	6	5.3
Food and Nutrition Club	6	5.3
Dairy Club	5	4.4
Food Science Club	4	3.5
Sigma Alpha Agriculture Sorority	4	3.5
Plant and Soil Science Club	3	2.7
Rodeo Club	3	2.7
ASABeE (Biosystems)	2	1.8
Collegiate 4-H	2	1.8

International Textile and Apparel Association	2	1.8
Livestock and Meats Judging Teams	2	1.8
Soil Stewards	2	1.8
University of Idaho Student Society of Aboriculture	1	0.9
Aldrich Entomology Club	0	0.0
Soil and Site Evaluation Team	0	0.0

Objective two sought to describe the extent to which CALS undergraduates believe CALS organizations impact their leadership development. Table 2 shows whether or not participants believe CALS student organizations have impacted their leadership awareness and behaviors. The majority of participants indicated that CALS organizations have impacted their leadership awareness (n=89, 59.3%). Slightly more than half of the participants (n=78, 52.4%) believe that CALS organizations have impacted their leadership behaviors. The responses for the question of the organizations contributing to leadership awareness consisted of 150 responses and eight nonrespondents, while the question of the organizations contributing leadership behaviors consisted of 149 responses and nine nonrespondents.

Table 2.
Contribution of CALS organizations toward leadership awareness and behaviors

	Yes		No	
	f	%	*f*	%
Would you say these organizations have contributed to your leadership awareness?[a]	89	59.3	61	40.7
Would you say these organizations have contributed to your leadership behaviors?[b]	78	52.4	71	47.7

[a]n = 150. [b]n = 149.

Table 3 shows participants' perceptions of the effectiveness of CALS organizations at contributing to their leadership skills and abilities. On a scale from 1 to 5 with 1 = not effective and 5 = extremely effective, the most frequent response was a 4 (n=44, 29.9%) followed closely by a response choice of 3 (n=42, 28.6%).

Table 3.
Effectiveness of CALS organizations at contributing to the leadership development of CALS undergraduates (n=147)

Organization Type	Value Label	*f*	%
CALS student organization	1	35	23.8
	2	12	8.2
	3	42	28.6
	4	44	29.9
	5	14	9.5

Note: Value Labels: 1=not effective, 5=extremely effective.

Objective three sought to identify university-wide student organizations in which CALS students are active (i.e. Student Government, Student Activities, Greek, Living Groups, etc.).

Participants were allowed to list as many organizations as they were involved in. Ninety-nine participants responded to the question. A total of 148 organizations were listed. Individual organization responses were grouped according to the type of organization for ease of data analysis and interpretation. Frequency of responses within each group are reported in Table 4. Greek organizations had the highest activity rate (*n*=26, 17.4%) with individual responses including specific sororities, specific fraternities, and general Greek participation. Leadership Organizations including student senate, student orientation, peer advising, and ambassador organizations had the second highest frequency of responses (*n*=25, 16.8%) followed closely by Co-Curricular & Pre-Professional Organizations (*n*=24, 16.1%) including organizations such as Landscape Architect Club, Young Farmers and Ranchers, and Pre-Dental Club. The organizations with the lowest frequency of responses were Private Residence Groups (*n*=5, 3.4%), Women's Organizations (*n*=5, 3.4%), and Minority Organizations (*n*=3, 2.0%,).

Table 4.
Participants' indications of organization across campus they are active in (n=99)

Organization Reported	*f*	%
Greek	26	17.4
Leadership Organizations	25	16.8
Co-Curricular & Pre-Professional Organizations	24	16.1
Recreational/Entertainment Organizations	16	10.7
Religious Organizations	14	9.4
Residence Halls	11	7.4
Honor Organizations	10	6.7
Service Organizations	9	6.7
Private Residence Groups	5	3.4
Women's Organizations	5	3.4
Minority Organizations	3	2.0

Objective four sought to describe the extent to which CALS undergraduates believe university-wide organizations impact their leadership development. Table 5 illustrates students' perception of the contribution of university-wide student organizations toward their leadership awareness and leadership behaviors. The majority of participants believe that university-wide student organizations have contributed to both their leadership awareness (*n*=101, 70.6%) and their leadership behaviors (*n*=96, 67.1%).

Table 5.
Participants' indication of organizations across campus contribution to their leadership awareness and behaviors (n=143)

	Yes		No	
	f	%	*f*	%
Would you say these organizations have contributed to your leadership awareness?	101	70.6	42	29.4
Would you say these organizations have contributed to your leadership behaviors?	96	67.1	47	32.9

Table 6 shows participants' perceptions of the effectiveness of university-wide student organizations at contributing to their leadership skills and abilities. On a scale from 1 to 5 with 1 = not effective and 5 = extremely effective, the most frequent response was a 5 (*n*=41, 28.9%). Slight less than one-quarter of participants also selected response choices 3 (n=33, 23.2%) and 4 (n=32, 22.5%).

Table 6.
Effectiveness of university-wide organizations at contributing to the leadership development of CALS undergraduates (n=142)

Organization Type	Value Label	*f*	%
University-wide student organizations	1	27	19.0
	2	9	6.3
	3	33	23.2
	4	32	22.5
	5	41	28.9

Note: Value Labels: 1=not effective, 5=extremely effective.

Conclusions and Implications

Due to a response rate of only 19.9%, the findings of this study are much more exploratory than explanative. However, they nonetheless offer interesting results for consideration by the profession. Findings of this study showed that CALS undergraduates are participating in many of the student organizations within the college. Almost three-quarters (71.5%) indicated that they participate in at least one of the student organizations within CALS. This finding suggests that students are taking advantage of at least some of the opportunities made available to them in terms of CALS student organizations.

The majority of participants also believe that CALS student organizations are contributing to their leadership awareness (59.3%) and leadership behaviors (52.4%). While this is encouraging, it is perhaps of more concern to recognize that over 40% of respondents do not believe that CALS organizations are contributing to their leadership awareness (40.7%) or leadership behaviors (47.7%).

When asked to rate the effectiveness of CALS organizations in contributing to the development of leadership skills and abilities on a scale from 1 to 5, the most frequent response was a 4. It is somewhat concerning that less than 10% of the respondents in this study believe that CALS organizations are extremely effective at contributing to the development of leadership skills and abilities. Many of the organizations within the college exist to offer students opportunities for professional development, participate in community service activities, and enjoy fellowship with other students with similar interests. Perhaps these organizations do not emphasize leadership development as a part of professional development, and therefore, members do not recognize a connection to their own development as a leader.

Participants in this study are also active in university-wide student organizations and activities. Two-thirds (66%) of the participants in this study indicated that they are involved in at least one university-wide student organization. The majority of students believe that university-wide student organizations are contributing to their leadership awareness (70.6%) and leadership behaviors (67.1%). When asked to rate the effectiveness of student-wide organizations in contributing to the development of leadership skills and abilities on a scale from 1 to 5, the most frequent response was a 5. It is encouraging to see that over one-quarter of the respondents (28.9%) view university-wide student organizations as extremely effective at contributing to the development of leadership skills and abilities.

Fewer students reported active participation in university-wide student organizations as compared to CALS student organizations. Yet, overall, participants in this study perceive university-wide student organizations such as student government, Greek, and living communities as more effective than CALS student organizations at developing leadership awareness, behaviors, skills, and abilities. Perhaps this is due to the fact that many of the organizations identified as university-wide student organizations require more commitment to the organization and involve more focused, long-term leadership education. There is evidence to suggest that single, short leadership program efforts are less effective than extended, sustained programs (Cummins, 1995; Tabke, 1999; Yukl, 2002). Many of the university-wide student organizations, especially student government and the Greek system, clearly incorporate leadership development into their yearly program of activities which may be more effective than the single, short leadership development efforts more commonly found in the CALS organizations.

Recommendations

This study showed that CALS undergraduates believe university-wide organizations are more effective at developing leadership awareness, behaviors, skills, and abilities than student organizations within the college. However, the low response rate jeopardizes the generalizability of the findings beyond the respondents. Additional studies, perhaps including multiple institutions, should be conducted to obtain a larger response rate so as to make the findings more generalizable.

In this study, more respondents were involved in CALS organizations than university-wide organizations. Colleges of agriculture should capitalize on this involvement and work to incorporate more leadership development into its organizations. It is recommended that CALS organizations determine the extent to which leadership development is actually a part of their mission, and implement additional strategies to develop the leadership potential of members.

Additional studies should be conducted with the leaders of the student organizations in CALS to assess their perceptions related to what their particular organization does to build the leadership potential of its members.

The population for this study consisted of all current undergraduates, not just those in leadership positions. Perhaps at this stage in their career, undergraduates have strengthened their potential to lead but have not been put in situations requiring them to effectively use their skills and abilities. In other words, perhaps they are developing as leaders through observing others (Bandura, 1986), but have yet to develop implement their own leadership skills and abilities through trial and error (Thorndike, 1913). As a result, participants may not truly recognize the impact of the student organizations they have been a part of. Future studies should compare the perceptions of students who hold leadership positions within the various types of organizations and those who do not hold leadership positions. The influence of classification (freshman, sophomore, junior, senior) should also be investigated.

This study was based on the perceptions of students related to the impact of student organizations on their leadership development. No data related to their actual level of leadership skills and abilities was collected. While identifying and understanding the perceptions of students is important, future studies should be conducted to gather empirical evidence related to the impact of student organizations.

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Perceptions of Outside Stakeholders: How Important Are Leadership Skills?

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Abstract

This study sought to describe the importance of 25 personal leadership skills and 23 interpersonal and team leadership skills as perceived by two outside university stakeholder groups: recent graduates and business and industry representatives. Recent graduates perceived both personal and interpersonal and team leadership skills to be important. At least three quarters of the recent graduates rated all 25 personal leadership skills and 19 of the 23 interpersonal and team leadership skills as important or very important and over half rated 13 of the 25 personal leadership skills and 5 of the 23 interpersonal and team leadership skills as very important. Business and industry representatives were slightly less convinced of the importance of each skill. At least three quarters of the business and industry representative participants rated 20 of the 25 personal leadership skills and 17 of the 23 interpersonal and team leadership skills as important or very important and over half rated nine of the 25 personal leadership skills and six of the 23 interpersonal and team leadership skills as very important. The perceptions of the two groups were relatively consistent as to which skills were most and least important.

Introduction

Possessing the skills needed to enter the workforce is the key to college graduates obtaining employment and succeeding in their future careers. Individuals with leadership skills are becoming highly sought after by employers (Morgan, Rudd, & Kaufman, 2004). Within the last 15 years, more agricultural employers have reported a need for effective leaders to aid in meeting the goals and objectives of their organization. Realistically, organizations are looking for college graduates that are leaders and can take the company to the next level. Companies across America are finding it difficult to fill such leadership positions because of a "crisis of leadership" (Wren, 1994).

Numerous studies have documented that while employers view technical skills as important, interpersonal skills, such as leadership skills, were of more importance (Litzenberg & Schneider, 1987; Maricle, 2003). In a study conducted by the National Association of Colleges and Employers (2002), researchers asked employers what skills they desired from new graduates. Of the top seven skills identified, six were leadership related. These skills were: interpersonal, teamwork, verbal communication, analytical, written communication, and leadership. The same study asked employers the personal qualities they seek in an employee. The top personal qualities included: communication skills, motivation/initiative, teamwork skills, leadership skills, academic achievement/GPA, interpersonal skills, flexibility/adaptability, technical skills, honesty/integrity, work ethic, and analytical/problem-solving skills.

Employers are realizing that even though they often require college degrees for individuals to be employed in leadership positions, these employees are missing the characteristics and abilities of leadership (McKinley, Birkenholz, & Stewart, 1993). According to Fritz and Brown (1998) many college graduates are ineffective leaders. Fritz and Brown suggested that this leadership void is caused by the lack of formal leadership training. Representatives from agricultural businesses have voiced their support of leadership skills development classes for prospective employees (Aldrich, 1988). Yet, organizations continue to spend money to send employees to leadership training or bringing professionals into the company to train their employees (Yukl, 2002).

Included in the mission and goals of the College of Agricultural and Life Sciences (CALS) at a land-grant university in the Northwest is:

To support economic growth and enhance the quality of life for the people of Idaho by:

- Preparing students to be innovative leaders in a global society;
- Helping people improve their lives through research based education and leadership development focused on issues and needs; and
- Providing new knowledge to support agriculture and enhance the understanding of natural and human resources (CALS, 2003)

Community and leadership development was also identified by CALS as one of the six areas for major program emphasis within the college (CALS, 2003). Despite a commitment to leadership development in its mission and an emphasis area in community and leadership development, the college has yet to offer a comprehensive leadership education program for undergraduates. With this in mind, it is essential that the CALS community and its stakeholders begin identifying leadership development needs of students in the college in order for the college to implement strategies designed to ensure that graduates possess all of the skills, not just the technical competencies, that their future employers are seeking when they hire employees.

Theoretical Framework

The Development Pipeline™ is a systematic framework for designing and evaluating leadership development programs based on the works of Peterson and Hicks (1995, 1996), Peterson (2001), and Campbell (1988) (as cited in Hughes, Ginnett, & Curphy, 2002). The Development Pipeline™ was copyrighted in 1998 by Personal Decisions International Corporation and consists of six sections: (1) Determine Training Content, (2) Provide Insight, (3) Enhance Motivation Levels, (4) Provide Training on New Knowledge and Skills, (5) Practice New Skills, and (6) Hold People Accountable for Learning. Because course content and objectives should be based on the needs of the organization (Hughes, Ginnett, & Curphy, 2002), this study focused on the first of the six sections of the Development Pipeline™ by determining the importance of leadership skills according to stakeholders.

Purposes and Objectives

This study, conducted as part of a larger study, sought to identify the leadership development needs of students in the College of Agricultural and Life Sciences (CALS) at a land-grant university in the Northwest according to the perceptions of recent CALS graduates and business and industry representatives. The specific research objectives of this study were to:

1. Describe recent graduates and business and industry leaders in terms of selected demographics.
2. Describe the importance of leadership skills as perceived by recent CALS graduates.
3. Describe the importance of leadership skills as perceived by business and industry representatives.
4. Assess the similarities and differences in the importance of leadership skills as perceived by recent CALS graduates and business and industry representatives.

Methods and Procedures

Population and Sample

The population for this study consisted of two groups: bachelors' degree recipients of CALS who graduated within the last five years and business and industry representatives who employ graduates of the university. Recent graduates were defined as those students who received a bachelor's degree from the College of Agricultural and Life Sciences within the past five years (Spring 2002-Fall 2006). A current list of graduates was obtained from the Alumni Office. A total of 496 graduates were identified and included in the population frame for this study. Responses were obtained from 120 of the 496 recent graduates for a total response rate of 24.6 %. Business and industry representatives were identified through the academic departments within the college using department advisory committees. Each department has an advisory committee that includes business and industry representatives who have a vested interest in undergraduate education at the college level. A total of 27 business and industry representatives were identified and included in the population frame for this study. Responses were obtained from 14 of the 27 business and industry representatives for a total response rate of 51.9%.

Instrumentation

Two variations of a single researcher-developed instrument, *Leadership Competencies in the College of Agricultural and Life Sciences,* were used to collect data collected from the two population groups in this study. Each version differed slightly based on the perspective from which participants were asked to respond. For example, recent graduates were asked to respond based on how they saw themselves when they graduated and business and industry representatives were asked to respond based on how they view CALS graduates at the time they hired them, especially those they hired immediately after graduation.

The instrument was based on a review of literature (Maricle, Fritz, & Moody, 2003; Morgan, Rudd, & Kaufman, 2004) and consisted of five parts. Part one gathered data related to perceptions towards the importance of and proficiency level of graduates in 25 Personal Leadership Skills. Part two gathered data related towards the importance of and proficiency level of graduates in 23 Interpersonal and Team Leadership Skills. Part three of the instrument gathered data related to the importance of and opportunity to participate in collegiate organizations but data were not analyzed and included in this study. Part four of the instrument gathered demographic information about the participants. In the recent graduate version of the instrument, this included data such as gender, ethnicity, age, current occupation, years employed with current employer, degree(s) earned and the year, major and institution, semester they graduated, leadership courses enrolled in at the university, and how prepared they felt they were to be a successful leaders after graduation. In the business and industry version of the instrument, this included data such as gender, ethnicity, age, degree(s) earned, current occupation, number of CALS graduates they have hired within the past five years, were leadership qualities important in order to advance in their company, and if they felt that students from CALS are prepared to be successful leaders. Part five of the instrument included an open ended question that gave participants the opportunity to add additional comments not addressed in the instrument. After development, the instrument was evaluated by a panel of experts for content and face validity.

Data Collection and Analysis

The two versions of the instrument were administered via a web-based survey. The first page of the survey included informed consent information such as a description of the study, the voluntary nature of the study, risks of participation, and the fact that there would be no compensation for participation. By clicking the “next” button to enter the survey, participants gave their consent to participate in the study.

Responses were collected through the use of the web-based instruments following the Tailored Design Method by Dillman (2000). Up to five contacts were made for each participant. Each participant was assigned an identification code in surveymonkey.com. When responses were received, participants were removed from the database for future contacts. In this study, nonresponse error was addressed by comparing early responders to late responders for statistical differences (Ary, Jacobs, & Razawieh, 1996; Lindner, Murphy, & Briers, 2001; Miller & Smith, 1983). Late responders were defined as the later 50% of the respondents of the instrument (Lindner et al.). Analysis revealed no statistical differences in data obtained from the early responders as compared to the late responders.

Data was analyzed using SPSS® for Windows™. Cronbach's alpha was calculated for the importance of the personal and interpersonal and team leadership skills. Cronbach's alpha is appropriate for estimating internal-consistency reliability within a scale in Likert format (Isaac & Michael, 1995). Cronbach's alpha for each skill area as perceived by outside stakeholder participants were: α=.92 for Personal Leadership Skills and α=.94 for Interpersonal and Team Leaderhip Skills. Descriptive statistics such as frequencies, percentages, and Friedman’s Mean Rank (FMR) were also used. FMR, a non-parametric rank-based procedure similar to analysis of variance, was used to more accurately describe the ordinal scales used in this study.

Results/Findings

The first objective was to describe each of the two population groups in terms of selected demographics. Findings of this objective are discussed by population group below.

Recent Graduates

Of the 104 recent graduates of the College of Agricultural and Life Sciences who responded to the demographic question about gender (16 did not respond), slightly less than three-fourths (73.08%, n=76) were female and 26.92% (n=28) were male. The mean age was

27.05 years old with a minimum of 22 years old and a maximum of 52 years old. Almost all (*n*=99, 95.19%) were white, while one (0.96%) was American Indian or Alaska Native, one (0.96%) was Asian, one (0.96%) reported black or African American, one (0.96%) was Hispanic or Latino, and one (0.96%) reported an ethnicity of "mixed." In terms of year of graduation, 7.69% (*n*=8) graduated in Fall 2005, 19.23% (*n*=20) graduated in Spring 2006, 16.35% (*n*=17) graduated in Spring 2005, 3.85% (*n*=4) graduated in Fall 2004, 16.35% (*n*=17) graduated in Spring 2004, 6.73% (*n*=7) graduated in Fall 2003, 12.50% (*n*=13) graduated in Spring 2003, 1.92% (*n*=2) graduated in Fall 2002, 8.65% (*n*=9) graduated in Spring 2002, and 6.73% (*n*=7) reported other.

Business and Industry Representative

Of the 14 business and industry representatives who responded to the demographic questions, 64.29% (*n*=9) were female and 35.71% (n=5) were male. The mean age was 47.38 years old with a minimum of 28.0 years old and a maximum of 58.0 years old. Almost all (*n*=13, 92.86%) where white, while one (7.14%) was Hispanic or Latino. Of the 13 who responded about occupation, two (15.38%) were extension educators, two (15.38%) was in education, one (7.69%) was a small business owner, one (7.69%) was a radiological health manager, one (7.69%) was a farmer/consultant, one (7.69%) was a public health intuitionalist, one (7.69%) was a office manager, one (7.69%) was a senior appraiser, one (7.69%) was a director of an agency on aging, one (7.69%) was a community development manager, and one (7.69%) was an executive director. The mean years of service in their current occupation was 15.3 years with a minimum of one month and a maximum of 30 plus years. Of the 13 business and industry representatives who responded to the question on whether they have hired CALS graduates within the last five years, over half (*n*=8, 61.54%) reported yes and 38.46% (*n*=5) reported no.

The second objective of the study sought to identify the leadership development needs of CALS students a perceived by recent graduates from the college. The recent graduates rated 25 personal leadership skills according to how important the skills are in order for them to succeed in their careers (see Table 1). Recent graduates ranked Demonstrate problem solving skills (FMR=16.51) highest in terms of needing the skill to succeed in their career, followed by Accept responsibility (FMR=16.19); Communicate effectively (FMR=15.99); Manage time (FMR 15.73); Be self-directed/self- motivated (FMR=15.40); Be accountable (FMR=15.35); Demonstrate conflict management skills (FMR=15.18); Make ethical decisions (FMR=14.77); Lead by example (FMR=14.68); Maintain a positive work attitude (FMR=13.82); Carry out instructions (FMR=13.53); Create and set goals (FMR=13.50); Listen actively (FMR=13.50); Develop and express critical thinking skills (FMR=13.25); Recognize and manage stress (FMR=13.25); Express written ideas clearly (FMR=12.36); Focus on the task at hand (FMR=12.00); Welcome change (FMR=11.16); Understand personality and/or learning styles (FMR=11.14); Understand leadership strengths and weaknesses (FMR=11.01); Evaluate risk (FMR=10.83); Understand personal leadership (FMR=10.53); Define leadership (FMR=10.27); Demonstrate visioning skills (FMR=7.70); and Integrate leadership theory with critical issues in agriculture (FMR=7.34).

Recent graduates rated 23 interpersonal and team leadership skills according to how important the skills are in order for them to succeed in their career (see Table 2). Recent graduates ranked Treat others with respect, trust, and dignity (FMR=16.28) the highest, followed by Work in a team as well as lead (FMR=14.48); Communicate openly and be seen as approachable and open to new ideas (FMR=14.36); Build trust and have confidence in others

Table 1.
Graduates' perceptions of the importance of personal leadership skills

			Not Important		Little Importance		Somewhat Important		Important		Very Important	
	FMR	Rank	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Demonstrate problem solving skills[c]	16.51	1	0	0.0	0	0.0	2	1.7	28	23.3	90	75.0
Accept responsibility[b]	16.19	2	0	0.0	0	0.0	2	1.7	35	29.4	82	68.9
Communicate effectively[c]	15.99	3	0	0.0	0	0.0	3	2.5	33	27.5	84	70.0
Manage time[c]	15.73	4	0	0.0	0	0.0	4	3.3	36	30.0	80	66.7
Be self-directed/self-motivated[c]	15.40	5	0	0.0	0	0.0	6	5.0	34	28.3	80	66.7
Be accountable[c]	15.35	6	0	0.0	0	0.0	4	3.3	38	31.7	78	65.0
Demonstrate conflict management skills[c]	15.18	7	0	0.0	0	0.0	7	5.8	37	30.8	76	63.3
Make ethical decisions[b]	14.77	8	0	0.0	1	0.8	6	5.0	38	31.9	74	62.2
Lead by example[c]	14.68	9	0	0.0	0	0.0	7	5.9	41	34.5	71	59.7
Maintain a positive work attitude[c]	13.82	10	0	0.0	0	0.0	9	7.5	46	38.3	65	54.2
Carry out instructions[c]	13.53	11	0	0.0	0	0.0	6	5.0	55	45.8	59	49.2
Create and set goals[c]	13.50	12	0	0.0	0	0.0	8	6.7	52	43.3	60	50.0
Listen actively[c]	13.50	12	0	0.0	0	0.0	10	8.3	50	41.7	60	50.0
Develop and express critical thinking skills[c]	13.25	14	0	0.0	0	0.0	10	8.3	54	45.0	56	46.7
Recognize and manage stress[c]	13.25	14	0	0.0	0	0.0	14	11.7	45	37.5	61	50.8
Express written ideas clearly[c]	12.36	16	0	0.0	1	0.8	13	10.8	55	45.8	51	42.5
Focus on the task at hand[c]	12.00	17	0	0.0	0	0.0	14	11.7	58	48.3	48	40.0
Welcome change[c]	11.16	18	0	0.0	3	2.5	21	17.5	48	40.0	48	40.0
Understand personality and/or learning styles[c]	11.14	19	0	0.0	4	3.3	15	12.5	57	47.5	44	36.7
Understand leadership strengths & weaknesses[c]	11.01	20	0	0.0	4	3.3	20	16.7	53	44.2	43	35.8
Evaluate risk[b]	10.83	21	0	0.0	1	0.8	22	18.5	57	47.9	39	32.8
Understand personal leadership[c]	10.53	22	0	0.0	2	1.7	26	21.7	50	41.7	42	35.0
Define leadership[c]	10.27	23	3	2.5	5	4.2	20	16.7	51	42.5	41	34.2
Demonstrate visioning skills[a]	7.70	24	0	0.0	6	5.1	32	27.1	60	50.8	20	16.9
Integrate leadership theory with critical issues in ag	7.34	25	6	5.0	11	9.2	31	25.8	52	43.3	20	16.7

[a]*n* = 118. [b]*n* = 119. [c]*n* = 120.

Table 2.
Graduates' perceptions of the importance of interpersonal and team leadership skills

			Not Important		Little Importance		Somewhat Important		Important		Very Important	
	FMR	Rank	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Treat others with respect, trust, and dignity[b]	16.28	1	0	0.0	0	0.0	4	3.7	25	23.1	79	73.1
Work in a team as well as lead[b]	14.48	2	0	0.0	1	0.9	5	4.6	44	40.7	58	53.7
Communicate openly and be seen as approachable and open to new ideas[b]	14.36	3	0	0.0	0	0.0	7	6.5	42	38.9	59	54.6
Build trust and have confidence in others[b]	13.69	4	0	0.0	1	0.9	9	8.3	45	41.7	53	49.1
Organize resources to accomplish maximum efficiency[a]	13.67	5	0	0.0	0	0.0	9	8.4	44	41.1	54	50.5
Encourage others[b]	13.32	6	0	0.0	1	0.9	14	13.0	39	36.1	54	50.0
Lead groups towards achieving the goal of the group[b]	12.92	7	0	0.0	0	0.0	9	8.3	56	51.9	43	39.8
Delegate effectively[b]	12.80	8	0	0.0	0	0.0	13	12.0	46	42.6	49	45.5
Recognize others for their contributions[b]	12.49	9	0	0.0	1	0.9	11	10.2	55	50.9	41	38.0
Attract, develop & retain talented individuals[b]	12.42	10	1	0.9	2	1.9	13	12.0	45	41.7	47	43.5
Supervise others/be a team leader[b]	12.21	11	0	0.0	1	0.9	13	12.0	53	49.1	41	38.0
Be considerate of the needs and feelings of each individual in the group[b]	11.97	12	0	0.0	2	1.9	19	17.6	44	40.7	43	39.8
Contribute ideas to a group[a]	11.78	13	0	0.0	2	1.9	14	13.1	53	49.5	38	35.5
Identify strengths and weaknesses of others[b]	11.44	14	1	0.9	3	2.8	18	16.7	46	42.6	40	37.0
Manage and respect others' time[b]	11.08	15	1	0.9	0	0.0	22	20.4	55	46.3	35	32.4
Value diversity[b]	11.00	16	4	3.7	2	1.9	19	17.6	44	40.7	39	36.1
Foster relationships[b]	10.89	17	1	0.9	2	1.9	23	21.3	42	38.9	40	37.0
Understand group dynamics[b]	10.87	18	0	0.0	1	0.9	23	21.3	50	46.3	34	31.5
Enable others[b]	10.73	19	0	0.0	2	1.9	20	18.5	54	50.0	32	29.6
Develop the leadership potential of others[b]	10.48	20	0	0.0	4	3.7	26	24.1	43	39.8	35	32.4
Practice team building skills[b]	9.86	21	2	1.9	4	3.7	25	23.1	48	44.4	29	26.9
Inspire, empower and exercise authority[b]	9.12	22	2	1.9	10	9.3	24	22.2	45	41.7	27	25.0
Take control[b]	8.16	23	2	1.9	8	7.4	32	29.6	46	42.6	20	18.5

[a]*n* = 107.

(FMR=13.69); Organize resources to accomplish maximum efficiency (FMR=13.67); Encourage others (FMR=13.32); Lead groups towards achieving the goal of the group (FMR=12.92); Delegate effectively (FMR=12.80); Recognize others for their contributions (FMR=12.49); Attract, develop and retain talented individuals (FMR=12.42); Supervise others/be a team leader (FMR=12.21); Be considerate of the needs and feelings of each individual in the group (FMR=11.97); Contribute ideas to a group (FMR=11.78); Identify strengths and weaknesses of others (FMR=11.44); Manage and respect others' time (FMR=11.08); Value diversity (FMR=11.00); Foster relationships (FMR=10.89); Understand group dynamics (FMR=10.87); Enable others (FMR=10.73); Develop the leadership potential of others (FMR=10.48); Practice team building skills (FMR=9.86); Inspire, empower and exercise authority (FMR=9.12); and Take control (FMR=8.16).

The third objective sought to identify the leadership development needs of CALS students as perceived by business and industry representatives. Business and industry representatives rated 25 personal leadership skills according to how important the skills are in order for students to succeed in their future career (see Table 3). Business and industry representatives ranked the Accept responsibility skill (FMR=19.21) the highest, followed by Demonstrate problem solving skills (FMR=18.08); Communicate effectively (FMR=17.67); Create and set goals (FMR=16.79); Be accountable (FMR=16.75); Make ethical decisions (FMR=15.33); Listen actively (FMR=14.46); Manage time (FMR=14.21); Be self-directed/self-motivated (FMR=13.96); Express written ideas clearly (FMR=13.63); Demonstrate conflict management skills (FMR=13.54); Recognize and manage stress (FMR=13.13); Lead by example (FMR=12.96); Maintain a positive work attitude (FMR=12.83); Develop and express critical thinking skills (FMR=12.33); Welcome change (FMR=11.88); Carry out instructions (FMR=11.67); Define leadership (FMR=11.21); Understand personal leadership (FMR=10.83); Evaluate risk (FMR=10.25); Understand leadership strengths and weaknesses (FMR=10.08); Integrate leadership theory with critical issues in agriculture (FMR=9.83); Demonstrate visioning skills (FMR=9.58); Focus on the task at hand (FMR=7.88); and lastly Understand personality and/or learning styles (FMR=6.92).

Business and industry representatives rated 23 interpersonal and team leadership skills according to how important the skills are in order for students to succeed in their future career (see Table 4). They ranked the Treat others with respect, trust, and dignity skill (FMR=17.36) the highest, followed by Communicate openly and be seen as approachable and open to new ideas (FMR=16.50); Work in a team as well as lead (FMR=15.71); Build trust and have confidence in others (FMR=15.29); Foster relationships (FMR=15.25); Attract, develop and retain talented individuals (FMR=13.54); Organize resources to accomplish maximum efficiency (FMR=13.11); Lead groups towards achieving the goal of the group (FMR=13.11); Manage and respect others' time (FMR=12.43); Recognize others for their contributions (FMR=12.14); Practice team building skills (FMR=12.11); Contribute ideas to a group (FMR=12.07); Delegate effectively (FMR=11.79); Supervise others/be a team leader (FMR=10.82); Be considerate of the needs and feelings of each individual in the group (FMR=10.68); Understand group dynamics (FMR=10.39); Value diversity (FMR=10.21); Encourage others (FMR=10.07); Identify strengths and weaknesses of others (FMR=10.04); Develop the leadership potential of others (FMR=9.71); Inspire, empower and exercise authority (FMR=9.54); Enable others (FMR=8.43); and lastly Take control (FMR=5.71).

Table 3.
Business and Industry perceptions of the importance of personal leadership skills

			Not Important		Little Importance		Somewhat Important		Important		Very Important	
	FMR	Rank	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Accept responsibility[b]	19.21	1	0	0.0	0	0.0	0	0.0	1	7.1	13	92.9
Demonstrate problem solving skills[b]	18.08	2	0	0.0	0	0.0	0	0.0	3	21.4	11	78.6
Communicate effectively[b]	17.67	3	0	0.0	0	0.0	0	0.0	4	28.6	10	71.4
Create and set goals[b]	16.79	4	0	0.0	0	0.0	1	7.1	2	14.3	11	78.6
Be accountable[b]	16.75	5	0	0.0	0	0.0	1	7.1	2	14.3	11	78.6
Make ethical decisions[b]	15.33	6	0	0.0	0	0.0	1	7.1	4	28.6	9	64.3
Listen actively[b]	14.46	7	0	0.0	0	0.0	1	7.1	6	42.9	7	50.0
Manage time[b]	14.21	8	0	0.0	0	0.0	1	7.1	5	35.7	8	57.1
Be self-directed/self-motivated[b]	13.96	9	0	0.0	0	0.0	3	21.4	2	14.3	9	64.3
Express written ideas clearly[b]	13.63	10	0	0.0	0	0.0	1	7.1	7	50.0	6	42.9
Demonstrate conflict management skills[a]	13.54	11	0	0.0	0	0.0	0	0.0	8	61.5	5	38.5
Recognize and manage stress[b]	13.13	12	0	0.0	0	0.0	2	14.3	5	35.7	7	50.0
Lead by example[b]	12.96	13	0	0.0	0	0.0	2	14.3	6	42.9	6	42.9
Maintain a positive work attitude[b]	12.83	14	0	0.0	0	0.0	1	7.1	8	57.1	5	35.7
Develop and express critical thinking skills[a]	12.33	15	0	0.0	0	0.0	4	30.8	3	23.1	6	46.2
Welcome change[b]	11.88	16	0	0.0	0	0.0	3	21.4	5	35.7	6	42.9
Carry out instructions[b]	11.67	17	0	0.0	0	0.0	1	7.1	8	57.1	5	35.7
Define leadership[b]	11.21	18	0	0.0	1	7.1	2	14.3	6	42.9	5	35.7
Understand personal leadership[b]	10.83	19	0	0.0	0	0.0	3	21.4	7	50.0	4	28.6
Evaluate risk[b]	10.25	20	0	0.0	0	0.0	3	21.4	8	57.1	3	21.4
Understand leadership strengths & weaknesses[b]	10.08	21	0	0.0	0	0.0	3	21.4	7	50.0	4	28.6
Integrate leadership theory with critical issues in ag[b]	9.83	22	0	0.0	0	0.0	5	35.7	6	42.9	3	21.4
Demonstrate visioning skills[b]	9.58	23	0	0.0	0	0.0	5	35.7	6	42.9	3	21.4
Focus on the task at hand[b]	7.88	24	0	0.0	1	7.1	3	21.4	8	57.1	2	14.3
Understand personality and/or learning styles[b]	6.92	25	0	0.0	2	14.3	4	28.6	6	42.9	2	14.3

[a]n = 13. [b]n = 14.

Table 4.
Business and industries perceptions of the importance of interpersonal and team leadership skills

			Not Important		Little Importance		Somewhat Important		Important		Very Important	
	FMR	Rank	*f*	%	*f*	%	*f*	%	*f*	%	*f*	%
Treat others with respect, trust, and dignity[a]	17.36	1	0	0.0	0	0.0	0	0.0	3	21.4	11	78.6
Communicate openly and be seen as approachable and open to new ideas[a]	16.50	2	0	0.0	0	0.0	0	0.0	5	35.7	9	64.3
Work in a team as well as lead[a]	15.71	3	0	0.0	0	0.0	0	0.0	6	42.9	8	57.1
Build trust and have confidence in others[a]	15.29	4	0	0.0	0	0.0	0	0.0	7	50.0	7	50.0
Foster relationships[a]	15.25	5	0	0.0	0	0.0	0	0.0	7	50.0	7	50.0
Attract, develop & retain talented individuals[a]	13.54	6	0	0.0	0	0.0	2	14.3	5	35.7	7	50.0
Organize resources to accomplish maximum efficiency[a]	13.11	7	0	0.0	0	0.0	2	14.3	6	42.9	6	42.9
Lead groups towards achieving the goal of the group[a]	13.11	7	0	0.0	0	0.0	2	14.3	6	42.9	6	42.9
Manage and respect others' time[a]	12.43	9	0	0.0	0	0.0	2	14.3	7	50.0	5	35.7
Recognize others for their contributions[a]	12.14	10	0	0.0	0	0.0	1	7.1	9	64.3	4	28.6
Practice team building skills[a]	12.11	11	0	0.0	0	0.0	1	7.1	9	64.3	4	28.6
Contribute ideas to a group[a]	12.07	12	0	0.0	0	0.0	1	7.1	9	64.3	4	28.6
Delegate effectively[a]	11.79	13	0	0.0	0	0.0	3	21.4	6	42.9	5	35.7
Supervise others/be a team leader[a]	10.82	14	0	0.0	0	0.0	2	14.3	9	64.3	3	21.4
Be considerate of the needs and feelings of each individual in the group[a]	10.68	15	0	0.0	0	0.0	2	14.3	9	64.3	3	21.4
Understand group dynamics[a]	10.39	16	0	0.0	0	0.0	2	14.3	10	71.4	2	14.3
Value diversity[a]	10.21	17	0	0.0	1	7.1	3	21.4	6	42.9	4	28.6
Encourage others[a]	10.07	18	0	0.0	0	0.0	4	28.6	6	42.9	4	28.6
Identify strengths and weaknesses of others[a]	10.04	19	0	0.0	0	0.0	2	14.3	10	71.4	2	14.3
Develop the leadership potential of others[a]	9.71	20	0	0.0	1	7.1	5	35.7	3	21.4	5	35.7
Inspire, empower and exercise authority[a]	9.54	21	0	0.0	1	7.1	4	28.6	5	35.7	4	28.6
Enable others[a]	8.43	22	0	0.0	0	0.0	6	42.9	5	35.7	3	21.4
Take control[a]	5.71	23	0	0.0	1	7.1	7	50.0	5	35.7	1	7.1

[a]n = 14.

The fourth objective of the study sought to assess the similarities and differences in importance of leadership skills as perceived by recent graduates of the college and business and industry representatives. Friedman Mean Ranks for importance of the 25 personal leadership skills for the two populations were compared. Of the top five skills in the relative rank for importance according to recent graduates (Demonstrate problem solving skills; Accept responsibility; Communicate effectively; Manage time; and Be self-directed/self-motivated), four of the same five (Accept responsibility; Demonstrate problem solving skills, Communicate effectively; Be accountable; and) were in the top five of the business and industry representatives rankings. Of the skills rated lowest in the relative rank for importance according to recent graduates (Evaluate risk; Understand personal Leadership; Define leadership; Demonstrate visioning skills; and Integrate leadership theory with critical issues in agriculture), only two of the five (Integrate leadership theory with critical issues in agriculture and Demonstrate visioning skills) were in the lowest five of the business and industry representatives rankings.

Friedman Mean Ranks for importance of the 23 interpersonal and team leadership skills according to the two groups were also compared. Of the five skills ranked highest according to recent graduates (Treat others with respect, trust, and dignity; Work in a team as well as lead; Communicate openly and be seen as approachable and open to new ideas; Build trust and have confidence in others; and Organize resources to accomplish maximum efficiency), four (Treat others with respect, trust, and dignity; Communicate openly and be seen as approachable and open to new ideas; Work in a team as well as lead; and Build trust and have confidence in others) were also in the top five of the business and industry representatives rankings. Of the skills rated lowest by recent graduates (Enable others; Develop the leadership potential of others; Practice team building skills; Inspire, empower and exercise authority; and Take control), four of the five (Develop the leadership potential of others; Inspire, empower and exercise authority, Enable others; and Take control) were also ranked lowest by the business and industry representatives.

Conclusions and Implications

Recent graduates perceived both personal and interpersonal and team leadership skills to be fairly important to their success in their career. These findings are consistent with the literature (Litzenberg & Schneider, 1987; Maricle, 2003). At least three quarters of the recent graduate participants in this study rated all 25 personal leadership skills and 19 of the 23 interpersonal and team leadership skills as important or very important and over half rated 13 of the 25 personal leadership skills and 5 of the 23 interpersonal and team leadership skills as very important. Recent graduates believed that the Demonstrate problem solving skills personal leadership skill (FMR=16.51) and the Treat others with respect, trust, and dignity interpersonal and team leadership skill (FMR=16.28) are the most important in terms of their success in their career. They believed that the personal leadership skills of Integrating leadership theory with critical issues in agriculture (FMR=7.34) and the interpersonal and team leadership skills of Take control (FMR=8.16) and Inspire, empower, and exercise authority (FMR=9.12) are the least important in terms of skills needed to be successful in their careers. As mentioned above, the Integrate leadership theory with critical issues in agriculture was one of the two personal skills not rated between important and very important and the interpersonal and team leadership skills of Take control and Inspire, empower, and exercise authority were two of the three skills not rated between important and very important when analyzed by mean score. They were instead seen as between somewhat important and important.

Business and industry representatives were not as convinced of the importance of many of the perceived personal and interpersonal and team leadership skills to the success of a student's future career as were recent graduates. At least three quarters of the business and industry participants in this study rated 20 of the 25 personal leadership skills and 17 of the 23 interpersonal and team leadership skills as important or very important and over half rated nine of the 25 personal leadership skills and six of the 23 interpersonal and team leadership skills as very important. Business and industry representatives believed that the personal leadership skills of Accept responsibility (FMR=19.21) and the interpersonal and team leadership skill of Treat others with respect, trust, and dignity (FMR=17.36) are the most important in terms of students success in their future careers. Business and industry representatives believed that the personal leadership skill of Understand personality and/or learning styles (FMR=6.92) and the interpersonal and team leadership skills of Take control (FMR=5.71) are the least important in terms of skills students need to be successful in their careers.

Overall, business and industry representatives are not as convinced of the importance of personal and interpersonal and team leadership skills to a student's success in their future career as compared to the recent graduates. However, the perceptions of the two groups seemed relatively consistent as to which skills were most and least important.

Recommendations

The demand for future agriculture leaders is immense. With the many changes occurring in agriculture it is essential that strong leaders are formed. Educators in CALS need to recognize this need and use stakeholder input to implement strategies and programs that aimed at developing leaders who are able to effectively guide and direct the agricultural industry in the future. Findings of this study showed that recent graduates and business and industry representatives believed leadership skills are important in order for students to succeed in their future careers. It is encouraging that both groups rated at least some of the skills as being important to very important, supporting the findings of several studies that have documented that various stakeholder groups perceive leadership development to be important (Birkenholz & Schumaker, 1994; Litzenberg & Schneider, 1987; Love & Yoder, 1989; Maricle, 2003; Schumaker & Swan, 1993). More research should address the level of proficiency of CALS students in each of the leadership skill areas. Are they more or less proficient in the areas that are perceived as more important by outside stakeholders?

This study is important to the efforts of agricultural education at this university to develop a leadership education program within CALS. However, future studies should also be conducted that include Colleges of Agriculture at other universities to gain a wider perspective and broader implications for agricultural education as a whole.

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The Nevada 4-H Program: Impacts on Nevada Public School Youth

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Abstract

This is the fifth in a series of 4-H impact evaluations conducted in Western States. Previous studies conducted in Montana, Idaho, Colorado, and Utah, were replicated in the Nevada public schools. The purpose was to measure the impact of the 4-H experience on the lives of Nevada youth, and to provide impact data for accountability and improvement for University of Nevada Cooperative Extension 4-H Programs. The 1,492 respondents were; 47.6% male and 52.4% female; 34.6% 5th grade, 28.1% 7th grade, and 37.3% 9th grade; 63.1% urban and 36.9% rural; and 11.7% 4-H and 88.3% non 4-H youth. Eight youth development constructs were measured including; extracurricular activity involvement; school leadership positions held; close relationship with adults; caring for others; amount of negative behavior; personal identity; positive identity; and self-confidence, character and empowerment. ANOVA for constructs by independent variables, age groups, gender, 4-H participation, and population density revealed that 4-H participation significantly contributed to the variance in extracurricular activity involvement ($p \leq .001$), school leadership positions held ($p = .025$), caring for others ($p \leq .001$),, and self-confidence, character and empowerment ($p = .004$).

Introduction/Theoretical Framework

4-H has a rich history of helping youth grow into productive citizens. Through participation in 4-H, youth learn life skills that they can further shape and use as adults. Federal, state, and county dollars fund 4-H programs coordinated by Land Grant College and Cooperative Extension systems. Accountability of these funds is of paramount importance to ensure continued support. Furthermore, 4-H youth development programming must be evaluated to determine how it impacts youth and in what ways it needs to improve.

4-H youth development is by the National 4-H Council (2002) as the following:

> 4-H Youth Development Programs provide opportunities, relationships, and support for youth to help them acquire the life skills necessary to meet the challenges of adolescence and adulthood. 4-H Youth Development uses experiential, research-based educational opportunities that help youth become competent, caring, confident, connected, and contributing citizens of character (p.5).

This definition, incorporating the "6Cs" of positive youth development (Competence, Caring, Confidence, Connectedness, Character, and Contribution) provides a solid description of 4-H youth development. Initially the 5C's of positive youth development were provided by Roth and Brooks-Gunn (2003) and Eccles and Gootman (2002). The 5Cs handily conceptualize positive youth development and integrate all characteristic indicators. Attention to youth assets and desirable characteristics rather than deficits precipitated the creation of the 5C's, later to be known as the 6C's (contribution, becoming the sixth C). The 6Cs help us comprehend the basis for 4-H and understand why it continues to thrive. The 6C's are foundational to positive youth development.

The science of child development is foundational to the applied science of positive youth development. Bronfenbrenner and Morris (1998) describe a detailed model of child development. In the center is the child. The child affects and is affected by all that surrounds him/her. Family environment is the most important influence as that is where most time is spent and most emotions are generated. Other significant and meaningful influences include extended family, education programs, health care settings, and other community learning sites. "Child development takes place through processes of progressively more complex interaction between an active child and the persons, objects, and symbols in its immediate environment. To be effective, the interaction must occur on a fairly regular basis over extended periods of time" (Bronfenbrenner & Morris, 1998, p. 996). Bronfenbrenner and Morris' work provides well accepted fundamental concepts for human development and serves as foundational principles in the ecology of child development.

Purpose/Objectives

One of the goals of The National 4-H Strategic Plan (2001) is to "collect national impact and accountability data that fully demonstrates the impact of 4-H on youth, their families, and communities" (p. 13). 4-H program managers and administrators are continually searching for improved methods of determining impact. Efforts to measure 4-H impact are numerous, and impact measurement strategies vary in focus and approach. Collection and synthesis of existing 4-H impact data is difficult at best. The purpose of this study was to replicate a 4-H impact evaluation conducted in Montana, Idaho, Colorado, and Utah, all AAAE Western Region States. Replication of one instrument over time and across states is needed to establish consistency and bolster accountability. The objectives of the study were to: (1) measure impacts of the 4-H experience on the lives of Nevada youth, and (2) provide impact data for accountability and improvement of University of Nevada Cooperative Extension's 4-H youth development programming.

Methods/Procedures

Although these data are part of a larger causal comparative study, this particular portion of the study was descriptive/correlational in nature. This study design use Dillman's (2007) Tailored Design Method (TDM). The in-person, in-class written questionnaire approach was the same used in previous studies (Astroth & Haynes, 2001; Goodwin, et al., 2005; Goodwin, Carroll, & Oliver, 2005; Tubbs, 2005), however, TDM principles were applied to this study to enhance response rate. Specifically, the study incorporated Dillman's recommendation regarding the order of survey questions, and the visual layout.

A stratified random sampling technique used two strata, urban and rural. Two school districts were grouped in the urban category, and 15 in the rural category. School districts in urban and rural Nevada counties were randomly prioritized using the Research Randomizer (2006). Researchers contacted school districts and requested participation in the study in this random order.

The sampling population for the study consisted of 5th, 7th, and 9th grade students, enrolled in Nevada public schools. The sampling unit was Nevada public elementary, middle, and high schools. Schools that include 5th, 7th and 9th grade students were referred to as elementary, middle, and high schools, respectively.

The instrument consisted of 67 questions/items. The format included yes-no, multiple choice, level of agreement, fill-in-the blank, and short essay questions. The instrument collected various types of student information as follows: Extracurricular activity involvement during the school week included various types of activities such as, drama, sports teams, school clubs, spiritual activities, or hanging out with friends. Risky or negative behavior included shoplifting, smoking cigarettes, and cheating on a test. Personal identity information included information such as meeting and greeting new people, level of comfort in new situations, and care about other people's feelings. Positive identity information included level of self-satisfaction and control over life circumstances. Self confidence, character, and personal empowerment information included self-perceived ability in record keeping, managing money, giving speeches, and setting goals. Close relationship with parents/guardian and other adults information included having good and lengthy conversations with adults and being willing to talk to adults about topics such as drugs, sex, and alcohol. Information on school leadership positions held included election to a school office or service on a school committee. Information on caring for others included helping other people not as fortunate or in need of assistance. General demographics information included age, grades earned, gender, and race/ethnicity. 4-H membership information included current 4-H membership status and the impact of 4-H on those with 4-H experience.

School principals were contacted by e-mail which consisted of a brief cover letter and attachments including the questionnaire and letter of cooperation. The letter of cooperation confirmed participation by the school (indicated by the principal's signature), determined the number of English and Spanish instruments needed, and identified the approximate date the questionnaires would be administered.

Nevada school principals requested a total of 4,041 English and 327 Spanish instruments, with 1,481 English and 11 Spanish surveys returned resulting in a 36.6% English survey response and a 3.4% Spanish survey response. The overall response rate was 34.2%. The potential for error due to Dillman's (2007), Coverage and Nonresponse threats severely limit the generalizability of the findings. It was impossible to accurately differentiate the amount of coverage and nonresponse error. Principals estimated the number of students matching the sample selection criteria and selected classes they thought would provide the greatest access to students in each age group. Without direct access to the students in each school, the researchers were unable to control this source of coverage error. If a school principal over-estimated the number of students matching the selection criteria, that would artificially inflate the estimate of coverage error. If a student did not respond because the principal did not provide him/her with an instrument, that would contribute to coverage error. If the student received an instrument, but failed to return it, that would contribute to nonresponse error. Students were anonymous at all times in this study. The potential for error due to Dillman's (2007), Coverage and Nonresponse threats severely limit the generalizability of the findings. The reader should use caution when transferring these results to other populations.

Lindner, Murphy, and Briers (2001) methods for statistically controlling nonresponse were considered and rejected due to the nature of the data collection process, the inaccessibility and anonymity of the respondents, and the fact that "late" respondents to this study were not truly "late respondents" in that they did not procrastinate but were simply provided the instruments at a date later than early respondents. The researchers were not able to sustain the required logical proposition by Lindner, Murphy, and Briers (2001) that "late respondents" in this study were more like non-respondents than "early respondents."

Age groups, gender, 4-H participation, and population density were the independent variables. Age groups consisted of 10-12 year olds representing 5th grade students, 13-14 year olds representing 7th grade students, and 15-18 year olds representing 9th grade students. Survey question #50, *are you female or male,* determined gender. Survey question #56, *have you ever belonged to a 4-H club that meets formally outside of school,* determined 4-H participation. The of each respondent's school was used to determine population density, rural or urban.

Results/Findings

Over one-half, 50.9%, of the 1,492 survey participants, were female, and 46.3% were male, while 63.1% of the survey respondents were from the urban school district, and 36.9% were from the rural districts. One hundred sixty six students, 11.1% of the respondents, indicated they had been involved in 4-H. The majority of students, 83.5%, never belonged to 4-H.

The sample population was composed of 40.0% 9th grade students, 27.0% 7th grade students and 33.0% 5th grade students. Age of respondents ranged from 10 to 18 years. The mean age was 13.04 years and the median age was 13.0 years. Whites were the largest race/ethnic group represented by 56.6% of the students in the study, followed by 22.4% Hispanic, 11% other, 3.8% Native American, and 2.3% African American. A majority of the students lived in town (62.0 %), while others lived in a large city (22.1%), in the country not on a farm (5.5%), and on the farm (4.2%). Most of the student respondents, 60.6% lived with both parents, while 12.2 % lived with just their mother, 11.1% lived with one parent and one step-parent, and 8.1% lived sometimes with mother or father. One-quarter of the youth (25.1%) claimed to earn an equal proportion of A's and B's, 24.5% earned mostly A's, and 20.1% reported earning an equal percentage of B's and C's

Spending time with friends without anything special to do (81.2%, n = 1,135) was the most commonly practiced extracurricular activity of students during the school week. The next most commonly practiced activity was spending time on school or community sports teams (51.9%, n = 720). 4-H club activities or projects was reported to occupy the time of the fewest number of students (10.8%, n = 145). Within the past year, 13.8% of the students held some type of school leadership position. Twelve and a half percent of students held elected positions, while 10.5% participated as a committee member and 6.1% served as a committee chairperson. Most respondents (85.9%) indicated that within the last month, they had a good conversation with one parent/guardian that lasted 10 minutes or more. The discussion between child and parent/guardian on the topic of sex was the relationship indicator practiced by the fewest number of students (57.5%, n = 817). Most students (85.8%, n = 1,264) claim to have helped others at school in the past year. Fewer than one-half the students indicated they have been involved in a project to make life better for other people (48%, n = 696), and to have given money or time to a charity or organization that helps people (49.9%, n = 723). The fewest number of students (39.3%, n = 566) claimed to have spent time helping people whom are poor, hungry, sick or unable to care for themselves.

Negative behaviors included cheating on a test, drinking alcohol without parents permission, shoplifting, using drugs, riding in a car with a driver who has been drinking or using drugs, damaging property just for the fun of it, smoking cigarettes, using smokeless tobacco, participating in any type of sexual activity, and skipping or cutting class without parent permission. Responses were on a frequency scale of 1 through 4, where 1 = never, 2 = once, 3 = a few times, and 4 = frequently. The most commonly practiced negative behavior was cheating on a test (M = 1.91, SD = .97). The least practiced negative behavior was the use of smokeless tobacco (M = 1.12, SD = .50).

Personal identity included indicators such as; *I am good at planning ahead; I care about other people's feeling; and I feel really sad when one of my friends is unhappy*. Students were asked to indicate a level of agreement to the personal identity statements on a Likert scale of 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree. Agreement or strong agreement was indicative of high personal identity. The statement receiving the highest score, or the strongest personal identity characteristic was, saying no when asked to do something wrong (M = 4.16, SD = 1.05). The personal identity statement receiving the lowest score was, volunteer in class to lead activities (M = 2.80, SD = 1.12). Positive identity included indicators such as; *when things don't go well for me, I am good at finding a way to make things better; I have little control over the things that will happen in my life; and on the whole, I like myself*. Students were asked to indicate a level of agreement to the positive identity statements on the same Likert scale of 1 = strongly disagree, through 5 = strongly agree. Four of the seven statements were negatively phrased. Disagreement or strong disagreement to negatively phrased statements was indicative of high positive identity. Agreement or strong agreement to the three positively phrased statements was indicative of high positive identity. The highest positive identity mean of the positively phrased statements was, all in all, I am glad I am me (M = 4.14, SD = .96). The lowest mean of the four negatively phrased statements was, *I feel I do not have much to be proud of* (M = 2.19, SD = 1.17).

Self-confidence, character, and empowerment included indicators such as; *I can do things on my own; I set goals; ten years from now, I think I will be very happy; and I am responsible for my actions*. Students indicated their level of agreement to the self-confidence, character and empowerment statements. One statement was negatively phrased; *adults in my town or city don't care about people my age*. Disagreement or strong disagreement to this statement was indicative of high self-confidence, character and empowerment. The positively phrased statement receiving highest level of agreement was, *I am responsible for my actions* (M = 4.18, SD = .83). The lowest level of agreement of the positively phrased statements was for the statement, *I have good written record keeping skills* (*M* = 2.50, *SD* = 1.22).

Summated Construct Index and Scale Scores

Summated construct scores were calculated for extracurricular activity involvement; school leadership positions held; close relationships with adults; caring for others; amount of negative behavior; personal identity; positive identity; and self-confidence, character and empowerment. Data were transformed and recoded into new variables that represented composite dependent construct variables as both index and scale scores which are described in more detail below.

Index Scores

Constructs, extracurricular activity involvement, school leadership positions held, close relationships with adults, and caring for others, were dichotomous response scale questions. Dichotomous scale data were inputted using 1 = no, and 2 = yes. These summated constructs were referred to as index scores and analyzed by comparing sums.

Scale Scores

Constructs, amount of negative behavior, personal identity, positive identity, and self-confidence, character and empowerment, were multiple level response scale questions. Multiple scale data were inputted using 1 = never, 2 = once, 3 = a few times, 4 = frequently for amount of negative behavior, and 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, 5 = strongly agree for dependent variables personal identity, positive identity, and self-confidence, character and empowerment. Negatively phrased question responses were recoded as 5 = strongly disagree, 4 = disagree, 3 = neutral, 2 = agree, and 1 = strongly agree. These summated constructs were referred to as scale scores and analyzed by comparing means.

Analysis of Variance (ANOVA) determined the influence of age groups, gender, 4-H participation, and population density upon the eight constructs referred to above. ANOVA serves to avoid experiment-wise error since the pooled variance in ANOVA produces a more valid test than individual t-tests.

ANOVA for the extracurricular activities construct by age groups, gender, 4-H participation, and population density is displayed in Table 1. Significance was found in variables, age groups (F = 3.974, $p = .019$), 4-H participation (F = 49.881, $p \leq .001$), and population density (F = 7.826, $p = .005$), in the amount of extracurricular activities youth engage in during the school week. Although the ANOVA showed these mean differences, the effect size was very small. The partial Eta squared was .007 for age groups, .022 for 4-H participation, and .007 for population density, demonstrating a very low contribution to the overall variance in predicting the amount of extracurricular activities youth engage in during the school week, by each of these factors alone.

Table 2 shows the ANOVA for leadership positions construct by age groups, gender, 4-H participation and population density variables. Statistical significance was found for the variables; age groups (F = 6.459, *p* = .002), 4-H participation (F = 5.009, *p* = .025), and population density (F = 4.287, *p* = .039). Partial Eta squared shows that variation in the construct may be explained by age groups (1%), population density (0.3%), and 4-H participation (0.4%).

Table 1
ANOVA for Extracurricular Activity Involvement Construct Index Scores by Age Groups, Gender, 4-H Participation, and Population Density (n=1,492)

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
A	14.995	2	7.477	3.974	.019	.007
B	1.695	1	1.695	.901	.343	.001
C	49.881	1	49.881	26.512	<.001	.022
D	14.725	1	14.725	7.826	.005	.007
A x B	.003	2	.001	.001	.999	.000
A x C	5.020	2	2.510	1.334	.264	.002
B x C	.001	1	.001	.000	.985	.000
A x B x C	.236	2	.118	.063	.939	.000
A x D	2.136	2	1.068	.568	.567	.001
B x D	2.089	1	2.089	1.110	.292	.001
A x B x D	21.332	2	10.666	5.669	.004	.010
C x D	4.765	1	4.765	2.532	.112	.002
A x C x D	1.832	2	.916	.487	.615	.001
B x C x D	1.956	1	1.956	1.040	.308	.001
A x B x C x D	11.977	2	5.989	3.183	.042	.005
Error	2174.994	1156	1.881			
Corrected Total	2370.149	1179				

A = Age groups 10-12 years, 13-14 years, 15-18 years
B = Gender
C = 4-H participation
D = Population density

The ANOVA for caring for others construct by age groups, gender, 4-H participation, and population density is shown in Table 3. One variable was found to be significant in predicting the likelihood of youth helping others in need, 4-H participation (F = 13.198, $p \leq .001$). 4-H participation (1%) attributes to variance in the caring for others construct.

Table 4 illustrates the ANOVA for self-confidence, character and empowerment construct by age groups, gender, 4-H participation, and population density variables. This construct is composed of youth responses to statements such as; *I can do things on my own; I set goals; and adults in my town or city make me feel important*. One variable, 4-H participation, was found to be statistically significant (F = 8.155, *p* = .004) and contribute 0.6% to the variance in the self-confidence, character and empowerment construct.

Table 2
ANOVA for School Leadership Positions Held Construct Index Scores by Age Groups, Gender, 4-H Participation, and Population Density (n=1,492)

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
A	9.062	2	4.531	6.459	.002	.010
B	2.569	1	2.569	3.663	.056	.003
C	3.513	1	3.513	5.009	.025	.004
D	3.007	1	3.007	4.287	.039	.003
A x B	.336	2	.168	.239	.787	.000
A x C	3.177	2	1.588	2.264	.104	.004
B x C	.063	1	.063	.090	.764	.000
A x B x C	.395	2	.198	.282	.755	.000
A x D	3.594	2	1.797	2.562	.078	.004
B x D	.048	1	.048	.069	.793	.000
A x B x D	3.716	2	1.858	2.649	.071	.004
C x D	2.045	1	2.045	2.915	.088	.002
A x C x D	1.367	2	.683	.974	.378	.002
B x C x D	.333	1	.333	.475	.491	.000
A x B x C x D	3.941	2	1.970	2.809	.061	.004
Error	872.662	1244	.701			
Corrected Total	942.874	1267				

A = Age groups 10-12 years, 13-14 years, 15-18 years
B = Gender
C = 4-H participation
D = Population density

Conclusions/Recommendations

Results indicate that youth who have been involved in Nevada 4-H programming have some character and behavior traits that differ from youth who have never been involved in 4-H. In particular, youth involved in 4-H are more likely to engage in other organized activities in and out of school, participate in more school leadership roles, care and contribute to the well-being of more people in need and have higher self-confidence, character and empowerment than youth that have never been involved in 4-H. The findings also show that the 4-H involved respondents do not differ from non 4-H respondents with regard to amount of negative behavior practiced, closeness of relationship with adults, and levels of personal and positive identity. One could conclude that 4-H programming is making a notable impact on the lives of Nevada youth, but there is room for improvement.

Rather than focusing on weaknesses, another strategy might be to concentrate on and further develop the program areas in which are strengths. Safrit and Auck (2003) make sound recommendations to improve our 4-H programming by capitalizing upon those areas in which 4-H seems to excel, leadership and community service. Their recommendations include:

1. Encourage volunteers to conduct community service and connect project work with service opportunities. 4-H programming typically encourages community service but thought is seldom given to making the connection between project and service. Community service that makes this connection may promote more enthusiastic participation by 4-H members. Making this connection may require more creative brainstorming on the part of members, parents, and leaders. More time spent on the front end of community service produces added benefits in the long term. When youth understand that their involvement in a particular field has application to the larger community, a feeling of contribution should result.

Table 3
ANOVA for Caring for Others Construct Index Scores by Age Groups, Gender, 4-H Participation, and Population Density (n=1,492)

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
A	8.430	2	4.215	2.692	.068	.004
B	3.010	1	3.010	1.922	.166	.001
C	20.665	1	20.665	13.198	<.001	.010
D	1.771	1	1.771	1.131	.288	.001
A x B	2.887	2	1.444	.922	.398	.001
A x C	4.885	2	2.443	1.560	.211	.002
B x C	.215	1	.215	.137	.711	.000
A x B x C	1.074	2	.537	.343	.710	.001
A x D	.962	2	.481	.307	.736	.000
B x D	3.876	1	3.876	2.476	.116	.002
A x B x D	4.377	2	2.189	1.398	.247	.002
C x D	.001	1	.001	.001	.978	.000
A x C x D	1.357	2	.679	.433	.648	.001
B x C x D	.153	1	.153	.098	.755	.000
A x B x C x D	2.102	2	1.051	.671	.511	.001
Error	2030.790	1297	1.566			
Corrected Total	2172.012	1320				

A = Age groups 10-12 years, 13-14 years, 15-18 years
B = Gender
C = 4-H participation
D = Population density

2. Youth development professionals develop and share community service learning materials. 4-H leaders need help understanding the value of community service and the inherent educational opportunity. Community service should not be thought of as just another Extension office expectation but a purposeful means of youth development. Materials must be developed and made available to 4-H leaders describing how community service optimizes learning. Also, materials training should increase the likelihood of community service learning material use.

3. Link statewide events to learning opportunities in volunteerism, community service, and service learning. State events can set the standard for community service learning and be a model for county programs to emulate.

4. Develop partnerships with schools and youth organizations by sharing curriculum and community service opportunities and essentially bring community service learning to all youth not just those identified as 4-H members. 4-H programs can expand their reach and collaborate with other youth entities within the community. Opportunity to identify service related to community needs, and opportunity to involve a more diverse youth work force spanning various interest groups, may result in more impact full service projects.

In addition to Safrit and Auck's (2003) recommendations, study results should be summarized and made available to legislators, school officials, and community leaders. It is the responsibility of the University of Nevada Cooperative Extension to disseminate accountability information. It is critical that community decision-makers are aware of how 4-H programming investments pay long term dividends in the growth and development of our youth.

Finally, the AAAE Western Region should consider providing leadership in this attempt to produce more defensible, methodologically sound, evaluation data for 4-H accountability efforts. Other western states can be encouraged to replicate this study and add more data sets. Composite analyses will need to be coordinated. Furthermore, these analyses could potentially investigate other youth development influences such as, race/ethnicity differences.

Table 4
ANOVA for Self-Confidence, Character and Empowerment Construct Scale Scores by Age Groups, Gender, 4-H Participation, and Population Density (n=1,492)

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
A	.164	2	.082	.007	.993	.000
B	3.221	1	3.221	.275	.600	.000
C	95.479	1	95.479	8.155	.004	.006
D	2.641	1	2.641	.226	.635	.000
A x B	11.238	2	5.619	.480	.619	.001
A x C	.457	2	.229	.020	.981	.000
B x C	.206	1	.206	.018	.895	.000
A x B x C	6.891	2	3.445	.294	.745	.000
A x D	24.584	2	12.292	1.050	.350	.002
B x D	2.083	1	2.083	.178	.673	.000
A x B x D	20.076	2	10.038	.857	.425	.001
C x D	.131	1	.131	.011	.916	.000
A x C x D	11.962	2	5.981	.511	.600	.001
B x C x D	7.323	1	7.323	.625	.429	.000
A x B x C x D	36.370	2	18.185	1.553	.212	.002
Error	14670.102	1253	11.708			
Corrected Total	15034.572	1276				

A = Age groups 10-12 years, 13-14 years, 15-18 years
B = Gender
C = 4-H participation
D = Population density

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Undergraduate Education As Preparation For Employment: A Survey of 2005 Graduates

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Abstract

The University of Arizona is a research-1 institute; therefore, it is a priority to assess the changing trends and perspectives of its students on an annual basis. This research is essential to University improvement with regards to graduate achievement and success. "Assessment in higher education can provide accountability for public funds, ensure a well-prepared work force, and improve effectiveness of programs" (Miller et al., 1998). More specifically, the College of Agriculture and Life Sciences (CALS) is dedicated to improving its practices and philosophies to better serve students. The College of Agriculture and Life Sciences is currently studying graduates each year by assessing overall attitudes toward the quality of the educational experience within CALS. This annual study examines CALS graduates and their overall satisfaction with the college based on five categories. These categories are: Individual and Instructional Influences, Personal and Professional Development, Family Influence, Personal or Professional Connections, and Job Satisfaction. This study will discuss the findings of the 2005 College of Agriculture and Life Sciences graduates and will also compare trends of satisfaction and dissatisfaction with the 2004 graduates.

Introduction

It is the aim of the College of Agriculture and Life Sciences at the University of Arizona to provide an educational experience, which will best prepare graduates for employment in their determined field. Colleges of agriculture have historically had a significant role in preparing their graduates for entry and advancement in agricultural professions and careers. In order to continue to improve the focus and direction of the courses offered in CALS, continuous reviewing by graduates becomes necessary. As a result of the CALS undergraduate experience, it is desired that graduates have a sense of readiness as they enter the job market. In an effort to continually meet the needs of their respective clientele, departments must make decisions regarding the curriculum of their respective programs, such as the format in which to deliver courses (Roberts and Dyers, 2005). Graduates are in a unique position to judge the strengths and weaknesses of programs in which they have participated. Student contentment with their undergraduate experience is essential to an institution's vitality. It is widely believed that higher education could and should be more responsive to the needs of the industries that employ graduates. An outcomes assessment of undergraduate programs was desired to determine (but not limited to) student perceptions of the CALS undergraduate experience. The idea was to put a system in place, which could be operated by staff in CALS on a continuing basis. It was hoped that information could be then used for analysis of trends over time.

Follow-Up Studies

The American Heritage Dictionary of the English Language defines follow-up as "One that follows so as to further an end or increase effectiveness". A follow-up study of graduates will allow stakeholders to determine how CALS is doing in terms of decisions, adjustments, and changes. Carefully planned and conducted follow-up surveys can contribute to student outcomes assessments on many campuses (Foster and Hartney, 1998). Data gathered through such a study can provide real information that will have long-term effects on the improvement of the various programs in the College. Follow-up studies of students often seek to measure the relationship between the training the students received at the institution and the expertise needed for their occupational placement (Randavay, 1990). Conducting a study of graduates on an annual basis will also provide a longitudinal framework to determine how well prepared CALS graduates are for entry and advancement in agricultural professions and careers.

Career Preparation

The focus on career preparation and career status of graduates has long been a major component of successful academic programs. Lack of career orientation poses a problem for faculty and advisors concerned with helping students link their undergraduate education to future employment (Lunneborg & Wilson, 1982). A well-prepared professional workforce in the agriculture and life sciences sectors is needed to further develop the [State] rural and urban economies. As the agricultural industry changes over time, the educational systems pertaining to agriculture and related subjects must not fall behind (Heyboer & Suvedi, 1999). All schools need to provide opportunities for students to prepare for agricultural careers so that the predicted shortage of trained professionals in agriculture may be alleviated (Phipps & Osborne, 1988).

Program Evaluation

Securing information on the placement and occupational success of graduates can illustrate the effectiveness of educational programs (Osmond & Hoover, 1995). Assessment of these programs allows institutions like the University of Arizona to remain relevant and predict changes in the job market. The entire state should benefit from the enhancement of programs which are designed to influence preparation of students for their life roles. A need for accurate and complete data covering all agriculturally related occupations is essential for sound planning of agricultural education programs (Pepple &Valdes, 1992). Identifying the areas where some deficiencies may exist will greatly enhance the probability of succeeding in future years (Peterson, 1971).

Purpose and Objectives

The purpose of this study was to determine the quality of the undergraduate educational experience of the graduates of the College of Agriculture and Life Sciences at The University of Arizona with the following outcomes:

- ✓ Knowledge of the attitudes of graduates relating to their undergraduate experience.

- ✓ Information about how the undergraduate experience assisted students in areas of personal and professional growth and development.
- ✓ Suggestions concerning areas of needed additional emphasis in the academic experience.
- ✓ Value of the undergraduate experience as preparation for graduate or professional education.
- ✓ Employment experience of graduates.

Methods and Procedures

The study used descriptive survey research design. It was designed to assess the undergraduate experience of CALS alumni from the University of Arizona as related to career preparation. The target population for this study was all domestic CALS graduates for the calendar year of 2005 (N=466). All foreign students were excluded. The population was comprised of 10 academic departments, with 19 respective majors. The survey frame was obtained from the office of Enrollment Management at the University of Arizona.

A researcher-developed instrument was created following a review of the literature, development of objectives, and the pilot test of the original study. There were a total of five sections to the questionnaire. Section I (questions 1-4) was designed to determine the respondents' perceptions of their undergraduate experience by using a Likert-type scale ranging from "Strongly Agree" (5) to "Strongly Disagree" (1). Section II (questions 5-7) was designed to determine the current activities of the respondents. This section utilized two selective response questions, one open-ended question, and one Likert-type scale construct ranging from "Strongly Agree" (5) to "Strongly Disagree" (1). Section III of the instrument (questions 8-10) was designed to obtain information from those respondents who were currently attending graduate or professional school. Section III consisted of two open-ended questions and one Likert-type scale construct ranging from "Strongly Agree" (5) to "Strongly Disagree" (1). Section IV of the instrument (questions 11-23) was designed to obtain information from those respondents who are currently employed outside the home. Section IV consisted of open-ended questions, selective response questions, and a Likert-type scale construct ranging from "Strongly Agree" (5) to "Strongly Disagree" (1), Section V consisted of three open-ended questions (questions 24a-24c) which were designed to obtain information regarding various aspects of the University of Arizona experience.

Data Collection

The 2005 study used a bimodal method of data collection and was similar to a study done of the 2004 graduates. A total of four letters were developed to be mailed to the population. Each letter encouraged the population to respond electronically. The population sample was directed to www.surveymonkey.com, an online questionnaire host. The cover letter indicated that participants would need to access the questionnaire host, and enter the password "cals05" and the provided 5-digit code number. The 5-digit code number was an indicator of the participant's unique response, department, and major. If the population had not responded by February 27, 2007, they were not only directed to the online questionnaire, but sent a hard-copy of the instrument with a return addressed stamped envelope.

To increase participation, it was recommended that individual department heads sign the letters to their respective graduates. This would serve to promote a sense of familiarity and authenticity to the instrument and its purpose. The first letter was sent out on January 9, 2007. The letter notified the population of the questionnaires purpose, and how it would be beneficial to the college by making it a more effective place for students to prepare for their life roles. The second letter was sent on January 30, 2007. The same directions regarding responses were included in the second mailing. The letter reminded the population of the purpose and usefulness of the questionnaire. On March 6, 2007, the third letter was sent to the population. The third letter encouraged internet response, and also included the option of responding to the questionnaire by a paper version, which was included in the mailing. The third letter reassured complete confidentiality or the respondents and offered to answer any questions respondents might have regarding the questionnaire. The fourth and final letter was sent on March 27, 2007 with similar directions as that of the third letter. The cut-off date for responses was April 24, 2007. Usable responses were received from 178 of the 466 subjects, for a 38% response rate.

Data Analysis

Quantitative data collected in the process of the study were coded and analyzed using the Statistical Package for the Social Sciences v. 14 (SPSS). Descriptive statistics such as frequencies, percentages, means, and standard deviations were used to describe the population. Lindner, Murphy, and Briers (2001) reported that non-response error exists to the extent that people included in the sample fail to provide usable responses and are different than those who do provide usable responses on the characteristics of interest study. In evaluation of non-response error for this study, (1) grade-point averages, and (2) major for the entire population were obtained. Responses from early and late respondents were also compared and the findings for both respondents and non-respondents and early and late respondents showed no significant difference in both G.P.A. and major of study, which allows the follow-up study to be reasonably reflective of the 2005 CALS graduating class.

Results/Findings

Results were obtained from 178 of the 466 graduates in the year 2005 for a 38% response rate. Graduates were surveyed on the level of their satisfaction with the CALS program overall, their preparation for the workforce or Graduate/Professional school, and their current employment status.

Responses Concerning Undergraduate Experience

Two items related to satisfaction with choice of university and major were received by respondents (N=163). There was a general accord regarding choice of university with 93% of respondents indicating agreement with the statement “If I could start all over I would still choose to attend the University of Arizona” (M=4.56, SD=.694). Approximately 66% of the respondents indicated they would “still choose to graduate with the same major” (M=3.91, SD=1.117). More variance is observed in responses relating to satisfaction with major than satisfaction with university.

Four items related to academic advising were rated by respondents (*N*=163). Participants rated "Appropriate access to academic advising" the highest of the four items (M=4.22, SD=.882), and rated "Sufficient information about graduate programs" the lowest (M=3.07, SD=1.12). The item concerning "high-quality academic advising" showed an 80% agreement in respondents (M=4.01, SD=1.077). Only a little more than half (57%) of respondents felt they had "sufficient information about career opportunities" (M=3.41, SD=1.159).

Eight items related to the extent the respondents' University of [State] experience helped them grow personally and professionally were rated (*N*=163). The greatest percentage of respondents, at 92% agreed or strongly agreed that the University of Arizona helped them grow in knowledge and understanding of their academic field (M=4.26, SD=.74). The item rated lowest in satisfaction by respondents was "Gaining professional direction" (M=3.74, SD=1.132).

Respondents were also asked to rate six areas as to whether they needed more emphasis (*N*=163). "Application of knowledge relating to my major" was the greatest item needing more emphasis agreed upon by 52% of respondents (M=3.32, SD=1.280). "Oral communication skills" were also indicated by 52% of respondents to be in need of more emphasis. The area least in need of emphasis was "Written communication skills" (M=2.90, SD=1.081).

Preparation for Graduate or Professional Education

Graduates were asked the degree they are currently pursuing (*N*=53). Each major was individualized with no one major drawing a majority of CALS graduates. Approximately 1/3 (33%) of respondents were enrolled in graduate or professional school at the time of the survey. 72% of respondents (*N*=53) also indicated that their "graduate or professional major is closely related to my undergraduate program" (M=3.91, SD=1.319). When asked to rate their level of preparation for graduate or professional education, 76.3% of respondents (*N*=55) agreed or strongly agreed with the following statement: "I am pleased with the quality of my [University of Arizona] College of Agriculture and Life Sciences undergraduate preparation for my graduate or professional education" (M=3.93, SD=1.069).

Preparation for Employment

There was also a high level of agreement (72%) regarding effective preparation for employment in respondents (*N*=125, M=3.67, SD=1.098). Approximately 60% of respondents stated that a B.S./B.A. is required for their position (M=3.38, SD=1.625). 43% of respondents agreed or strongly agreed with the following statement: "My [University of Arizona] academic preparation gave me an advantage over new employees from other universities" (M=3.19, SD=1.148).

Employment of Respondents

Of those graduates who responded (*N*=124), approximately 58% of those employed were in a field closely related to their undergraduate program of study (M=3.29, SD=1.561). Respondents were asked to indicate whether or not this was their first job after graduation

(*N*=124). Sixty-nine respondents (55.6%) were currently employed in their first job after graduating. Fifty-five respondents (44.4%) reported that they have been employed in more than one job since graduating. Respondents reported what state/country their current job is located (*N*=126). Seventy-eight respondents (61.9%) stated their current job was located in Arizona. Twenty-four respondents (19%) were working in a state that borders Arizona. Four respondents (3.1%) reported their job was located in the Western U.S. not bordering Arizona. Twenty respondents (15.8%) indicated their jobs were spread across the nation outside of the Western U.S. Finally, only one respondent (.7%) was working outside of the United States.

Respondents were asked to indicate their approximate salary before taxes (N=122). The responses were coded in $10,000 increments. The range for responses was from "1" to "8". "1" indicated $0-$10,000 and "8" indicated $70,001-$80,000. Forty-one respondents (33.6%) indicated they were making between $30,001-$40,000 a year. There were eight respondents (6.5%) who reported making $70,001-$80,000 and above per year.

Conclusions/Recommendations

Overall, CALS graduates had a favorable perception of their undergraduate education at the University of Arizona. Students felt they had sufficient growth both personally and professionally during their time at The University of Arizona. There was a majority of positive perceptions regarding preparation for employment or graduate/professional school. In addition, nearly all respondents were employed, in a graduate program, or both.

While there was missing information, due to standard non-response error and validity of responses, there were sufficient data collected to be indicative of the overall perception of 2005 graduates. Some recommendations to make this follow-up survey more successful would be to design a database of permanent email addresses for each graduate or at least the creation of a database with related information which will make it easier for researchers to contact former students personally. Another recommendation would be to conduct three separate surveys. One survey will be conducted at the conclusion of a student's exit interview while the other two surveys will be administered one year and five years post-graduation. Perceptions of students may change given time and a second survey gives students an opportunity to reflect upon their university experience from a different perspective. Follow-up studies such as this help to provide the College of Agriculture and Life Sciences at the University of Arizona with the tools to improve their programs to better fit the changing needs of its students. Assessment of student perceptions helps to improve teaching strategies, department resources, and course information focus.

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Concurrent Research Session F

Theme: Distance Education and Technology Integration

Chair: Dr. Mike Swan, Washington State University

Facilitator: Dr. Dan Jansen, Oregon State University

iPod Technology in Graduate Agricultural Education and Communications Courses: A Comparison of Adopters and Non-Adopters

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Todd Brashears, Texas Tech University
Cindy Akers, Texas Tech University
Scott Burris, Texas Tech University
Christine Alvarado, Texas Tech University

Abstract

This descriptive research aimed to identify relationships between demographic and personological variables and adoption of iPod technology in college of agriculture graduate courses. Sixty-one graduate students enrolled in iPod-enabled courses were provided iPods during the 2007 spring semester. Students completed data collection instruments including the Group Embedded Figures Test (GEFT), California Critical Thinking Disposition Inventory, Computer Skills Inventory and a researcher-designed demographic instrument. The latter collected information such as gender, race, academic department and iPod usage during the semester. Researchers determined 34 of the 61 participants failed to adopt the iPod as an educational resource. T-tests determined significant differences in participants' GEFT scores, total GRE, and the value of an iPod as an educational resource score. The mean score for non-adopters GEFT was 10.06 (n=34) while adopters recorded a 13.15 (n=27). This suggests non-adopters of iPod technology are typically categorized as field-dependent learners and adopters are more likely to be field-independent learners. Adopters scored approximately 85 points higher on the combined quantitative and analytical sections of the GRE with adopters recording a mean score of 972.96 and non-adopters scoring 887.65. Recommendations are made for improvement of practice and future research.

Introduction

The Boyer Commission (1998) stated that the profession's best teachers and researchers should find options of designing courses which allows technology to enrich teaching rather than provide a substitute for teaching. This is occurring according to McKeachie and Svinicki (2006), who stated that the integration of technology into the educational process is becoming a major thrust for most colleges and universities. The National Research Agenda for Agricultural Education and Communications (2007) indicates that research should be conducted to determine "What teaching, advising, and mentoring strategies most effectively and efficiently yield desired student outcomes with particular groups of students?" In addition, it is a priority initiative of this research area to "Evaluate the costs and benefits of specific instructional practices on student academic achievement and career success." (p. 17). The purpose of this research was to evaluate student use of iPods in graduate courses and to determine the cost/benefit of incorporating this technology.

While most consumers purchase an iPod for the entertainment value, it has quickly been adapted for use in education. iPods have been a recent focus of attention as an educational tool on many university campuses. In August 2004, Duke University distributed 1,600 Apple iPods to first-year students (Carlson, 2004). These iPods were distributed specifically for students to use for educational purposes. According to the *Duke University iPod First Year Final Evaluation Report*, a total of 15 fall courses (628 students) and 33 spring courses (approximately 600 students) integrated the iPod into the educational process.

An iPod is a hand-held device that allows digital information in the form of audio or video tracks to be downloaded, transported and viewed at the users' convenience. This device is a brand of portable media player, designed and marketed by Apple Computers, which has been the world's best-selling digital audio player since October 2004 (iPod, 2006). In Jobs (2006), Apple CEO, reported total sales of over 42 million iPods, and 14 million in the first quarter of the fiscal 2006 year, meaning that 100 iPods were sold every minute during that quarter. The sales of iPods have greatly increased since the 2002 fiscal year, when Apple Computers sold 381,000 iPods (Apple Computer, 2004).

In addition to individual programmatic implementation by universities, the Apple Corporation provides a web portal for hosting educational content for its members. This portal is called "iTunes U". Twenty-six United States universities are content-providing members including schools such as Duke, MIT, Stanford and Yale. This site provides iPod users with literally thousands of audio and video segments from a wide range of educational content areas.

While iPod technology is being implemented in various ways in the postsecondary classroom it is unclear if implementation equates into an increase in student achievement or satisfaction. In addition, the level of technology adoption for iPods by students has yet to be determined. This adoption rate will affect the impact of the technology on the population and the best intentions of teachers and researchers who rush to implement new technology.

The purpose of this study was to identify characteristics of adopters of iPods versus non-adopters and to evaluate the impact of iPod implementation on adopters versus the costs associated with developing and implementing the technology. Objectives established for this study in order to help guide researchers were as follows:

1. Describe demographic characteristics of adopters and non-adopters of iPod technology in iPod-enabled graduate courses.
2. Compare personalogical characteristics and behaviors of adopters and non-adopters.
3. Examine the cost of iPod implementation in a graduate program.

Theoretical Framework

Rogers Diffusion of Innovations (2003) served as the theoretical framework for this study. Rogers stated the act of implementing a new technology as outlined in Figure 1. The subject must first acquire knowledge of the innovation then be persuaded to adopt that technology. This research project focuses on the third stage of this process, that of the decision to adopt or reject. Assuming adoption, the fourth stage is implementation followed by confirmation.

Rogers (2003) presented two types of rejection. Active rejection occurs when the subject considers adoption (even using on a trial basis) before deciding not to adopt it. Passive rejection occurs when the subject never really considers using the innovation. Several variables are related to the relative speed, or rate, of adoption that an innovation experiences in a social system. These variables include: 1) Perceived Attributes of the Innovation, 2) Type of Innovation Decision, 3) Communication Channels, 4) Nature of the Social System, and 5) Extent of the Change Agents' Promotion Efforts (Rogers, 2003).

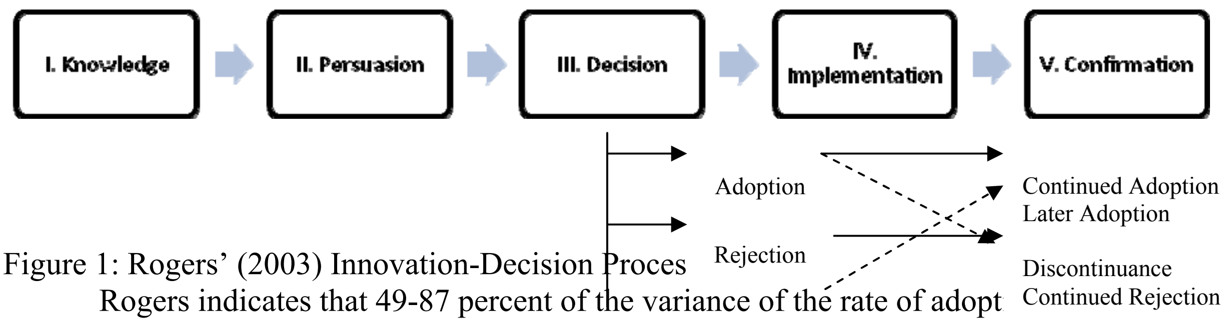

Figure 1: Rogers' (2003) Innovation-Decision Proces

Rogers indicates that 49-87 percent of the variance of the rate of adopt explained by the five perceived attributes of the innovation. These are the rela compatibility, complexity, trialability and observability. A more detailed model of these variables can be seen in Figure 2.

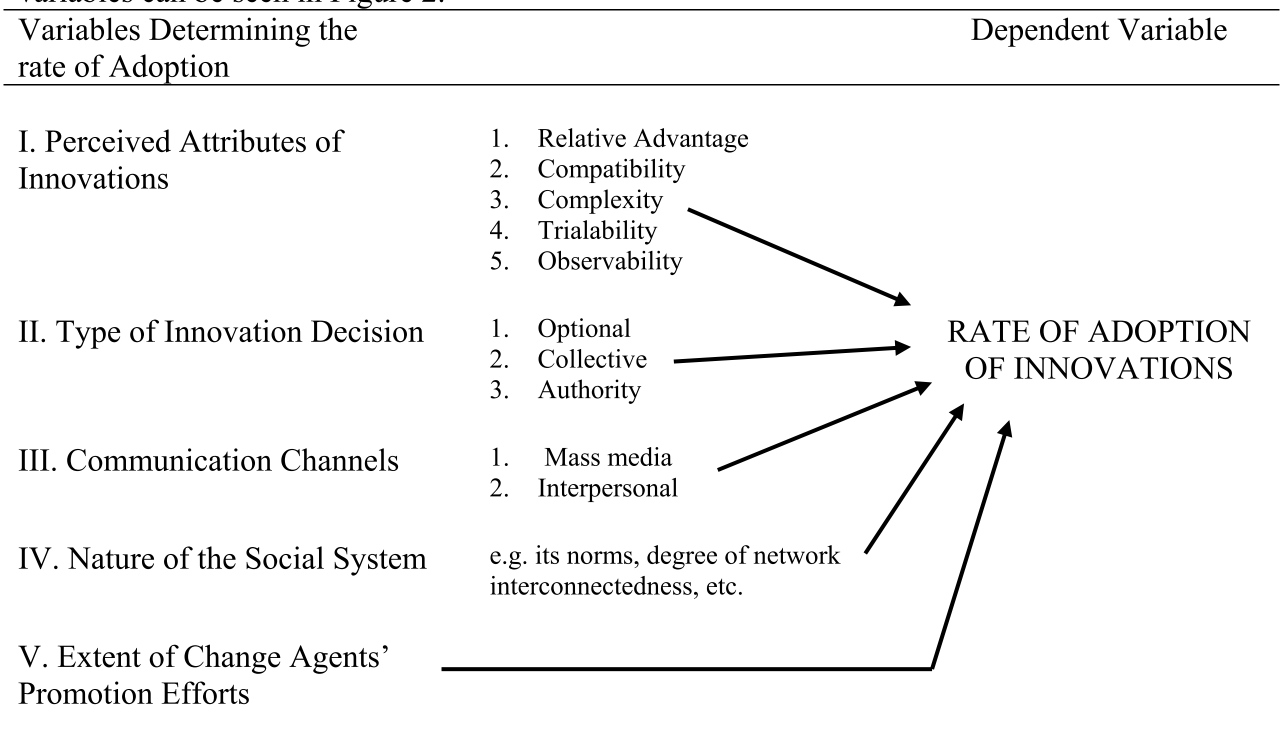

Figure 2. Variables Determining the Rate of Adoption of Innovations

Finally, Rogers used a standard normally distributed bell curve to identify adopter categories. This indicates that the first 50 percent of the population to adopt are categorized as Innovators (first 2.5%), Early Adopters (next 13.5%), and Early Majority (next 34%). The second half of the population to adopt an innovation were categorized as Late Majority (34%), and Laggards (the final 16%).

The adoption of certain learning technologies was addressed by Chen and Macredie (2002) who indicated cognitive styles had a significant impact in the adoption of content delivery methods when students were given control over the learning environment. Using the Group

Embedded Figures Test (GEFT) to identify students as Field-Independent or Field-Dependent, Yoon (1994) found students categorized as Field-Independent performed better in a content delivery model where they were given control of the delivery of the information. Field-Dependent students performed better using a content delivery model in which they had no control but were simply provided the content using a standard method.

The first article using the GEFT appeared in the Journal of Agricultural Education (JAE) in 1990. Since that time, 21 studies published in the JAE have used the GEFT to evaluate educational variables of college students. This includes 2280 undergraduate, graduate, on-campus, off-campus and several other designations of students. These papers reported mean scores on the GEFT from 10.51 to 13.98 with a categorical breakdown of field-independent/field-dependent/field-neutral students of 1108/698/129. Some studies failed to report a ratio of types of learners in the study. In a study of students receiving course content on videotape, Miller (1998) found the highest performing students in the class spent less time studying, spent more time viewing the videotape, were more likely to use alternative study methods and scored higher on the GEFT (field-independent). Torres and Cano (1995) found a moderately positive correlation ($r = .36$) between learning style and critical thinking of students. Garton, Dyer and King (2000) found a moderate positive correlation ($r = .36$) between GEFT scores and ACT scores.

Methodology

During the spring semester of 2007, four graduate courses at a single southern university were designated as “iPod enabled.” This designation in the departmental course description was further explained in the course syllabi. Each of these courses included content that was delivered over the internet to the individual students’ computers. This content was cataloged and indexed in iTunes, a program that automatically recognizes and downloads Podcast episodes. This program allows users to view content and transfer the content seamlessly to an iPod, allowing the student the ability to view the content virtually anywhere. Sixty-one master’s and doctoral students self-selected and completed these courses. The census of this accessible population was a time and place sample (Oliver & Hinkle, 1982) allowing for an analysis using inferential statistics. Each student enrolled in these courses was provided a 60 Gigabyte video iPod for use during the semester. The courses included in this study were Methods of Technological Change, Statistics, Research Methods and Graduate Seminar.

Content was captured and delivered to the students in a variety of formats with one overarching commonality, all content was provided in audio/video form which could then be viewed and heard using the iPod. Examples of content included videos of entire lectures, short-segment introductions of content and mid-length overviews of theory. The preceding examples were operationalized as combinations of video footage of the instructor, students asking questions and PowerPoint slides. In addition to this “live-action” video, instructors also created content that consisted of PowerPoint slides and full-motion screen captures of how to use SPSS with an accompanying instructor voiceover. The videos were captured in the departmental iPod studio classroom which is equipped with multiple cameras, computers, document camera, microphone and projector. These sources feed into two computers. The first renders the raw footage into the Podcasting format while the second acts as the server, making the files available to students within minutes of the end of each class. The type of file created for each class within the course depended on the content being taught as well as the instructor preference for creating the media.

Multiple instruments were used to collect data from the participants in the study. The first instrument was the Computer Skills Inventory. This self-completed instrument was designed by Compeau and Higgins (1995) to determine computer self-efficacy. Rogers (2003) stated that one of the variables that contribute to rate of adoption was the complexity. This instrument was used to measure the participants' self-efficacy toward the complexity of the computer aspect of the technology. The instrument was available in a web-based form and provided results on a 100-point scale with individual scores for the following subcategories: (1) computer hardware, (2) computer settings, (3) computer software, (4) computer terminology, (5) e-mail, (6) Internet, (7) keyboard usage, (8) networking, and (9) Windows.

The second instrument completed by the participants was the California Critical Thinking Disposition Inventory by Facione and Facione (1992). The authors state that the (CCTDI) is intended to analyze a person's disposition towards critical thinking. Rogers (2003) indicates that individuals who were able to determine the relative advantage of using an innovation would be more likely to adopt. This determination of relative advantage requires the participant to think critically, therefore necessitating the use of this instrument. The instrument itself consists of 75 questions on a 6-point Likert-type scale. Seven categories are measured, which include: truth-seeking, open-minded, analyticity, systematicity, confidence, inquisitiveness, and maturity. A score above 50 within a category indicates strength within that dispositional aspect. Scores between 30-to-40 express that the individual possess ambiguous dispositions within the category. Participant scoring below 30 within a specific category are negatively disposed. An overall score greater than 350 indicates a broad strength in the disposition toward critical thinking. Scores between 210 and 280 indicate ambiguous feelings toward critical thinking. Overall scores below 210 indicate a significant opposition towards critical thinking. This instrument was included as previous research indicated that a relationship exists between critical thinking and learning style (Torres & Cano, 1995).

The Graduate Record Examination (GRE), the General Test, is used in graduate academic settings as a predictor for graduate students' first-year grade point average (Guide to the Use of Scores, 2006). As each participant in this study was a graduate student, the research chose to use the GRE rather than the ACT for the timeliness of the test. Each participant's GRE score was obtained from university records. Researchers used each student's highest score if there was more than one score on a student's academic record. The combined score of the verbal and quantitative sections was recorded. Each student's undergraduate and current graduate grade point average (GPA) was collected in the same manner. Graduate GPA was recorded following the end of the semester including courses taken during the research project.

The Group Embedded Figures Test (GEFT) allowed researchers to determine if each student was categorized as a field-independent or field-dependent learner. Students each completed three sections of this instrument in the allotted time frame. The developers of this instrument report a national norm of 11.4. Participants scoring 12 or higher are considered field-independent learners while participants scoring 11 or less are considered field-dependent (Witkin, Oltman, Raskin, & Karp, 1971). Miller (1997) found that the average score on this instrumentation among agricultural education majors was 11.27 (s.d.=4.2) or virtually equal to the national norm.

In order to measure student attitudes, prior experiences with technology and iPod usage the researchers created an instrument to be completed by the subjects. The pilot test was conducted during the fall 2006 semester. A total of 69 graduate students completed the instrument for the pilot test. Researchers were able to establish measurement error and edit unclear questions found within the instrument. Section A used 21 questions to collect data on use of the iPod. Section B consisted of questions regarding barriers for non-adopters. Section C used 19 Likert-type questions to establish attitudes and beliefs about using the iPod for educational purposes. The final two sections established prior technology use and demographics of users. Table 1 presents the reliability coefficients for all instruments.

Table 1
Instrument Reliability Scores for Instruments Administered to iPod-enabled Graduate Classes

Instrument	Reliability Type	Calculated Reliability
GRE		
Verbal	KR-20	.92
Quantitative	KR-20	.91
GEFT	Spearman-Brown	.82
CCTDI		
Overall	Cronbach's Alpha	.91
Truth Seeking	Cronbach's Alpha	.71
Open Mindedness	Cronbach's Alpha	.73
Analyticity	Cronbach's Alpha	.39
Systematicity	Cronbach's Alpha	.74
Self Confidence	Cronbach's Alpha	.78
Inquisitiveness	Cronbach's Alpha	.80
Maturity	Cronbach's Alpha	.75
Computer Skills	Cronbach's Alpha	.81-.85
Demographics	NA	NA
Attitudes and Beliefs	Cronbach's Alpha	.91

Data was collected at the beginning of the semester with the researchers administering the Computer Skills Inventory, GEFT, and CCTDI during the first week. During the semester, university records were accessed to determine GRE and GPA data. The final day of class, the participants completed the demographic and attitudes and belief instruments. iPods were collected to record participant usage throughout the semester. All data was entered into SPSS 13.0 for analysis. Descriptive statistics were calculated including frequencies, means, and standard deviations. In addition, t-tests were used to compare means of adopters and non-adopters for selected variables.

Results

Objective one.

Objective one in this study was to describe demographic characteristics of adopters and non-adopters of iPod technology in iPod-enabled graduate courses. Question 4 on the researcher designed instrument asked each student if they used their iPod to view course materials during the semester. Thirty-four of the 61 respondents replied "no." These respondents were coded as non-adopters while the 27 students who responded "yes" were coded as adopters. Table 2 indicates demographic descriptions of each group.

Table 2
Demographic Characteristics of Adopters and Non-Adopters of iPod-Enabled Graduate Courses

	Adopters (*N* = 27)		Non-Adopters (*N* = 34)	
Characteristics	Frequency	Percent	Frequency	Percent
Gender				
Male	14	51.9	17	50.0
Female	13	48.1	17	50.0
Total	27	100	34	100
Ethnicity				
Caucasian	24	88.9	29	85.3
Hispanic	2	7.4	1	2.9
African American	1	3.7	2	5.9
Native American	0	0.0	2	5.9
Asian	0	0.0	0	0.0
Other	0	0.0	0	0.0
Total	27	100	34	100
Academic Standing				
Masters	16	59.3	23	67.6
Doctoral	11	40.7	11	32.4
Total	27	100	34	100

Adopters and non-adopters completed each of the measurement instruments. Comparisons of the groups are provided in Table 3. With GEFT scores of 11 or less, 31 students were categorized as field-dependent, while 30 were categorized as field-independent with scores of 12 or more.

Table 3
Instrumentation Scores of iPod Adopters and Non-Adopters in Graduate-Level Courses

		Adopters (*N* = 27)		Non-Adopters (*N* = 34)	
Instrument	Scale	Score	*SD*	Score	*SD*
Computer Skills Inventory					
Overall	0-100	64.00	14.18	62.47	8.62
Hardware	0-100	41.37	33.34	40.21	27.05
Settings	0-100	88.46	29.35	79.69	35.60
Software	0-100	89.85	17.47	86.77	17.76
Terminology	0-100	64.81	41.17	65.52	44.52
Email	0-100	72.44	12.72	78.68	9.35
Internet	0-100	61.07	37.32	48.06	38.04
Keyboard	0-100	56.15	37.94	55.68	28.82
Networking	0-100	63.56	31.38	56.25	43.53
Windows	0-100	51.84	25.95	52.21	17.46

CCTDI					
Overall	70-420	298.48	24.52	302.47	27.57
Truth Seeking	10-60	39.25	4.39	38.47	5.94
Open Minded	10-60	37.48	5.11	40.23	4.88
Analyticity	10-60	46.07	4.57	44.32	4.49
Systematicity	10-60	42.14	6.82	41.73	8.73
Confidence	10-60	44.40	5.61	45.38	4.18
Inquisitiveness	10-60	46.88	5.73	48.08	4.44
Maturity	10-60	43.77	5.92	44.23	6.45
GEFT	0-18	13.15	3.73	10.06	3.99
GRE					
Total	0-1600	972.96	164.40	887.65	160.43
Verbal	0-800	447.41	75.32	402.35	76.91
Quantitative	0-800	525.56	109.83	485.29	111.43
GPA	0-4	3.90	.20	3.74	.35

Objective two.

The purpose of research objective two was to compare adopters and non-adopters using personalogical and behavioral variables. These were measured using the four instruments described in the previous section as well as the GRE and GPA scores. To accomplish this objective, independent-samples t-tests were conducted to determine if mean score differences occurring between adopters and non-adopters was a statistically significant variation. The assumption of equal variances was met except where noted. In two cases, Levene's proved significant at ά = .05; therefore the adjusted p value was used to determine significant differences in the means. Age was included for adopters (*M* = 31.85, *SD* = 8.59) and non-adopters (*M* = 28.73, *SD* = 7.78). The tests for GEFT, GPA, Verbal GRE, Total GRE, Verbal GRE and the iPods value as an educational resource were significant. Values for these tests as well as non-significant variables are shown in Table 4.

Table 4
Independent t-Tests for Equality of Variable Means Between Adopters and Non-Adopters

			Levene's Test for Equality of Variances		t test for Equality of Means		
	Adopter mean	Non-Adopter mean	*F*	*p*	*t*	*df*	*p*
GEFT	13.15	10.06	.110	.741	-3.08	59.00	.003*
GPA[a]	3.90	3.74	7.06	.010	-2.058	54.64	.044*
Total GRE	972.96	887.65	.054	.816	-2.041	59.00	.046*
Quant. GRE	525.56	485.29	.618	.435	-1.407	59.00	.165

Verbal GRE	447.41	402.35	.065	.799	-2.293	59.00	.025*
CCTDI	298.48	302.47	.306	.582	.589	59.00	3.980
Computer Skills	64.00	62.47	13.594	.001	-.520	59.00	.605
Age	31.85	28.73	.717	.400	-1.483	59.00	.143
iPod value as educational resource[a]	14.67	3.13	4.606	.036	-5.449	47.31	.001*

[a] Equal variances not assumed
* Significant at ά = .05

Objective 3.

Various costs are associated with implementing the iPod-enabled courses described in this research study. Software costs, faculty time, student time, and hardware are just a few of the expenses incurred while developing this program. Objective three sought to determine the expense of such a program. It should be noted that this project was funded with a grant provided by the International Center for Food Industry Excellence. Funds from this grant purchased hardware, software and paid for graduate assistants to provide labor. Faculty time is calculated using average assistant professor salary for the southern region (AAAE, 2002). Known costs of this project are shown in Table 5.

Table 5
Costs Associated with Creating and Delivering iPod-enabled Courses

Item	Purpose	Cost per item	Quantity	Total Cost
Hardware				
60 G Video iPod	Used by students to view course content.	$349.00	100	$34,900.00
Mac Server	Provides storage of video podcasts and link to the Internet for downloading.	$2857.00	1	$2857.00
Windows PC	Connected to video cameras in iPod studio. Captures raw video and audio.	$2213.00	1	$2213.00
Sony EV100 analog camera	In studio to capture video of lectures.	$1100.00	2	$2200.00
Software				
Adobe Premiere Pro	Capture raw video and audio in studio.	$800.00	1	$800.00
Garage Band	Convert files to podcast format. Part of the iLife suite.	$79.00	1	$79.00
Labor				
Student Assistantship	One graduate student worked for one year organizing and creating content.	$12,000.00	1	$12,000.00
Faculty Labor (4 faculty members)	Faculty estimated an extra 200 hours to create content for this project per semester.	$29.51	200	$5,902.00
Total Estimated Cost				$60,951.00

One hundred iPods were purchased that were available for check-out to students on a semester-by-semester basis. First priorities were students currently enrolled in iPod-enabled courses and faculty teaching those courses. In addition, faculty members who were interested and graduate students who have previously taken an iPod-enabled course were able to check out any excess iPods.

Conclusions

In regards to objective one, the researchers administered several instruments to the population to measure variables for the purpose of describing characteristics of adopters and non-adopters in iPod-enabled courses. Forty-four percent of the population (*n* =27) were categorized as adopters. It was determined adopters and non-adopters were both split relatively equally across genders and ethnicities. The typical adopter and non-adopter was likely Caucasian and were as likely to be male as female. Doctoral students were more likely to be adopters than master's students. In addition, the groups were similar in age with adopters having an average age of almost 32 years and non-adopters being almost 29 years old.

For objective two, researchers compared personological and behavioral measures using independent t-tests. Evaluation of the GEFT revealed a statistically significant difference between adopters and non-adopters. Of particular interest was the fact that the mean score for adopters was 13.15, greater than the national average of 11.4 indicating that, on average, adopters tended to be more field-independent learners. Alternatively, non-adopters recorded a GEFT mean score of 10.06, indicating that this group tended to be field-dependent learners. Rogers (2003) refers to a large quantity of research literature to summarize characteristics of adopters (innovators, early adopters and early majority) compared to late adopters (late majority, laggards). These characteristics fall into three categories; 1) socioeconomic status, 2) personality values, and 3) communication behaviors. Because adopters in this study tended to be field-independent, Table 6 provides a comparison of personality characteristics of early adopters and field-independent learners.

Table 6
Comparison of Field-Independent and Early Adopters Characteristics

Early Adopters Personality Characteristics[a]	Field-Independent Learners[b]
May be less dogmatic than later adopters	Accepting to ideas strengthened that are through analysis
Have greater intelligence than later adopters	Demonstrate greater proportional reasoning skills
Have a greater ability to deal with abstractions than do later adopters	Are able to reorganize information to provide context for prior knowledge
	Are good with problems that require taking elements out of their whole context
Have a greater rationality than later adopters	Experience their surroundings analytically, with objects experiences as being discrete from their backgrounds

[a] Rogers (2003)

[b] Adapted from Chen and Macredle (2002)

Forty-four percent (*N* = 27) of the students adopted the iPod during the first semester of use. See Figure 3. This indicates that there is opportunity for further adoption even within the early adopter category. The adoption of this innovation has not yet reached its peak within the population and additional trialablity with the device may persuade non-adopters to adopt during subsequent courses.

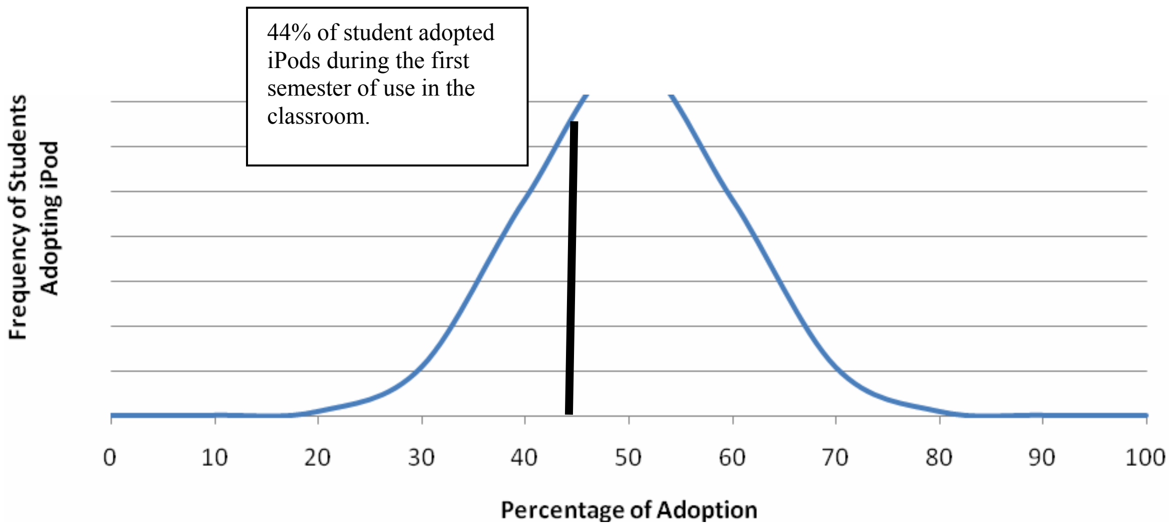

Figure 3. Student Rate of Adoption of iPods as Educational Tools during a Single Semester

Adopters and non-adopters expressed significant differences in the area of GPA and Verbal and Overall GRE scores. GPA was measured at the end of the semester including the iPod-enabled courses but significant differences in student performance in the individual classes were not observed. This indicates that students who typically score higher in classes were more inclined to adopt the iPod. The researchers did not interpret this to mean the use of the iPod resulted in a higher GPA. In the same manner, Verbal and Overall GRE scores do not reflect use of the iPod but could be an indication of the characteristics of early adopters and field-independent learners expressed in Table 6.

The final variable that exhibited a significant difference was the Likert-type item that asked adopters and non-adopters to rate the iPod's value as an educational tool. Adopters rated the iPod significantly more valuable that non-adopters. It is unclear whether this reflects student attitudes about prior opinions or at the end of the trialability stage. Further studies should incorporate this question as a pretest/post-test item.

In regards to cost analysis (objective 3), it may seem that nearly $62,000 is a great deal of expense for the development and delivery of four graduate courses. It should be noted that programs wanting to create iPod-enabled courses can do so in a less expensive manner. iPods do not have to be provided as it could be argued that adopters will have purchased their own. In addition, many of the computer and software resources that are required for this program are currently available on many university campuses. It is also of note that after the initial time expense of creating the courses, the upkeep required from semester to semester is minimal, thereby reducing average costs over time.

Recommendations/Implications

This research raises several important questions in the context of iPod adoption by students in graduate courses. Some of these new research questions include: Can researchers predict technology adoption in the classroom by regressing a combination of personolgical variables and behaviors? Are the non-adopters actively or passively rejecting adoption of the technology? Is there a connection between adopter category and field-dependence/field-independence? What actions can be taken to help facilitate adoption of technology in the classroom? Is it necessary that all students adopt iPods for iPod-enabled courses to be considered effective? Do students view iPods favorably in the same proportion before and after the trialabiliy stage, or are adopters swayed toward that attitude through the adoption process?

Students continue to purchase and use iPods for personal entertainment and will do so until the “next big thing” comes along. Until that time, educators should look to use iPod-enabled courses as another method of delivering course content to students who prefer to receive it in that manner. Non-adopters should be identified and provided additional chances to adopt through informing them about the attributes of the innovation as suggested by Rogers (2003) or providing other options more suited to their learning style. Continued research on the most effective delivery method as well as identifying barriers to adoption may also influence the study of classroom technologies.

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Oregon's Secondary Agricultural Education Teachers' Level of Computer-based Technology Integration

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Abstract

The focus of this research was to examine the relationship between the Oregon secondary agricultural education teachers' level of computer-based technology integration and selected demographic variables. Correlational analysis of the level of computer-based technology integration and the following demographic variables was conducted: (a) age, (b) gender, (c) education level, (d) years of teaching, (e) school size, (f) high-speed Internet at home, and (g) computer at home. The data were collected during April-May of the 2007 academic school year. The research instruments consisted of the Kotrlik/Redmann Technology Integration Scale (KRTIS). The data were analyzed using descriptive and correlational research techniques. The response rate for the study was 97.5%. The research indicated that the Oregon agricultural education teachers were most active in the phase of adoption – using computer-based technology and least active in the area of experimentation – beginning to use computer-based technology. Correlational analysis of the level of computer-based technology integration and selected demographic variables also failed to produce a significant relationship and degree of correlation.

Introduction

The State of Oregon, attempting to meet the National Educational Technology Standards for Teachers (International Society for Technology in Education [ISTE], 2002; Oregon Department of Education [ODE], 2002), has established technology common curriculum goals that encourage school districts to establish their own individual content standards and benchmarks in technology. The Oregon State Board of Education adopted common curriculum goals in technology in March 2002:

1. Demonstrate proficiency in the use of technological tools and devices.
2. Select and use technology to enhance learning and problem solving.
3. Access, organize, and analyze information to make informed decisions, using one or more technologies.
4. Use technology in an ethical and legal manner and understand how technology affects society.
5. Design, prepare, and present unique works using technology to communicate information and ideas.
6. Extend communication and collaboration with peers, experts, and other audiences using telecommunications. (ODE, 2002, p. 1)

The fulfillment of Oregon's common curriculum goals in technology would bring the state into compliance with the National Educational Technology Standards for Teachers adopted by the ISTE (ODE, 2002). The Oregon Department of Education (2002, 2006) has identified technology as essential in both the teacher's delivery of instruction and the student's education.

Kotrlik et al. (2003) stressed the need for additional research in the area of technology integration in the secondary agricultural education environment. The recommendation was given to the research community to identify the "factors related to technology integration in the teaching/learning process" (p. 88). This study expanded the current research base and identified the Oregon agricultural education teacher's level of integration of computer-based technology. The study provides a needs assessment by isolating the level of computer-based technology integration and will allow educational leaders to determine a future course of action for professional development (Anglin, 1995; Kise, 2006) and program improvements in an attempt to meet educational standards (NCLB, 2002; ODE, 2002). The study also identified if a relationship existed between the secondary agricultural education teacher's current level of computer-based technology integration (Kotrlik et al., 2003) and selected demographic variables.

Theoretical Framework

The constructivist learning theory (Piaget, 1973) provides the theoretical framework for utilizing computer-based technology within instructional settings. Constructivist theory implies that students learn by doing, building, making meaning out of individual experiences both past and present, and constructing an understanding within their current environment. The constructivist theory of learning is based upon the works of Bruner (1960), Dewey (1938), Piaget (1973), and Vygotsky (1930/1978). These authorities were used to establish part of the philosophical base for the theoretical framework that guided the research project.

Dewey (1938) professed that learning in the traditional wrote memorization approach only provided superficial learning with little lasting effect. His theory was built on the tenets that knowledge is based on active participation and involved experience. Further, the educational system should be established to improve the cognitive process as applied to problem solving. Dewey proposed that knowledge of the learner was built around the educational experience, and individual discovery led the way. He viewed learning as a dynamic process and recommended that students should be placed in a situation where they are given a chance to explore their world and make meaning out of active participation.

Piaget (1973) placed focus on the learning of children and the cognitive processes that shape their knowledge acquisition; he subsequently developed the hierarchy of thinking stages: sensorimotor, preoperational, concrete, and formal. Piaget did not set rigid parameters around the four thinking stages, but used them as a way of provoking discussion on how children learn (Goldman-Segall & Maxwell, 2003). Learning in the child occurs at a greater rate when the child explores, examines, theorizes, and then confronts the unknown of the world, thus making meaning out of her or his current environment. Piaget's theories, revolutionary for his time, provide support for instructional technologies of the 21st Century (Papert, 1993). As a student uses the computer, he or she is making meaning out of the unknown by building upon her or his previous experience and knowledge (Papert; Piaget). Piaget set the foundation, and others elaborated on the constructivist thought.

Vygotsky (1930/1978), early in the twentieth century, examined the social component of learning with emphasis in language, writing, and culture. He suggested that learning took place at all times; as students share and discuss current problems, they develop skills and increase their learning. The comparison of Vygotsky's work to that of Piaget (1973) illustrated that they built upon similar components. Vygotsky focused on the social component of learning, and Piaget on the individual mind of the child. From Vygotsky's point of view, the learner should establish her or his own meaning in a social context and share that reality with those in her or his community. Vygotsky developed the concept of the "zone of proximal development" (p. 86) where the child is constantly expanding her or his zone of knowledge and problem solving skills.

Papert (1993) illustrated that use of instructional technologies in a social context provides feedback that indicates their effectiveness in the educational learning environment. The computer can be used as an instructional tool to complement the educational environment. The World Wide Web, video conferencing, email, and web cams provide an extended social learning community.

The theory of constructivism empowers the individual learner to construct meaning out of the environment. The tools provided by computer-based technology enable the learner to be engaged in an educational environment and assimilate knowledge into her or his world. Computer-based instructional technology has the potential to reward and provide feedback to the student and teacher. In doing so, the participant is motivated to continue in the educational process. The interactive nature of computer-based technology supports the philosophy of constructivism (Papert, 1993). The implications for the research are that constructivism allows for progressive teaching practices utilizing real-world tools more than the drill and practice methods of early computer-based technologies utilized by educators.

Objectives

The focus of the research was to examine the relationship between the Oregon secondary agricultural education teachers' level of computer-based technology integration and selected demographic variables. The research objectives were as follows:

1. To determine the demographic profile of Oregon's secondary agricultural education teachers concerning: (a) age, (b) gender, (c) education level, (d) years of teaching, (e) school size, (f) high-speed Internet at home, and (g) computer at home.

2. To determine the current level of computer-based technology integration by the Oregon secondary agricultural education teachers.

3. To determine the level of association between selected demographic variables and the secondary agricultural education teacher's level of computer-based technology integration.

Methods/Procedures

The study utilized a web and mail base survey-type questionnaire administered to the secondary agricultural education teachers in the State of Oregon. The questionnaire contained the KRTIS (Kotrlik et al., 2003).

Descriptive survey methods were used to gather the data regarding the teacher's level of computer-based technology integration and teacher's demographic information. The population for this study included all secondary agriculture teachers in the State of Oregon who were employed and teaching agriculture during the 2006-2007 academic year. The entire population was selected for participation in this study rather than a sample due to the relatively small population size (N = 121) and ease of accessibility. The study concluded with a 97.5% response rate.

The Kotrlik/Redmann Technology Integration Scale identifies four phases of activity in the technology integration spectrum: (a) exploration, (b) experimentation, (c) adoption, and (d) advanced integration. As teachers progress in their level of technology integration, they move from phase to phase of integration (Kotrlik et al., 2003). The KRTIS produced nominal data that allowed for categorical classification for statistical analysis (Courtney, 2006, 1988). The Cronbach's Alpha Reliability Coefficient for the KRTIS has an exemplary level of reliability the alpha of Exploration $\alpha = 0.84$, Experimentation $\alpha = 0.90$, Adoption $\alpha = 0.96$, and Advanced Integration $\alpha = 0.90$ (Kotrlik et al., 2003).

A panel of experts and pilot group provided feedback on the face and content validity of the instrument. Minor changes were made to the wording to produce clarity to the end reader. The analysis of the KRTIS instrument was only conducted to determine the overall reliability of the completed questionnaire and not as an effort to disprove the work of Kotrlik/Redmann. The results of the Cronbach's alpha reliability coefficients analysis of the pilot test produced an acceptable level of reliability the $\alpha = .92$ which is similar to the Cronbach's alpha reported by Kotrlik et al. (2003) that ranged from α of .84 – .96. The results of the reliability and validity analysis were deemed appropriated and the questionnaires were prepared for delivery to the population.

To determine the level of correlation between the secondary agriculture teacher's level of computer-based technology integration and the selected demographic variables of: (a) age, (b) gender, (c) education level, (d) years of teaching, (e) school size, (f) high-speed Internet at home, and (g) computer at home, the Pearson product-moment correlation coefficient was used to determine the level of significance and the level of correlation. The sum of the KRTIS integration scale was used as the continuous variable to determine the level of integration (Kotrlik et al., 2003). The demographic variables were used as correlational variables for the Pearson correlations (Alston, 2003).

Results/Findings

Tables 1 through 6 present the means, standard deviations, frequencies, and percentages for the demographic / personal variables contained in the survey instrument. Table 1 presents demographic data of age and gender for the secondary agricultural education teachers in the State of Oregon. The secondary agricultural education teachers in the State of Oregon who participated in the study (N = 118) reported a mean age of 33. Two-thirds (66.9%) of the participants in the study were male, and one-third (33.1%) were female.

Table 1

Age and Gender of the Respondents (N = 118)

Age (N = 118):	Frequency	Mean	*SD*
Agricultural Education Teachers	118	33.0	11.7
Gender (N = 118):	Male	Female	Total
Agricultural Education Teachers Total	79	39	118
Percentage	66.9%	33.1%	

The distribution by racial and ethnic identity of the secondary agricultural education teachers in the State of Oregon was very one dimensional with N = 116 (98.3%) of the participants representing the "White" racial group. Two (1.7%) respondents were identified as "Hispanic." There were no participants who reported that their racial/ethnic identity was described as "African," "Asian," "Middle Eastern," "Native American," or "Other."

The participants in this study were asked to provide their highest level of education attained (Table 2). Ninety-four (79.7%) of the secondary agricultural education teachers in this study had at least a masters degree and 24 (20.3%) held a bachelor's degree. Thirty-two (27.1%) of the teachers had a masters degree plus 30 credits, and one (.85%) participant had a doctorate degree.

Table 2

Highest Degree Earned by Respondents (N = 118)

Educational degree earned	Frequency	Percent
Bachelor	24	20.3%
Masters	61	51.7%
Masters plus 30 credits	32	27.1%
Doctorate	1	0.9%
Total	118	100%

Note. Frequency = number of agriculture teachers who earned the respective degrees

Teachers were also asked how many years of experience they had teaching agricultural education (Table 3). Seventy-four (62.7%) teachers had been teaching 10 years or less; of these 74 teachers, 34 (28.8%) had been teaching less than four years. Twenty-two (18.6%) of the teachers had been in the profession between 11 - 20 years, and 22 (18.6%) of the participants had 21 or more years of service.

Table 3

Years of Teaching Experience of the Respondents (N = 118)

How many years have you taught agricultural education?		
Years taught	Total	Percent
First Year	11	9.3%
1-3 Years	23	19.5%
4-10 years	40	33.9%
11-20 years	22	18.6%
21+ years	22	18.6%
Total	118	100%

The teachers were asked what the population of students was within their school (Table 4). Forty-one (34.8%) of the respondents were employed in a school with less than 250 students. The data presented 24 (20.3%) teachers who were teaching within schools of 251 to 500 students, and 24 (20.3%) teachers were in a school with 500 to 1,000 students. Schools with the population between 1,000 and 1,500 students represented the smallest proportion of teachers 14 (11.9%). The largest schools containing more than 1,500 students had 15 (12.7%) teachers in the study.

Table 4

Student Enrollment Population at Participating Schools (N = 118)

Population of School	Total	Percent
Less than 250 students	41	34.8%
Between 251 and 500 students	24	20.3%
Between 500 and 1,000 students	24	20.3%
Between 1,000 and 1,500 students	14	11.9%
More than 1,500 students	15	12.7%
Total	118	100%

In addition to personal and demographic variables, the secondary agricultural education teachers were asked to indicate curricular subjects that they had taught within the last two years, other than agricultural or natural resources related curriculum. Table 5 provides frequencies and percentages of the number of agriculture teachers teaching non-agricultural curricula as part of their assigned instructional duties. The research instrument did not ask the participants the total number of courses in a given curricular area.

The participants had taught a variety of non-agricultural courses in vocationally related areas and traditional academic curricula. The closely related vocational curriculum areas consisted of welding, woodworking, construction, automotive, and drafting/auto CAD. There were five vocational curriculum areas that would be considered separate and independent from the agricultural education curriculum (e.g., computer applications, technology education, business, health occupations, and family and consumer sciences), and nine core academic and other curricula areas ranging from leadership to career education.

Table 5

Respondents' Instructional Assignment of Non-agricultural Related Curriculum (N = 118)

What other teaching assignments have you had in the last two years?	Frequency	Percent of total teachers (*N* = 118)
Closely related vocational curricula		
Welding other than Agricultural Mechanics	42	35.6%
Woodworking/carpentry other than Agricultural Mechanics	29	24.6%
Construction other than Agricultural Mechanics	14	11.9%
Automotive other than Agricultural Mechanics	6	5.1%
Vocational curricula independent from the agricultural education curriculum		
Computer Applications	10	8.5%
Technology Education	5	4.2%
Business	3	2.5%
Health Occupations	2	1.7%
Family and Consumer Sciences	1	0.8%
Core academic and/or other curricula		
Leadership	23	19.5%
Science	19	16.1%
Math	14	11.9%
English	3	2.5%
Social Studies	3	2.5%
Physical Education	2	1.7%
Special Education	1	0.8%
Fine Arts (Music, Art)	0	0.0%
Foreign Language	0	0.0%
Other self-identified subjects:		
Senior Transition	5	4.2%
Drafting/Auto CAD	4	3.4%
Career Education	2	1.7%
Total	188	

Note. Frequency = number of teachers per curricular area

The agricultural education teachers reported "Welding other than agricultural mechanics" more than any other curricular area with a frequency of 42 (35.6%), followed by "Woodworking/carpentry other than agricultural mechanics" with a frequency of 29 (24.6%). The most frequent non-agricultural curricula taught in the core academic and/or non-vocational related curriculum was leadership with 23 (19.5%) teachers responding, science had 19 teachers respond (16.1%), and the curriculum area of math produced 14 (8.5%) participants indicating that they had taught math in the last two years.

Demographic data concerning home computer and Internet access were collected. The participants were asked if they had high-speed Internet at home and asked to indicate if they had a computer at home. Table 6 presents the frequencies for high-speed Internet access at home for the agricultural education teachers. A majority, 68 (61.3%) of the teachers, had high-speed Internet in their homes. Forty-three (38.7%) of the teachers reported having dial-up or slow Internet connection in their homes. Ninety-four percent (*N* = 111) of the participants had a computer at home.

Table 6

Computer Access and Internet Connection at Home of Respondents (N = 118)

Do you have cable, satellite or DSL Internet connection at home?					
	Yes	Percent	No	Percent	Total
High-speed Internet	68	61.3%	43	38.7%	111
Computer at home	111	94.1%	7	5.9%	118

The second research objective sought to determine the current level of computer-based technology integration by the secondary agricultural education teachers. The KRTIS technology integration continuum contains four distinct and independent phases that were used to answer this question: (1) exploration, (2) experimentation, (3) adoption, and (4) advanced integration. Table 7 presents the means, standard deviations, frequency, and percent of the participants' most active area in the KRTIS phases of computer-based technology integration.

Table 7

Level of Computer-based Technology Integration of the Respondents (N = 118)

	M	*SD*	*Most Active*	*Percent*
Exploration (5 statements in subscale) grand mean	3.1	.78	23	19.5%
Experimentation (9 statements in subscale) grand mean	2.0	.53	9	7.6%
Adoption (16 statements in subscale) grand mean	3.6	.67	81	68.6%
Advanced Integration (4 statements in subscale) grand mean	2.3	.68	5	4.2%

Note. Scale: 1 = Not Like Me at All, 2 = Very Little Like Me, 3 = Somewhat Like Me, 4 = Very Much Like Me, and 5 = Just Like Me.

Over two-thirds (68.6%) of the participants were most active in the phase of adoption – using computer-based technology regularly, 19.5% of the teachers identified with the phase of exploration – thinking about using computer-based technology. The phase of experimentation – beginning to use computer-based technology accounted for 7.6%, and 4.2% of the teachers identified with advanced integration – innovative use of computer-based technology as their phase of integration. A majority of the participants were in the later stages of integration with 72.8% identifying with the phases of adoption and advanced integration.

The focus of research objective three was to determine the level of correlation between the secondary agriculture teacher's level of computer-based technology integration and the selected demographic variables of: (a) age, (b) gender, (c) education level, (d) years of teaching, (e) school size, (f) high speed Internet at home, and (g) computer at home. The results indicated that there was no relationship between the selected demographic variables and the teachers' level of computer-based technology integration. Table 8 presents the Pearson product-moment correlation coefficient.

Table 8

Summary of Correlations Between Selected Demographic Variables and the Level of Computer-Based Technology Integration of the Participants

	Pearson Correlation Coefficient	Assumption Significance
Age	.148	.109
Gender	-.044	.636
Education level	-.060	.517
Years of teaching	.044	.637
School size	.104	.264
High speed Internet at home	.013	.889
Computer at home	-.006	.946

Note. Age: 1 = <35, 2 = >35. Gender 1 = Male, 2 = Female. Education: 1 = Bachelors Degree, 2 = Masters or more. Years of teaching: 1 = <10 years, 2 = >10 years. School size: 1 = <250 students, 2 = >250 students. High-speed Internet at home: 1 = Yes, 2 = No. Computer at home: 1 = Yes, 2 = No.

Pearson correlations produced negligible to low correlation with the variables examined. Age ($r = .148$) and size of school's student population ($r = .104$) provided the only, yet small, correlation. Older teachers (35 years of age and older), had a higher level of integration, and the teachers in larger schools (more than 250 students enrolled) had a higher level of integration. According to Cohen (1988), these results indicate a small correlation. Overall, the secondary agricultural education teacher's gender, education level, years of teaching experience, availability of high-speed Internet at home, and availability of a computer at home provided very little correlation.

Conclusions/Recommendations/Implications

Objective one examined the demographic profile of the Oregon agricultural education teachers. The teachers reported a mean age of 33 years. This is seven years less than the age of participants in Alston's (2003) examination of secondary agricultural education teachers in North Carolina and Virginia where the mean age was 40 years. The mean age of the participants in this study was also less than the mean age of the participants in a northwest regional study by Nordheim and Connors (1997) in which the average age of agriculture teachers was 40. The population of secondary agricultural education teachers in Oregon appears to be younger than the average of other regional studies.

The male to female ratio of 2:1 is in line with Alston's (2003) study in North Carolina and Virginia which reported that 64.6% of the teachers were male and 35.4% were female. These numbers are in stark contrast to those reported in the Kotrlik et al. (2000) study of Louisiana agricultural education teachers, where 94% of the teachers were male. The results from this study are also in contrast to a national study (Warnick, 2004) of beginning secondary agricultural education teachers where the national sample contained 51.9% males. With agricultural education being a traditionally male-dominated profession (Foster, 2001), the results indicate there are strides towards gender balance in some states.

Objective two examined the level of computer-based technology integration by the Oregon secondary agricultural education teachers. The findings of this study are slightly different from other related instructional technology studies in agricultural education. The Kotrlik et al. (2003) study indicated that secondary agricultural education teachers in Louisiana were most active in the area of exploration – thinking about using technology, and least active in the area of advanced integration – innovative use of computer-based technology. However, the grouping between the top pair, adoption and exploration, and the bottom pair, experimentation and advanced integration, were consistent between the two states. The research suggests that the Oregon teachers perceive they are adopting technology into their instructional practices and are at a higher level of integration than the Louisiana agricultural education teachers.

A two-thirds majority (68.6%) of the participants in this study were in the phase of adoption, using computer-based technology regularly, and least active in the area of experimentation, beginning to use computer-based technology.

Based upon the results of objective two, it is recommended the a study be conducted to study the advanced integrators, those who were categorized in the advanced integration phase of the KRTIS, and the individuals who were categorized in the low level of integration, the exploration phase, or thinking about using technology. The study could determine what factors assisted the advanced integrators in developing their computer-based technology skills. This evaluation would provide a more in-depth analysis of the teachers' level of computer-based technology integration and a possible examination of the effectiveness of the KRTIS to measure the level of integration by the Oregon secondary agricultural education teachers.

The proposed research should use the benchmark established by the current study of Oregon secondary agricultural education teachers' level of computer-based technology integration. This benchmark will provide a point to measure progression over time to determine if the Oregon population is progressing in their level of computer-based technology integration or if there is an ebb and flow regarding the level of computer-based technology integration in relation to the various computer-based technological advancements (e.g., the introduction of a new computer operating system).

Objective three examined the level of correlation between the secondary agriculture teacher's level of computer-based technology integration and the selected demographic variables. The results indicated that there was no significance in relationship between computer-based technology integration and selected demographic variables of: (a) age, (b) gender, (c) education level, (d) years of teaching, (e) school size, (f) high speed Internet at home, and (g) computer at home. The examination of secondary agricultural education teachers in Texas (Fraze et al., 2002) yielded a moderate positive correlation with the stage of adoption and availability of a computer at home. This is in contradiction to the data collected from the Oregon agricultural education teachers. The results from this study are similar to those reported by Kotrlik et al. (2003) based on secondary agricultural education teachers in Louisiana. The variables of (a) age, (b) years of teaching, (c) home computer access, and (d) home Internet access failed to produce a significant level of variance in the level of technology integration by the teachers in Louisiana.

The results indicated that there was no significance in relationship between the sum of the computer-based integration scale and the selected demographic variables. A small correlation was shown between older teachers (35 years and older), as well as teachers at larger schools with a minimum enrollment of 250 students, and a higher level of computer-based integration.

Based upon the results of objective three, conduct a study examining the variables of teacher age and size of student population to determine what caused the level of correlation associated with those variables and the level of computer-based technology integration.

The results of this study indicate that there is a small level of correlation between teacher age, size of the student population, and the level of computer-based technology integration. Further research could support or reject this correlation and provide additional insight if the correlation was supported.

Are the older teachers (35 years of age and older) at a higher level of integration than the younger teachers, or do the older teachers have a different perspective regarding what computer-based technology integration entails? Since they are farther removed from their preservice training, do they perceive that using a computer for email communication purposes means they have "adopted" technology? Since the younger teachers are fresh from their preservice experience, they may be more familiar with the wide variety of available computer-based technology. Therefore, they recognize they do not know all aspects of what computer-based technology has to offer for their instructional practices. Consequently, they may perceive they are not fully integrating computer-based technology integration in all aspect of their programs. In reality, are the younger teachers integrating technology on a wider basis than the older teachers? Do the older teachers not know what they do not know?

The low correlation between size of school and the teacher's level of computer-based technology integration should be examined more closely. The larger schools (more than 250 students enrolled) correlated with a higher level of computer-based technology integration. Is the level of computer-based technology different between the small and large schools? Do larger schools have more resources available for computer-based technology, and therefore the agricultural education teachers have an increased level of integration?

The proposed research should use the benchmarks established by the current study of Oregon secondary agricultural education teachers' level of computer-based technology integration. This benchmark will provide a point to measure progression over time to determine if the variables concerning teachers' age and size of student population have an impact on the level of computer-based technology integration.

The Oregon Vocational Agricultural Teachers Association (OVATA) in conjunction with the Oregon Department of Education (ODE) and Oregon State University (OSU) should examine methods to encourage computer-based technology integration. The cooperative effort between these entities could assist Oregon's agricultural education programs in reaching the curriculum goals in technology and would bring the state into compliance with state and national standards as outlined by the NCLB (2002) and ODE (2002).

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The Importance of Community to Online Students

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Abstract

This case study investigated adult students during their first semester in a distance delivered doctoral program in Agricultural Education. The purpose of the study was to examine the desirability and importance of community to the online students. Data collection methods included a semi-structured telephone interview, containing an adapted Sense of Community Index and postings on a Wiki (editable web page). Findings from this study found that (a) a variety of web-based tools enabled the students to connect with their cohort on a routine basis, (b) the students feel a strong sense of community and it is important to them, (c) use of web-based communication tools are vital as they assist in the student's learning, (d) students felt isolated from their cohort until they participated in a group project even though they had the use of web-based communication tools at their disposal. The results of this study suggest that opportunities for students to engage socially with their peers should be built into the design of online classes and degree programs. Future research is recommended to examine the sustainability and desirability of virtual communities.

Introduction/Theoretical Framework

The World Wide Web (WWW) has increased the ability to communicate with people all over the world. The WWW has also enabled higher education to harness the communication power of the web to deliver online classes and degree programs to place-bound students. The most recent study by the Sloan Consortium (Allen & Seaman, 2006) reported that almost 3.2 million students took at least one online course during the 2005 Fall semester, an increase of 900,000 more students than in 2004. More than 96% of institutions with enrollments of 15,000 or more students offer online courses with doctoral/research institutions delivering the highest rate (greater than 80%) of online offerings in the form of courses or full degree programs. Many academic disciplines offer online classes, certificates, and full degree programs with agriculture being listed as one of the top ten disciplines developing online learning at the post-secondary institutional level (National Center for Education Statistics, 1998).

For over 20 years, social learning theories have held a prominent place in learning research (Nicol, Minty, & Sinclair, 2003). While views of social theorists differ in significant ways, one common thread states that interaction and dialogue are fundamental for productive learning (Cohen, 1994; Qin, Johnson, & Johnson, 1995; Roschelle, 1992; Slavin, 1994). Reisetter and Boris (2004) documented that students highly value virtual teacher availability and peer chats. Rovai and Wighting (2005) report learning occurs most effectively when there is a strong sense of community among the learners. How do online learners develop and maintain a strong sense of community?

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 learners will gain new knowledge based on existing experiences and knowledge. Vygotsky (1978) also stressed that learning is dependent on the social context in which learning occurs. His theory called social constructivism stresses the worth of interaction with people other than the instructor, i.e. other students.

Humans have five basic needs, one of which is the need for belonging (Glasser, 1986). Being part of a community supplies an individual with a sense of identity, belonging, emotional connection, and wellbeing (Rovai & Whiting, 2005). The social phenomenon of community might be a useful concept in support of online learning (Brook & Oliver, 2005) and this application of theory is supported by the learning theories of Dewey (1938) and Vygotsky (1978) that state social interaction is important in knowledge construction. Vygotsky (1978) argues learning is not merely the accumulation of new knowledge, learning is a product of social interactions and learning is the process of learners being integrated into a knowledge community. The pedagogical benefits deriving from a learning community are: reduced attrition (Tinto, 1998), promotion of critical thinking skills (Fink, 2003), and making it easier to achieve learning outcomes (Gibbs, Angelides, & Michaleides, 2004).

The concept of community has been examined and discussed by many scholars over the years and there is still no standard definition. After reviewing 94 occurrences of the term community in sociologi`cal studies, Hillery (1955) stated that community is characterized by two domains: locality and/or a sharing of common interests. While it is still difficult to define community 50 years later, it is understood that community is a central component in the lives of most individuals (Brook & Oliver, 2002). Emphasizing community as a form of emotional connection that develops through social relationships is consistent with Sarason's (1974) Psychological Sense of Community (PSOC). McMillan and Chavis (1986) built upon Sarason's foundational work and define the PSOC concept as a "feeling that members have of belonging, a feeling that members matter to one another and to the group, and a shared faith that members' needs will be met through their commitment to be together" (p. 9). A similar definition suggests that there is no feeling of community until the members experience a sense of trust, safety, and belonging (Furman, 1998). Several authors (Fisher, Sonn, & Bishop, 2002; McMillan, 1996; McMillan & Chavis, 1986) have suggested that common expectations, shared values and beliefs, interactivity, connectedness, mutual interdependence among members, trust, and spirit are the most fundamental aspects of a learning community.

Higher education is changing from a teacher-centered to a learner-centered focus (Dawson, 2006). Feldman foresaw this transition from the "age of the individual to the era of community" (p. xiii) in 2000. Due to this pedagogical transition, communities of practice, in particular the concept of learning communities, are being developed and integrated into higher education (Kilpatrick, Barrett, & Jones, 2003). This shift from a behaviorist to a social constructivist approach is also supported by Gibson (2003) when she argued that a focus on socially constructed networks with student-to-student interaction is more in line with the current perception of effective approaches to learning. Communities of practice and learning communities are terms that have been used interchangeably, as both concepts relate to the impact that socialization has on the process of learning (Dawson, 2006). A more specific definition of a learning community is:

> Learning community … consists of the feelings of community members regarding the degree to which they share group educational norms and values and the extent to which their educational goals and expectations are satisfied by group membership. (Rovai & Whiting, 2005, p. 101)

Learning communities are also defined as "a bounded group of students involved in cooperative learning online" (Misanchuk & Anderson, 2004, ¶ 3).

When connecting to others in new situations, we create a degree of interpersonal contact or simply put, social presence, which is defined as "the degree to which a person is perceived as a 'real person' in mediated communication" (Gunawardena & Zittle, 1997, p. 9). In their 1997 study, Gunawardena and Zittle found social presence to be a strong factor in predicting a student's satisfaction with learning in an online learning environment. A more recent study by Gunawardena, et al. (2001) put forward that social presence in an online learning context facilitates the building of trust. Social presence is one variable that is important and contributes in building a sense of community among online learners (Aragon, 2003; Bibeau, 2001; Garrison, Anderson, & Archer, 2000; Rovai, 2002a; Tu & McIsaac, 2002). Aragon (2003) thinks that social presence should be the first component established to initiate learning online. Rovai's (2002a) study found that social presence and social quality are two factors that have a positive correlation to a sense of community.

Technology can facilitate the growth of an online learning community by providing a gathering and communication space for its members. An effective and accessible use of technology for online discourse can foster virtual learning communities (Schwier, 2002). It is crucial for a learner to feel that (s)he is a part of a learning community where his or her contributions add to a common knowledge pool and where a feeling of community spirit is fostered through social interactions (Rovai & Whiting, 2005). In the traditional on-campus classroom, students can informally interact with each other before and after class in common spaces such as the classroom and hallways. Those chance encounters encourage informal communication and social connections that enhance the students' pedagogical experience. Meeting in the common spaces allows for casual discussion about class material, assignments, other courses, school events, and other topics that might not be appropriate during class time. Students taking online classes do not have those common spaces that allow for informal interaction and communication (Nicholson, 2002).

Learners should receive encouragement to communicate with other students outside the formal venue of the online class whenever possible (Bold, 2006). Using a variety of media to facilitate communication and deliver instruction enhances learning (Cain et al., 2003). The Internet has advanced the ability to interactively communicate, blurring the lines between time and distance. Students that participate in online instruction can access a variety of web-based communication tools that enhance the interactivity and the social aspect of the learning process (Parker & Rossner-Merrill, 1998).

In Nicholson's 2002 study, he reported that online students who used instant messenger (IM) services felt a strong sense of community and IM gave them another venue for informal social communication allowing them to share information about class material, information about school, and their degree program. IM has been shown to support online students emotional well-being, sense of belonging, as well as social presence awareness (Rossade, Heins, & Hampel, 2005).

Purpose

The purpose of the study was to determine if the need exists to help distance learners develop a sense of community. The research objective was to explore and describe whether a sense of community is desired and important with new, adult, online students.

Research Design

This study is classified as expansion research within the qualitative research paradigm using naturalistic inquiry, incorporating quantitative analysis that was descriptive and correlational. The natural setting for this study included all 19 students of the new cohort of a distance delivered doctoral program. The cohort was introduced to the study and the use of a Wiki (a collection of web pages that can be edited with a browser) during their induction, August 2006. The following December, after the cohort had completed their first semester in the program, each student participated in a semi-structured telephone interview assessing the cohort's experience as new online students, their sense of community, and their use of web-based communication tools. A tally was kept of each individual's use of the Wiki and the pages of the Wiki were printed for content analysis.

The constant comparative method of content analysis was used on collected data (postings from the Wiki and the transcribed interviews) to compare across categories and construct meaning. Each interview was transcribed and sent to each participant for verification. Due to the sensitivity of research on human subjects, Institutional Review Board (IRB) approval was acquired prior to conducting the study. IRB approval, #2006-0421, was granted for the study.

The Sense of Community Index (SCI) was administered during the telephone interview. The data collected from the SCI was used as another form of triangulation in support of the findings from the interviews and the content of the Wiki. Scoring on the SCI used True = 1 and False = 0. Descriptive frequencies and responses from the SCI were analyzed using the Statistical Package for Social Sciences (SPSS, 2006).

Findings

Importance of Social Connection

One important ingredient missing in a distance student's experience is the ability to gather in the hallway before or after class and talk about whatever students want to discuss. A distance student cannot go out with other students after the class to study or socialize or make a date to gather with other students to study or work on a group project. The distance student does not have a *place* that will encourage social connections with the other students. They do not have the same opportunity as an on-campus student for informal communication. This important ingredient is supported by theory as Vygotsky (1978) proposed that social interaction is very important in the learning process.

The participants in this study are adults that value the flexibility of the doctoral program they are enrolled in. Do they care that they may not be able to have a social connection? Is that an aspect of learning that isn't important to them and they are willing to forego so they can reap the benefits of their distance delivered education? Some of the students in the cohort strongly expressed that it was important, while a few students were absolutely certain that a social connection was not important. The students were asked if they thought an informal social connection was important or necessary for them to be successful in their program and if an informal social connection helps them learn.

For some, it was needing to know they were building relationships and a sense of trust with others in the cohort, they responded:

> Shannon: I think it [a social connection] is important. Interaction with other people builds relationships. Those relationships are useful for building trust; you learn who you can count on. Can you count on the other person to follow through and do what they said they will do? The relationships are also good for formal teaching and working with the professors. Without the informal connection how are we going to know if people are going to follow up with what they are supposed to do.

> Andrew: It is important but not necessary. Relationships are important when doing group work. There has to be a certain level of trust that the other group members will follow through and they need to know that you will follow through. There is an expectation that has to be met for the group work to be a productive activity.

> Tammy: Yes, for me I think it is needed. I don't want to feel like it is just me and one professor. Learning informally is definitely important; we are the sum of our experiences.

For others, they thought that the social connection gave them a level of emotional support and added a touch of humanity to their distance delivered program, stating:

> David: I don't think it [a social connection] is necessary, but I value it. It adds a human face to the fact that I am doing my coursework online and seeing the teacher on the TV. Having a way to know that one of the students is raising a certain type of cows in Iowa, that helps. Cuz then, when I am expecting him to reply back to me I understand that he is running a cow operation, he is a teacher, he has three kids, it helps to understand what is going on. Yes, through email and through the Wiki when it was active we were learning outside of class. We were doing the same thing on the Centra® study sessions. We all came to a greater understanding. Coming off of my notes I would not have made as good a grade if we hadn't shared in those study sessions.

> Mike: I would say that it is important but not necessary. I feel that we need an opportunity to bond with these people. We are going through a lot together and I think that sometimes you can share experiences and it helps other people get through.

> Max: Yes – it really helps me to know that others face the same problems I face and that our lives are similar. For me personally I think it is necessary. I am a social creature. If I had to sit and get all this information off even MSN®, I have learned how to read people's personalities in what they type. I like the

voice interaction of Centra®, and I like the voice interaction of the face-to-face [interactive television] and I love to get together with everybody.

Tim: Since needed is different from necessary I would say yes. I think it allows people to bond more. But if I had to say is it absolutely necessary, I would say no. It is important to me, but not necessary. It allows you to bond with other people, plus it allows you to feel that you know what is going on. Some of these classes are going to have group projects so if you can kind of pick – I'm more like these people – you will more than likely stay with those people.

Many in the cohort valued the time spent outside of class as an avenue to help each other and support their formal learning, with the following thoughts:

Dorothy: Yes, I think it is necessary because people are social butterflies. I think that people that get this far in their education are people that are not good at being by themselves. I think that people pursue such a high degree and expect so much out of themselves to receive this degree, they need the social interaction. They need to know that there are people out there doing what they are doing. Maybe struggling at the same time or being successful at the same time and I think it is necessary. I was able to help on a topic during a Centra® session when the instructor couldn't be there. I received emails over the next several days and was able to help. It makes you feel good and strengthens your knowledge of what is happening.

Jim: I think we all need to help each other when we can. Nobody is going to be an expert in every subject. Somebody is gonna slip a little bit and say 'Hey I didn't get that.' We have all had a time when we didn't get a handout or couldn't download something or 'I missed that one, could you send it to me.' I think we are all going to need it at times or with different subjects. I think it would be horrible doing it in a vacuum with no interaction.

George: Hmm, that is difficult. I would say it is important but it is not needed. Even though I do correspond a lot by email, my typing skills leave a lot to be desired. I do very little text chat because I am not a fast or proficient typist. The other cohort, there seems to be a camaraderie where everybody is helping everybody and I really like that. We all have different talents and abilities and it is very helpful and it all works out well.

Veronica: I think it definitely helps. It makes it more enjoyable and probably easier on all of us. It helps my understanding. I think it is important and necessary. Sometimes I could understand things when explained by somebody else [other than the instructor]. I even use people from the previous cohort.

Katie: I think it is important but I don't think it is necessary. Being part of Mission Control [group of four students] enhances the feeling that learning happens in an informal way. There is bound to be one of the group that understands things the way they were presented and they can explain in a way the rest of us understand.

Carl: Absolutely! In fact after we set our group up, we were thinking it would be easier to do our paper and presentation and found out it wasn't so easy. But it did give us the opportunity to connect and make some connection outside of the actual TTVN [ITV Wednesday class session]. I think it is needed and necessary. It allows us to not only draw from our experiences but from the experiences of others.

Not everybody agreed that an informal social connection was important, and expressed their thoughts:

Kyle: No. I think that I can learn informally in specific contexts. The pre-exam study sessions were helpful but I don't need to have a close bond with the people for the session to be good.

Susan: No. A social connection can be helpful to learning. Even with Mission Control, I think everyone in this program is probably overwhelmed with family, work, and other activities. So for us really to be on that level it is kinda adding on another element to that. So I am thinking, my opinion is that we respect one another, we interact with one another only when it is needed. That is because of our commitments.

Learning theorists (Dewey, 1938; Vygotsky, 1978) posit that social interaction enhances learning. Tammy stated, "I have decided that I am a social learner. I like the interaction of classmates, exchanging thoughts, and ideas." Carl said "I am a not a loner, I like to communicate with people." These students are expressing a need to communicate with their cohort members. Many of the students agree as they think that a social connection is either necessary or needed. They could not imagine being in their doctoral program without informal social interaction with their cohort.

The need for a social connection is not a universal experience (Levy, 2006). All but three of the students agree that a social connection is important to them and helps them learn in an informal way. Yet those three students scored at least 75% True answers on the Sense of Community Index (SCI) indicating that they feel a sense of community with their cohort. Sarason's (1974) Psychological Sense of Community (PSOC) theory states that a person just knows when they are part of a community, it is a sense they feel. During the interview all of the students responded that they fit in with the cohort, they feel a connection. The entire cohort was in agreement that their three-day face-to-face induction allowed them to develop that bond. Rovai (2002b) found that a sense of community must be consciously supported in an online environment even though that sense of community grew naturally from participation in a face-to-face setting. Several of the students stated that if they hadn't had the face-to-face experience they thought the cohort would have eventually developed a social connection, however, that bond would not have happened so quickly.

Personal Sense of Community

The literature cited illustrates that a basic human need is a sense of belonging (Glasser, 1986). Sarason (1974), who pioneered the seminal work on Personal Sense of Community (PSOC), stated that a person just *knows* when they are part of a community. The Sense of Community Index (SCI) was incorporated into the interview to give credence to the students' feeling of community.

Every student (pseudonyms are used to ensure confidentiality) in the cohort exhibited a strong sense of community selecting at least 75% *True* (n = 16, M = 14.74, SD = 1.41) answers on the SCI as shown in Table 1 (True = 1, False = 0). Eight students showed a very high sense of community by answering True to every statement on the SCI.

Table 1

Participant Responses to the Sense of Community Index (n = 16)

Student	True	False
Carl	14	2
Jeff	15	1
Jason	12	4
Katie	16	0
Veronica	15	1
George	16	0
Tim	16	0
Dorothy	13	3
Kyle	13	3
Max	15	1
Jim	16	0
Mike	16	0
Susan	16	0
Tammy	16	0
Don	12	4
Tony	16	0
Andrew	14	2
Shannon	14	2
David	15	1

Note: True responses indicate a strong feeling of community. False responses indicate a weak feeling of community.

Table 2 illustrates how the cohort collectively answered each statement on the SCI. The area that showed the least agreement was a feeling that not all students wanted the same outcome as a result of being in their distance delivered degree program. A few of the students elaborated on their answers when they returned the transcript of their interview. Jason stated, “Some, like me, want to be teachers and researchers, others have no interest.” Max agreed, “I have a goal to be a college professor – not everybody wants the same thing.” Tammy does think the cohort wants the same thing, she wrote, “A diploma!! And the opportunity to work with and learn from great people.”

Table 2

Collective Responses to the Sense of Community Index (*N* = 19)

Statement	True	False
I think this program is very helpful in meeting my needs in flexible delivery.	19	0
People in this program seem to share the same values.	16	3
Other students and I want the same things from this program	11	8
I think that this program has an appropriate scope in what it tries to do.	19	0
I can recognize most of the people who participate in this program.	18	1
I feel at home in this program.	18	1
Many of the other people in this program know me.	17	2
Members in this program welcome other members' documents and suggestions for help, etc.	18	1
I care about what other members think of my actions in this program.	19	0
I feel I have influence in what happens when members work together in this program.	17	2
I feel that other people in this program would help me if I requested help.	19	0
I feel my opinions and ideas are welcomed by others in this program.	17	2
It is very important for me to participate in this program.	19	0
People in this program seem generally to get along with each other.	19	0
I expect to continue in this program into the future.	19	0
People in this program seem to have similar understandings and interests.	14	5

Note. Adapted from Brook and Oliver, (2002).

The sixteen statements of the SCI were transformed into one additive index resulting in a Cronbach's alpha of .54 and then correlated with the variables of IM use (*M* = .37, *SD* = .50), gender (M = .74, SD = .45), age (M = 36.74, SD = 6.71), previous online courses (M = .26, SD = .45), perform class work at home, work, or both (M = 1.53, SD = .84), and broadband availability at home (M = .74, SD = .45). Running a bivariate correlation on these variables showed no statistically significant correlations, α = .05 set a priori, as seen in Table 3.

Table 3

Correlations between Sense of Community Index and Selected Participant Variables

Variables	*r*
Use IM to interact with cohort members	.18
Gender	-.20
Age	-.28
Previously took an online class	.03
Perform class work at home, work or both	.41
Broadband access at home	.06

Previous studies have shown a reliability for the SCI across contexts: α = .71 (Pretty, 1990), α = .80 (Perkins et al., 1990), α = .69 (Pretty & McCarthy, 1991) and α = .80 (Obst & White, 2004). Combining the 16 statements of the SCI into a single additive index produced a reliability of α = .54. This low reliability may be due to the small sample size and the heterogeneous population. The students' sense of community index was correlated with the variables of IM use, gender, age, previous online course, doing class at home, work, or both, and broadband access at home. There were no statistically significant correlations.

Three web-based communication tools were utilized during this study (a Wiki, instant messaging, and web-based conferencing software) allowing the cohort to connect with each other on a social and intellectual level. Many of the students are in contact with each other, using IM or email on a daily basis; others report that they are in contact at least once a week and that web-based communication tools are vital to feeling connected to the other students in the cohort.

Yet, three students expressed that they felt isolated. They did not participate in exchanges with their cohort. It took participation in a group project before they felt connected to at least the students in their group. After participation in the group project they started to feel included on a larger scale and all three started using IM.

Conclusions, Recommendations, and Implications

Connecting to each other is important and necessary to the students. The students in this study are not unusual as a recent study reported that students place a high value on their social connection with their peers (Cain et al., 2003). Using IM and email, many of the students can and do interact on a daily basis. The combination of web-based communication tools allows the cohort more venues for informal and social communication, as well as the potential to share information about their degree program and their classes. A sense of community is strongest in those who experience the most intensive exchange and the use of real-time communication is a key in strengthening group cohesiveness as well as individual relationships (Levy, 2006).

This cohort of students acknowledges that they experience a strong group connection; all of them feel like they fit in with the group concurring with Glasser (1986) that a strong feeling of community helps with their sense of wellbeing with the program. They have a common goal to earn a doctoral degree. Many communicate on a daily basis using several web-based communication tools, nevertheless three students felt alone and isolated until half way though the semester when they worked on a group project for one of their classes. Attrition is always a concern for both on-campus and online learning, and isolation is a major contributor to attrition (Morgan & Tam, 1998). Misanchuk and Anderson (2004) posit that encouragement of students to support each other and feel part of a community may be one potential strategy in reducing dropout rates. Incorporating group work early in the class schedule and the encouragement of student interaction in informal discussions with their peers may reduce the feeling of isolation with students that are hesitant to engage others outside of class time.

Schwier (2002) cautions that "Virtual learning communities do not just happen; but neither are they created" (p. 3). As educators we can promote the development of learning communities and encourage their use, but ultimately it is the learners who decide if they will use the provided tools and they will determine if a community emerges. If and when a community emerges it takes time for a community of practice to develop (Wenger et al., 2002). While we cannot force the development of a community of practice among new graduate students, a laudable goal would be to help one develop. Distance students should be instructed in the use of web-based communication tools and faculty should encourage their use.

I strongly recommend that group work be incorporated early in a class schedule. It took participation in a group project for three students to engage with their cohort members. Group work is pedagogically sound in that students benefit from student-student interaction, so it may also follow that students benefit from the informal social interaction provided in group work. Future studies should examine the potential of group work as a viable technique in reducing isolation for online learners. Isolation and distance education is not a new concern. A quick library search using only one search engine revealed 962 articles devoted to the topic including articles dating from 1982 to the present. Research from multiple academic disciplines has reported that student isolation is concern and researchers have examined the causes and proposed solutions.

Use of the SCI confirmed the students' feeling of belonging. This cohort quantitatively feels a strong sense of community. While previous studies showed a reliability of $\alpha = .80$, indicating an acceptable reliability for the SCI, my analysis revealed an $\alpha = .54$. This may be the result of the small sample size used in this study. As such, replicating this study with a larger population would be advisable as a step in re-examining the instrument's reliability. In addition, it is recommended that a confirmatory factor analysis then be conducted on the instrument to examine the four subscales of: (a) integration and fulfillment of needs, (b) sense of membership, (c) sense of influence, and (d) shared emotional connection. Such a procedure will further refine the instrument

The correlation of the SCI additive index with the variables IM use, gender, age, previous online course, doing class at home, work, or both, and broadband access at home exhibited no statistically significant correlations. This may be due to the small sample size used for the statistical procedure instead of variables that are not correlated. This is an initial investigation of the correlates and future studies need to investigate the variables of this study as well as different variables with a larger population to examine if relationships exist. A 2007 study (Xiojing, Magjuka, Bonk, & Lee, 2007) found evidence that there is a positive relationship between sense of community and perceived learning gains, learner engagement, and student satisfaction. A possible variable to investigate might be personality, using an instrument with proven validity and reliability such as the Myers-Briggs® Type Indicator with the results evaluated as to the possible impact personality may have on social engagement and importance of networking with cohort members.

The scholarly discipline of Agricultural Education has been at the forefront of distance education, and is one of the top ten educational disciplines offering online education in the United States (National Center for Education Statistics, 1998). Multiple institutions of higher education offer classes and complete, online, agricultural education graduate programs; their reach is now international. The experiences of the students participating in this study can be used to support student engagement in existing programs and elemental in the design of new programs or the instructional design of new classes. It is recommended to follow up this study with the same cohort to see if the sense of community is important as they complete their program of study.

Another recommendation would be to replicate this study with students working towards an undergraduate degree, or an online certificate program, as well as students that are earning their degree individually and not part of a cohort. As this is a qualitative study and we are not concerned with generalizability in the same manner as a quantitative study, applying the research objective to different groups will do more to advance our understanding of community with online students.

For over 80 years, scholars have studied the importance of community as it applies to knowledge construction. Dewey (1916) an important learning theorist in Agricultural Education, is one of the pioneers. A 2007 study concurs "…the sense of learning community is worth pursuing, as the process of building community itself enhances effective collaboration and communication, learner engagement, and social networking that will eventually benefit both participants as well as the online program" (Xiojing et al., 2007).

As educators we need to expand our educational vision and apply creativity to the use of web-based communication tools to create new educational environments. It is apparent that communicating effectively is a critical skill for online learners in the development of community. Learners should be encouraged to interact with each other often outside the formal classroom. Furthermore, as educators we should be role models in effective online communication, provide examples of community building behavior, exhibit an online presence in student discussions, and remind learners that their role in discussions are important.

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Web-based Communication Tools in Support of a Distributed Community of Practice

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Abstract

This case study investigated adult students during their first semester in a distance delivered doctoral program. The purpose was to examine the use of web-based communication tools and their ability to establish a community of practice enabling the new students to share solutions related to distance doctoral study. Data collection methods included a semi-structured telephone interview and postings on a Wiki (editable web page). This study found that (a) a variety of web-based tools enabled the students to connect with their cohort on a routine basis, (b) it was possible to establish an embryonic community of practice, (c) students were able to assist each other with concerns that helped them acclimate to learning online and their doctoral program, (d) use of web-based communication tools are vital as they assist in the student's learning, (e) three students felt isolated from their cohort until they participated in a group project even though they had the use of web-based communication tools at their disposal. The results of this study suggest that opportunities for students to engage socially with their peers should be built into the design of online classes and degree programs.

Introduction/Theoretical Framework

Online learning has been highlighted as a delivery system for distance learning 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, 2003; Miller & Miller, 2005). Interaction and dialog are fundamental for productive learning, in person or online (Cohen, 1994; Qin, Johnson, & Johnson, 1995; Roschelle, 1992; Slavin, 1994). Reisetter and Boris (2004) documented that students highly value virtual teacher availability and peer chats. Rovai and Wighting (2005) report learning occurs most effectively when there is a strong sense of community among the learners. Creative use of communication technologies can enhance the quality of online learning by providing opportunities for student networking. In an online learning environment, student networking must occur while students are in different locations. Distance students do not have the same opportunity as on-campus students for informal communication with their peers (Miller, Murphrey, & Edgar, 2006).

Using a variety of media to deliver instructional content and to facilitate communication enhances learning (Cain, Marrara, Pitre, & Armour, 2003). In fact, one study documented that the greater the number of communication channels available for students to interact (network), the more positive students were about their online learning experience (Williams, Nicholas, & Gunter, 2005).

Previous research suggests that communities of practice among face-to face learners are beneficial as they provide interaction and dialog between experienced members and newcomers (Wenger, 1998b). That communication not only promotes the relaying of knowledge, it also promotes the cultivation of new knowledge and understanding (Gray, 2004). Community knowledge is an important part of a community of practice, which means that the sum of community knowledge is greater than the sum of the knowledge of individual participants (Gherardi & Nicolini, 2000). Originally, the idea of communities of practice applied to groups of people that interacted in face-to-face settings (Lave & Wenger, 1991). Johnson (2001) asked if current technology can be used to support the collaboration needed to establish a distributed or virtual community of practice applicable to online learning.

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 learners will gain new knowledge based on existing experiences and knowledge. Vygotsky (1978) stressed that learning is dependent on the social context in which learning occurs. His theory called social constructivism stresses the worth of interaction with people other than the instructor, i.e. other students.

The theoretical construct of communities of practice is based on the anthropological perspective that explores how adults learn through common everyday social practices. Wenger (n.d.) defined a community of practice as "a group of people who share an interest in a domain of human endeavor and engage in a process of collective learning that creates bonds between them" (p. 1). Communities of practice, self-organizing systems of informal learning, are different from other communities in three main ways. First, is a focus on the domain of mutual interest, as members are distinguished from other people due to their level of proficiency and knowledge. Second, members engage in joint activities and discussions. They help each other and share information as the group interacts and learns together. It is through these interactions that the group builds community, fostering relationships around the domain. Third, through sharing, the group develops a collection of best practices and uses their shared experiences to solve problems. The shared collection of experiences becomes a common knowledge base giving adults the skills they need when facing new situations. The communities stay together through shared learning and interest. In summary, a community of practice is a group of people who share a concern or a passion for something they do and they learn how to do it better as they interact on a regular basis (Gray, 2004). This definition takes into account that learning may be the reason that the community comes together or it may be an incidental outcome of the interactions of individuals.

Communities of practice encompass the technical acquisition of skills as required by a specific practice, but add the dimension of allowing the informal and social aspects of creating and sharing knowledge. Individuals in a community of practice learn to function in that practice as well as become acculturated to the community's behaviors, viewpoints, and language. Participating in a community of practice, even at its periphery, is considered authentic learning and it is through participation that members learn how to do and just as important, how to be (Wenger, 2001; Wenger, McDermott, & Snyder, 2002).

Gray's (2004) study reported that it is possible to meet the informal learning needs of a professional association. The coordinators of the Alberta Community Adult Learning Council participated in an online community of practice designed to support informal workplace learning. The study found that through active participation and peripheral lurking, newcomers to the association were oriented to new skills and the culture of practice. Findings included that the role of the online facilitator is critical in sustaining the online community. This example demonstrates the merit of a community of practice for newcomers to a professional association. The lessons learned may apply to new, adult, online learners in a university setting as they transition to an unfamiliar academic environment.

Technology can facilitate the growth of an online learning community by providing a gathering and communication space for its members. An effective and accessible use of technology for online discourse can foster virtual learning communities (Schwier, 2002). It is crucial for a learner to feel that (s)he is a part of a learning community where his or her contributions add to a common knowledge pool and where a feeling of community spirit is fostered through social interactions (Rovai & Whiting, 2005). In the traditional on-campus classroom, students can informally interact with each other before and after class in common spaces such as the classroom and hallways. Those chance encounters encourage informal communication and social connections that enhance the students' pedagogical experience. Meeting in the common spaces allows for casual discussion about class material, assignments, other courses, school events, and other topics that might not be appropriate during class time. Students taking online classes do not have those common spaces that allow for informal interaction and communication (Nicholson, 2002).

Learners should receive encouragement to communicate with other students outside the formal venue of the online class whenever possible (Bold, 2006). Using a variety of media to facilitate communication and deliver instruction enhances learning (Cain et al., 2003). The Internet has advanced the ability to interactively communicate, blurring the lines between time and distance. Students that participate in online instruction can access a variety of web-based communication tools that enhance the interactivity and the social aspect of the learning process (Parker & Rossner-Merrill, 1998,).

Bold (2006) described how she used a Wiki to support collaboration among her online students. A Wiki is a set of related web pages that can be authored individually or collaboratively by a group. Using an ordinary web browser, a page is authored through the display of a simple mark up language. Collaborative documents can be displayed immediately without knowledge of HTML tags (Bold, 2006). A document can be changed using the live edit feature in a web browser while connected to the Internet. In contrast, a collaborative document in a course management system (CMS) requires using a word processor to save the document, the document needs to be uploaded, and then downloaded by the other authors. After they have made changes the process starts over again, with each author having to wait to make changes.

Nicholson's 2002 study, found that online students who used instant messenger (IM) services felt a strong sense of community and IM gave them another venue for informal social communication allowing them to share information about class material, information about school, and their degree program. IM has been shown to support online students emotional well being, sense of belonging, as well as social presence awareness (Rossade, Heins, & Hampel, 2005).

Instant messaging services comprise a small program that runs in the background on a user's computer connecting to a central hub program on the Internet. The central hub program allows users that have the same software to connect to each other. When users are aware that a person they want to communicate with is available they can send messages and respond in real-time. The IM service notifies the user when other users on their approved list are available to send messages. This is comparable to a student lounge; it is as if a student can talk to another person in the room allowing for a common space for a chance meeting with others. Some IM services allow multiple participants in each chat, even allowing two users to talk if both have a microphone attached to their respective computers. If the users have a broadband Internet connection and webcams, the participants can see and talk in real-time. Another feature of IM is that users can send files to each other without using email (Nicholson, 2002). An attractive feature of IM is that most services are free and come already installed on a computer (Miller, Jenkins-McKendrick, & Murphrey, 2005).

Web-based conferencing programs allow students another avenue to communicate in real time. These programs such as Centra®, Ellumunate®, or Breeze® allow multiple participants to talk to each other, view a PowerPoint presentation, and if they have a broadband connection see a small video of the presenter. A person with a 56K dialup connection can participate using the program if no video is included. Use of the software is very straightforward. An administrator can set up a virtual meeting and then a URL for the meeting is sent to the participants. In addition, online meetings can be recorded and accessed at a later date for review. Students have reported that using a web-based conferencing system helps them feel connected to the rest of their classmates (Miller et al., 2005).

When adults are new to online learning, it is suggested that web-based communication tools may provide a common place for them to gather and communicate. When the technology is easily accessed it can help foster a virtual learning community. Will that same technology allow for a community of practice to be established over the life of the doctoral program? Is a community of practice an integral ingredient that will help online students succeed in their program of study and be satisfied with learning in an online environment?

Purpose

The following objective guided this study: Explore and describe whether a community of practice can be established using web-based communication tools, examine whether those tools help new, adult, online, doctoral students adapt to online learning, and increase a student's satisfaction and perception of success with online learning.

Method

This study was 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). Qualitative inquiry pays particular attention to meaning in context and the researcher looks for underlying meaning while gathering and analyzing the data (Merriam, 1998). A principle of qualitative studies is that "reality is holistic, multidimensional, and ever-changing" (Merriam, 1998, p. 202) allowing the researcher to understand how the participants in a study make meaning of their experiences.

A case study design was used to provide illumination of the research objective. According to Gall, Gall, and Borg. (2003), a case study is used to explain a phenomenon ¬ the events, processes, persons, and/or things that interest the researcher. This study used a purposive sample, "the goal is to select cases that are likely to be 'information rich' with respect to the purposes of the study" (Fraenkel & Wallen, 2006, p. 483).

The natural setting for this study included all 19 students in a new cohort of a distance delivered doctoral program, using multiple delivery technologies. The researcher designed a Wiki (editable web page) as a dedicated shared web space for the cohort to interact virtually outside of the institutional classroom. The Wiki was a private space for the students having no interaction from faculty members, with the researcher assuming the role of facilitator. During the cohort's face-to-face (f2f) induction (August 2006,), they attended a session that introduced them to the reason for the study, taught them how to use the Wiki, were given a handout that explained how to use the Wiki, and were instructed in the use of an activity to promote engagement and dialog among the cohort. During the introductory session the participants were asked to sign a Student Consent Form approved by the Institutional Review Board, IRB #2006-0421.

Data Collection

At the end of the students' first semester (December 2006), each participant was interviewed using a semi-structured open-ended interview protocol developed by the researcher, assessing their experience with the Wiki and other web-based communication tools. The personal interviews were recorded and transcribed. Respondents were coded with a unique identifier to tract trends in the data to ensure confidentiality.

Following the completion of the cohort's first semester, postings on the Wiki were evaluated using content analysis to assess engagement. "Content analysis is a technique that enables researchers to study human behavior in an indirect way, through an analysis of their communications" (Fraenkel & Wallen, 2006, p. 483). Patton (2002) writes "Content analysis is used to refer to any qualitative data reduction and sense-making effort that takes a volume of qualitative material and attempts to identify core consistencies and meanings" (p. 453).

Data Analysis

The constant comparative method was used on collected data to compare across categories and construct meaning (Denzin & Lincoln, 2000). This method described by Glaser and Strauss (cited in Erlandson et al, 1993) 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.

Credibility is supported through prolonged engagement, establishing trust and a rapport with the respondents. The researcher is a member of the previous cohort of the doctoral program and was the facilitator of the Wiki allowing prolonged engagement. Triangulation, enhancing credibility, was achieved through analysis of the semi-structured interviews and the content analysis of the student postings on the Wiki. Draft copies, for peer debriefing of the findings, were sent to a department head at a separate institution, who teaches online classes and has participated in online classes. Member checks were accomplished by sending a synthesis of each interview to respondents, asking for verification of accuracy. Transferability was 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. Keeping detailed records of all collected data and resulting analysis achieved dependability. A copy of each interview was printed and a synthesis of the answers was provided to each respondent for verification or correction. All documents and notes were retained for inspection. Lastly, confirmability of the study was addressed by including quotes from the raw data that support 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.

Qualitative research is an activity that locates the observer in the sphere of the study (Strauss & Corbin, 1990) and while a qualitative inquiry does not require distance from the data and objectivity, the researcher is aware that the dual role of facilitator and researcher may affect the participant's responses to the research questions. However, due to theoretical sensitivity, that limitation may be counterbalanced due to the researcher possessing the personal and professional experiences necessary to develop an awareness of the subtleties in the meaning of the data and the ability to understand the context. The researcher kept a self-reflective journal throughout the research study in an effort to explore presuppositions, assumptions, and biases allowing participant's meanings to dominate the findings.

Data from the interview and the content analysis of the Wiki were evaluated using Wenger's (1998b; 2001) communities of practice framework. The resulting analysis was used to offer illumination of the research objective as it concurs with theory, negates existing theory, or expands on existing theory as illustrated by the literature cited.

Findings

A composite snapshot of the cohort shows that the members of the cohort were adult learners and new to online learning. The group was scattered across the United States and Canada, they were busy professionals with families and they had access to a high-speed Internet connection at home or work. The group liked online learning although they had to make adjustments in order to be a student again as they had been absent from a formal classroom from 1 to 15 years. The students were confident in their ability to do the work that is necessary to complete their program and most felt competent in using the technology needed to earn their doctoral degree at a distance. The cohort felt a strong sense of community within their group. Most of the students felt that an informal social connection was beneficial to their efficacy in the program. Even though all the students had access to the web-based communication tools to interact with each other, three students felt isolated until they participated in a group activity for one of their classes. After they were involved with the project, the three students increased their interactivity with the remaining cohort members.

Web-Based Communication Tools

The idea behind using web-based communication tools, especially the Wiki, was to provide the students a virtual place to gather. Would this place help build a community of practice (CoP)? The Wiki was set up so that only the cohort members and the facilitator had access to read what was posted, post and answer questions, and upload documents. The reasoning behind that thought was the students would like the ability to interact and not feel like they had to be guarded in how they posted with respect to faculty members or the program. The Wiki was meant to be a technological solution to help the cohort work together as a CoP.

Wenger (1998b; 2001) stated that there is no perfect technology solution to use with a distributed CoP but some tools may be useful. A CoP is composed of three crucial characteristics. First, there is a focus on a domain of shared interest. In this case, that domain is the doctoral program in Agricultural Education. Second, as members of the community pursue their joint interest in the domain, they participate in joint activities, they hold discussions, they help each other, and they share information. It is through those interactions that community is formed around the domain and relationships are built. The third characteristic is that members of the community develop a set of resources that they share: experiences, stories, tools, and ways to address problems – in other words a shared practice of operating within the domain. It takes time for this to occur.

Wiki

The Wiki was set up to allow the cohort to have a dedicated web-space where they could ask and answer questions about the program, their classes, or any topic they might need help with, have a space to store documents, and to allow a way for them to socialize with each other.

The use of the Wiki would allow for activities that are integral to a CoP (Wenger, 1998b, 2001; Wenger et al., 2002). It could be a repository for documents the cohort wanted to share, they could hold a discussion about class work or any topic of interest, they could post pictures and videos, and it was free for them to use. For students that did not participate in the discussions, they were still able to lurk (read but not post) and learn. Ideally one person could post a question that might be of interest to many in the cohort. A question would only have to be answered once; it would remain on the Wiki and be helpful to all. The Wiki was a tool that was selected because it would be easy for the cohort to access; all they needed was an Internet connection and a web browser. The Wiki could be accessed and manipulated with a 56K dial-up Internet connection. A broadband connection was not required.

A total of 174 posts were made on the Wiki. All but three students posted on the Wiki at least one time. Five students (one female) wrote 84% (146) of the 174 posts. The facilitator posted 20 times in response to questions or comments from the students. The facilitator thought that (s)he shouldn't be too present on the Wiki, that the best way to judge how useful it was would be to allow the cohort to post topics that were important to them. The facilitator didn't want to jade their thinking or activity. Even though the facilitator had been a new inductee to the program three years earlier, his/her concerns then, may not be the same as their concerns now. Activity on the Wiki stopped on October 20, 2006. During the time from August 22, 2006 to November 11, 2006 the Wiki was used to discuss classes, tests, assignments, and committee member selection. The participants shared aspects of their personal life as well. The Wiki was never utilized with the sharing of documents or collaboration on group projects. When cohort members shared documents, they did so through email.

MSN® Instant Messenger

During the time that the Wiki was active the facilitator encouraged the cohort to look into using MSN® Instant Messenger (IM) as a way to communicate with each other. The previous cohort started using IM halfway into their second semester as a way to stay in touch with each other and they really enjoyed their contact with each other. The previous cohort did not communicate with each other by email very often. One of the participants of this study liked the idea and put together a cohort contact list comprised of email addresses, phone numbers, and MSN® contact information. Not all students updated their information nor did they all have MSN® sign-in names.

IM was not adopted by all cohort members. Initially it was used during class by a few of the students to communicate with each other without breaking into the ITV class session. Eventually it was used whenever a person had a question or wanted to chat when they saw another cohort member was online. IM would also allow group chats for as many students as were online at the same time.

At the point in time when the interviews were conducted, about half of the cohort used MSN® to converse. Since that time a few more have adopted use of IM. One of the final posts on the Wiki explained the drift away from the Wiki to other forms of web-based communication, "I think we've converted to the IM and Centra® world. Seems like we're answering our questions faster these days that way."

Centra®

The cohort had the opportunity to use Centra®, web conferencing software, on Tuesdays as an instructional supplement to their two Wednesday classes. The students downloaded the software and once they were scheduled to be part of a conference, they would sign in and they could talk to each other in real time. All they needed was an inexpensive microphone attached to their computer. They could upload documents to share and they could upload PowerPoint presentations. Centra® allowed them to share their desktop or applications, and if they had a web cam they could also use video if they had a broadband connection. One attractive feature of Centra® is that the sessions can be recorded and listened to at a later point in time. That was beneficial for a student that missed the session.

There was one time when a student could not attend the Tuesday Centra® session but (s)he didn't want to miss anything, the student asked on the Wiki, "Could someone please, ever-so briefly, summarize what happened on Centra®? I got stuck in a meeting. THANKS!" Several of the cohort members used Centra® in their Extension jobs and were able to set up Centra® sessions for additional interaction outside of the Tuesday sessions. For students not in Extension, they had to send off an email asking to have a Centra® session, when and with whom and a staff member scheduled the session for them.

Usefulness of Web-based Communication Tools

Whereas the cohort is not located in close proximity to each other and have no easy way to meet, they were asked their opinion about using web-based communication tools (Wiki, Centra®, IM, Email) in connecting with their cohort members. Most of the students responded that the tools were useful. Some went on to explain their thoughts:

Carl: It primarily started with the issue analysis project for our [philosophy] class. Up until that point, I had very little communication with others in the class outside of class time. I am not a loner; I like to communicate with people. I am a red, so it has been extremely helpful to communicate with others in the cohort on a regular basis.

Jeff: I would miss using IM. Every so often emails will be sent to the whole cohort with something that may be of interest to everybody. It is important to socialize and it would be a hindrance if that was taken away.

Katie: There is no other way to contact our classmate in Canada. I will go to web-based communication tools before I will use the phone. I use the tools on a continual basis, at least once a day there is an email of a response or something, and that is on a slow day. Usually it is much more.

Veronica: It is vital. I don't know how else we would do it. We interact pretty regularly. Some in the cohort we never hear from. There are about 10 of us that communicate a lot.

Dorothy: I can't imagine being in this program without those tools one way or another. Each tool has a positive and a negative. Up until a day ago I was talking to a cohort member everyday.

Tammy: It would be really difficult to establish even a secondary relationship with everybody if you didn't have these tools. Even with as cheap as cell phones are these days, it is so easy to shoot people an email as opposed to calling them on the phone and interrupting dinner or whatever. For some of the people the only time I talk to them is during class time. Probably about half the class we IM and email outside of class.

David: With email you are limited in the inflections that you can put in. With TTVN that is one way but it is still kinda iffy. With the Wiki and with being able to hear each other on Centra®, those helped because you could – while I really do like to get to the point when I am studying – when I am not studying I like to hear things and know about people and understand why you are asking the question you are asking. Some people may not remember that I have no background in Ag Education. So, when I ask a question it isn't for just an answer, I really want to know.

However, even though there was activity on the Wiki, students were using and enjoying IM, with Centra® sessions occurring every week, three students felt isolated and not part of the cohort until they participated in a group presentation for their Philosophy class. They explained that it took being part of a group project for them to establish a social connection. From that point on, they used the web-based communication tools to further establish their informal social connection.

Conclusions/Recommendations/Implications

By using the Wiki, IM, and Centra® the students were able to establish a community of practice during their first semester in their distance delivered doctoral program. It is too soon to tell if their community of practice can be maintained using web-based communication tools especially since the Wiki lost favor with those that used it. IM is used by many in the cohort and is seen as a quick way to get answers to questions and to socialize with members in the cohort. At the time of the interview only eight students had an IM account. Centra® proved to be a usable tool permitting cohort members to collaborate on projects and share information as they prepared for exams; the students liked the ability to talk to each other and they could see people who used web cams. After one semester the cohort is at an embryonic stage of a community of practice. Time is needed to examine whether the students keep using the web-based communication tools as they presently are, if they find new uses for the tools during the next few years, or adopt new tools that may come along as they complete their doctoral program. A concern with the demise of the Wiki is that students who like to lurk, no longer have that ability.

I recommend that the cohort be reevaluated when they have completed their class work and again when they are close to defending their dissertation in their use of web-based communication tools to assess the ability of those tools to maintain and support this community of practice past the embryonic stage.

The web-based communication tools contributed to the students' acclimation to online learning as they were instrumental in teaching new skills needed for doctoral study, allowed the students to help each other with class work, and provided emotional support. Receiving support from their classmates contributed to a sense of confidence that grew as the semester progressed. Not every tool was used by every student; however the students that adopted use of either the Wiki, IM, and/or Centra® said that the tools were vital in establishing and maintaining relationships. To enhance the ability for the students to gather and share information it takes a variety of tools as the students used all three plus email. This finding echoes Cain, Marrara, Pitre, and Armour's (2003) recommendation that a variety of media be utilized to facilitate communication.

Membership in a community of practice involves whoever participates (Wenger, 1998a); future study of this cohort should examine why students have/have not engaged in activities. Is their engagement or lack of engagement in the community of practice a personality trait, due to their extrinsic or intrinsic motivation, or possibly their level of self-direction? It would also be beneficial to investigate the development of community or lack of community and the resulting stages with students that progress through an online program as individuals not part of a cohort.

Is the use of the tools based on the needs of the learners? Wenger (1998a) states that communities of practice go through stages of development "characterized by different levels of interaction among the members and different kinds of activities." (¶ 12). The stages of development model (Table 1) proposed by this study needs to be tested as to its viability. Further investigation is needed to examine what developmental stages the cohort may go through as they progress through their program, how they interact, and what activities they use in their community of practice. This examination needs to discern if there are definite patterns that explain engagement.

Table 1

Student Needs and Use of Web-based Communication Tools During the First Semester in a Distance Delivered Doctoral Program

Induction/First Six Weeks	Mid Semester	End of Semester/Finals
• Students find the face-to-face induction vital to establishing a sense of community. • Students feel overwhelmed with the amount of information conveyed during the induction, a few would like to know more, many are aware that more information will come. • Students would like more time with faculty, especially as they need to select committee members and find it difficult when they have met faculty for only two days. • Students experience distress and would like instruction on use of the Course Management System, APA style writing, and online library use. • Students start interacting with each other using the Wiki, they express uncertainty and doubt. They have conversations about school as well as social interaction. They feel the need to connect with their cohort members. Students are unsure of what instructors are looking for; they want more specific parameters for assignments.	• Students abandon the Wiki for IM to receive quicker answers to questions. While communication is mostly school related, students still use IM for social communication. • Students use Centra® to work on group projects as they can talk to each other and see one another if a web cam is available. They like hearing real voices; they feel more connected to each other. • Three students start to feel less isolated due to working in groups. • Students use Centra® to study for mid term exams.	• Students that had unease using technology at the beginning of semester, feel more competent. • IM still in use on a daily basis by some students. They report needing their *daily fix* of contact with cohort members • Students that felt isolated until participating in a group class project, now use web-based communication tools to have contact with cohort members. • Students looking forward to seeing each other at the next scheduled f2f. • Some students still struggle with self-direction and self-discipline needed for doctoral study. • Some students lack understanding of the program requirements. • Students' confidence is high that they can be successful with their coursework.

Schwier (2002) cautions that "Virtual learning communities do not just happen; but neither are they created" (p. 3). As educators we can promote the development of learning communities and encourage their use, but ultimately it is the learners who decide if they will use the provided tools and they will determine if a community emerges. If and when a community emerges it takes time for a community of practice to develop (Wenger et al., 2002). While we can not force the development of a community of practice among new graduate students, a laudable goal would be to help one develop and planned for in the design of online programs and classes.

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Poster Abstracts

Concept/Innovation

Bridging the Ag Literacy Gap

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Bridging the Gap: Gateway to Agriculture Professions

Introduction

As a result of declining enrollments, many colleges of agriculture are working to increase or revise recruitment efforts to more effectively attract students. Based on recent community college enrollment trends, a potential source of students to increase agricultural enrollments might be found at community colleges (Horn et al., 2002). However, anecdotally, the university has found that recruiting students for careers in agriculture to be a challenge. The majority of the regions large minority population views any work in the agriculture industry as tedious and low paying. Herein lies the motivation for the "Bridging the Gap: Gateway to Agriculture Professions" project. This project is intended to supplement efforts by the university to attract increased numbers of underrepresented students by tapping into our closet source of potential students, (Community College name). The inherent goal of this program is to help students to bridge that gap to the numerous career opportunities that exist for them in the agriculture industry.

How It Works

Over the initial two year period of this project, the following steps were taken to accomplish the four objectives set forth by the project staff.

Objective #1: Build bridges between agriculture and general disciplines taught at community college. Steps taken by project staff: 1) train at least 20 community college faculty and ten high school counselors from feeder high schools in agriculture literacy concepts, 2) make at least five agriculture literacy presentations to classes at the community college, and 3) create an Interdisciplinary Ag Club at the community college to help promote agricultural careers.

Objective #2: Bridge the gap between community college students and university agriculture programs. Steps taken: project staff utilized the university's Agriculture Ambassadors to build relations with the community college students. Ambassadors interacted with students through at least six activities each year, including visits to their campus, classroom presentations, and outreach activities provided at the university.

Objective #3: Build a bridge between students and agriculture industry. Steps taken: 1) staff developed a two-week summer program entitled the "Ag Summer Bridge", 2) staff recruited and selected 20 students from the community college, 3) coordinators met each student and their parents to answer questions and get parent approval, 4) first week of the program consisted of field trips to numerous agricultural industry sites, presentations and panel discussions with industry people, USDA field and agency personnel, university students, faculty and administrators, and 5) during the second week, participants had the opportunity to shadow a professional working in the agriculture industry. Week two culminated with a stakeholder's luncheon and presentations by participants reflecting on their experiences.

Objective #4: Provide financial support to one student. Step taken: project staff selected one past participant of the "Ag Summer Bridge" program to receive a $15,000 scholarship.

Results

There was a significant increase in project outcomes between the first two years of this project. In Year II, all goals and objectives were achieved. Nearly all listed activities were met. Only one, the development of an Ag Club fell below the minimum standard for achievement. All other program activities exceeded attendance and number in Year II. Participant satisfaction, as measured by surveys and exit interviews, was rated at nine out of a possible ten.

There was a measurable difference in positive outcomes between Year I and Year II of the program. Using several measures, a comparison of the two groups indicated a measurable difference in attitudes and behavior in the context of educational and career goals (See Table 1).

Three major themes emerged from the four surveys and the exit interviews. The major themes communicated by participants when discussing the impact of the "Ag Summer Bridge" program: 1) strong desire to make contacts and secure a job (98% of participants), 2) desire to complete a four year education at the university (90% of participants), and 3) desire to pursue a career in an agriculturally related industry (97% of participants).

Table 1. *Outcome comparison between Year I and Year II of Bridging the Gap*

	Year I (n = 13)	Year II (n = 20)
No. of students who transferred from community college to university	1	7
No. of students who choose a major or career in agriculture sciences	1	15
No. of students who made a commitment to serve as outreach rep.	5	20
No. of students who felt that the program had a positive impact	2	20

Conclusions/Future Plans

The "Bridging the Gap" program met or exceeded expectations in all four stated objectives. Project Coordinators addressed the challenges from the first year of the program and made adjustments that resulted in a positive experience for students, industry leaders, staff, and family members. Given the positive results and notable impact the "Bridging the Gap" project has had in its first two years, the project coordinators are exploring possible ways of continuing this program beyond its third and final year by seeking additional funding sources.

Cost

This project was funded by a grant from the United Department of Agriculture's Hispanic Serving Institutions Educational Grants program. The grant provided a total budget of $328,000 for this project.

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Curriculum Aligned to Standards Equals Success

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Curriculum Aligned to Standards Equals Success

Introduction

In recent times officials at the local, state, and national levels have based the educational assessment process on academic standards that promote post-secondary success. These standards serve as the building blocks for an assessment that determines the requirements for promotion of students; therefore teachers must be cognizant of these standards within their classrooms and assessments. An important step toward aligning classroom instruction with such an assessment system would be the alignment of classroom assessments with the standards on which the statewide assessments are based (Wolfe, 2007).

The Arizona Agriculture Teachers Association (AATA) developed Agriscience Standards that are drawn from the Arizona Science Standards and National Agriculture, Food, and Natural Resources Career Clusters. From these standards, the AATA developed the Arizona Agriscience Curriculum. The curriculum is composed of lessons and assessments that are aligned with the Arizona Agriscience Standards. These assessments benefit the Arizona agricultural education profession, because they can be used to measure student achievement of the Arizona Agriscience Standards. In addition, the study benefits Career and Technical Education nationwide by providing a roadmap for developing a curriculum and assessments based on the national, state, or local standards (Bushong, 2007).

Methodology

The AATA Agriscience II Curriculum plan was divided into three stages: collection and organization, development, and distribution. The curriculum project was executed by two teams of committee members composed of agricultural educational professionals. In stage one, the committee collected materials (lessons, PowerPoint presentations, activities, assessments, and any other additional educational resources) from teachers around the state of Arizona. Then, these educational materials were organized into lesson plan formats similar to those of LifeKnowledge and Colorado Agriscience Curriculum.

The creation of the curriculum and reviewing of the curriculum was stage two. The AATA Curriculum Committee and volunteer professionals created the assessment tools during the development of the Agriscience Curriculum in the summer 2006. The curriculum committee was headed by a coordinator and consisted of six Arizona secondary agricultural education instructors. This committee developed the assessments and aligned each assessment with the Arizona Agriscience Standards. The curriculum and assessment tools were appraised by the curriculum review committee to make edits and provide validity. The review committee was also headed by a review coordinator and consisted of six Arizona agricultural education teachers. The review committee checked for spelling and grammar errors as well as appropriate formatting, content errors, constancy between suitability of supplementary materials, and incorporations of multiple learning styles. The enlistment of two separate groups of professionals for creation and review of the curriculum determined the assessments to be valid.

The final stage of the project was pilot testing the curriculum by the curriculum committee to check for possible problems. The assessments, lesson plans, and other instructional materials were complied onto the Agriscience II Curriculum CD-ROM. After modifications were made to the CD-ROM, the curriculum was distributed to Arizona Agriculture Teachers at the 2007 AATA Summer Conference.

Results

The Arizona Agriscience II Curriculum was developed by Arizona Agricultural Education Professionals as an answer to new legislation requiring state assessments to be aligned with state standards. This curriculum includes valid and reliable assessments as well as a variety of learning materials that accompany the assessments tools. These additional learning materials include: lesson plans, power points, activities, handouts, worksheets, quizzes, and other educational resources. The assessments provided a measure of the Arizona Agriscience Standards and students' ability to accomplish these standards. The study will not only serve the state of Arizona Agricultural Education, it will serve as a model for other states and Career and Technical Education Programs nationally. This curriculum demonstrates the capacity of curriculum and assessments to be developed based on national, state, or local standards by state agricultural education professionals.

Future Plans

The curriculum committee is planning to continue with the review and expansion of the curriculum. The association has asked for its professionals to tender any recommendations for the improvement of the curriculum and submission of additional materials that may help to strengthen the content. In addition, research is currently in progress to determine the reliability of assessments within the Arizona Agricultural Teachers' Association Agriscience II Curriculum.

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Enhancing the Rigor and Relevance in Lessons

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Enhancing Rigor and Relevance in Lessons

Introduction

The changing educational climate stressing higher academic achievement for students and instructional lessons that promote academic excellence is a reoccurring theme in educational reforms. In an effort to help pre-service teachers in agricultural education evaluate the potential impact lessons will have on student learning, Oregon State University added critical elements to reflect the current trends of increased accountability in lesson design and implementation.

The existing Oregon State University agricultural education lesson plan format remains the foundation for the lesson. The Rigor and Relevance Framework (figure 1.) has been added to the lesson plan format to support increased expectations of a well planned lesson and creation of lessons which are aligned with state and national standards. The framework allows the teacher to classify the strength of the lesson based on the level of knowledge processing expected from the lesson content and the level of application in the lesson.

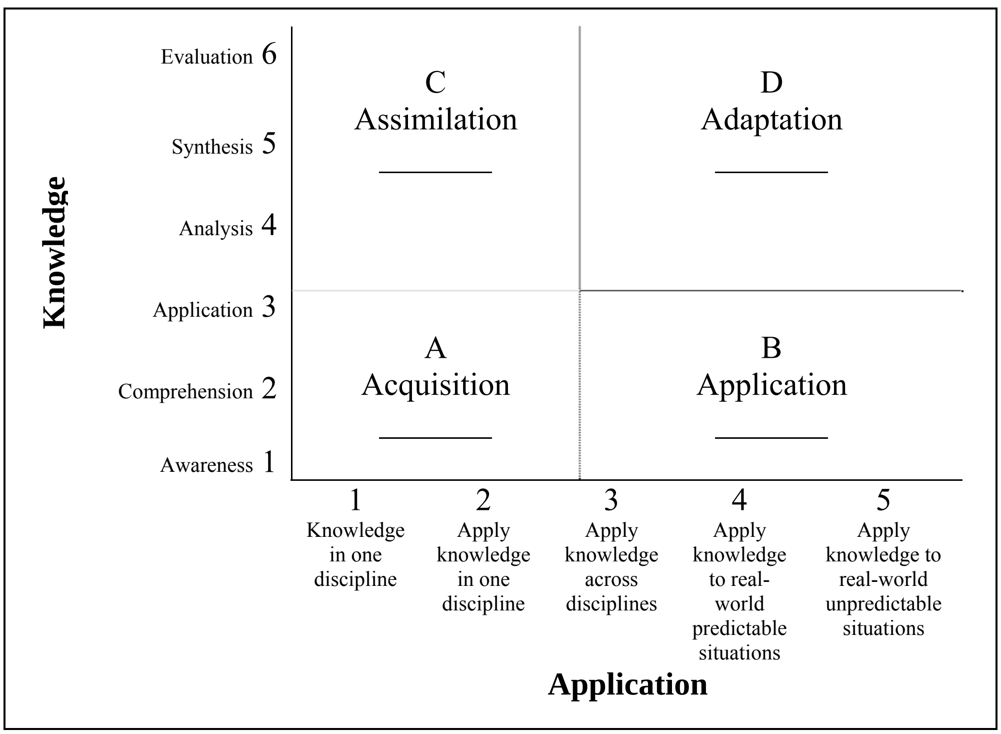

Figure 1. Rigor/Relevance Framework®

How it Works

The Rigor/Relevance Framework® (Daggett, 2005) utilizes Knowledge and Application taxonomies located on separate axis to define quadrants representing levels of student learning. The Knowledge taxonomy representing the y-axis is comprised of Bloom's six levels of thinking or knowledge processing. Bloom's scale has a range beginning at the lowest level associated with awareness of information to the highest level of information processing through evaluation. The application scale defined by Daggett, describes five levels of how knowledge can be situated and used. This scale ranges from the low end of instruction providing a student with abstract knowledge, to an upper level of instruction providing application of knowledge to real-world situations.

The four quadrants of learning or student performance emerge from the relationship between Knowledge and Application scales. These levels are defined in figure 2.

Quadrant C - Assimilation Students extend and refine their acquired knowledge to analyze and solve problems and create solutions.	**Quadrant D – Adaptation** Students have the competence to think in complex ways and to apply their knowledge and skills to unpredictable situations.
Quadrant A - Acquisition Knowledge acquisition based on memorization of facts and figures.	**Quadrant B - Application** Students use acquired knowledge to solve problems, design solutions, and complete work.

Figure 2. Four Quadrants of Learning (International Center for Leadership in Education, 2007)

The lowest level quadrant is Acquisition. This is considered rote memorization or abstract baseline information merely to provide back-grounding for students to build upon. The Application quadrant combines baseline information with problem solving activities. Assimilation and Adaptation both require upper level Bloom's taxonomic classification of Analysis, Synthesis, and Evaluation. Adaptation differs from Assimilation in that instruction expands principles beyond the target discipline or provides real-world situations requiring manipulation of abstract knowledge.

Results

The benefit of Rigor/Relevance Framework assists student teachers with designing lessons to meet the demands essential of academically challenging curriculum. The Rigor/Relevance Framework becomes a tool to assist pre-service teachers in designing individual lessons that combine practical application with student engagement in critical thinking. Such connections help to strengthen student learning outcomes and curriculum accountability.

Pre-service teachers have grown in their understanding of Bloom's taxonomy and how to integrate it into a lesson plan. The Rigor/Relevance scale helps pre-service teachers focus on lessons and student work/activities that require both complex thinking and application of knowledge to real-world situations. Administrators have been impressed with the pre-service teachers' understanding of rigorous lesson plan development and their knowledge of student learning that is associated with the lesson.

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Soil Science Curriculum – Teacher Reference Unit

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Soil Science Curriculum – Teacher Reference Unit

Need for the Idea

Soil science is an integral component in the Agricultural Education curriculum. Agricultural instructors are in need of a user-friendly resource, which challenges students academically and provides real life applications. Along with well prepared lesson plans, activities, and assessments, the soil science curriculum must also integrate science. With the development of the standardized testing, it is essential that agricultural education programs teach their students science concepts and allow the students to apply their new knowledge in real life situations.

Methodology

Before the creation of the teacher reference unit could begin, current soil science curriculum was reviewed. The creation of the curriculum included all the components of a teacher friendly lesson, crosswalks to meet current (State) Department of Education standards, and an Agriscience curriculum with science integration.

Procedures followed in order to complete this project include:

1. **Selection of Topic:** The Soil Science Department wanted to develop a more current soil science curriculum for the (State) agricultural educators.
2. **Selection of Design Team:** The design team consisted of professors from the Soil Water and Environmental Science and Agricultural Education Departments.
3. **Review of Literature:** Available soil science materials were reviewed for their effectiveness within secondary level agricultural education classes.
4. **Creation of Teacher Reference Unit Objectives:** The unit objectives were created based on the content suggested by the design team, the (State) Standards, and the needs of the students.
5. **Development of Teacher Reference Unit (TRU):** Lesson plans were developed for the Soil Science Teacher Reference Unit.
6. **Draft Proposal:** The draft of the soil science teacher reference unit was given to the design team for review.
7. **Review of TRU:** Fellow agricultural educators were given copies of the Soil Science TRU for editing.
8. **Evaluation of TRU Review:** The edits were reviewed; changes were made accordingly.
9. **Approval of TRU:** The design team was given a copy of the revised TRU for approval.
10. **Publishing and Implementation of TRU:** The design team recommended publishing.

Results and Implications

A Soil Science Teacher Reference Unit was created to guide Agricultural Educators in their soil science instruction. The unit contains 18 lesson plans and a final assessment. Each lesson plan includes Agriscience and science standards, objectives, resources, materials needed, key terms, an interest approach, scripting, content, activities, note sheets, applications, lab activities, and quizzes. The Soil Science Teacher Reference Unit benefits agricultural educators by providing them with lesson plans in a familiar format, addressing Agriscience and science standards, and contains the latest technological and scientific advances. The curriculum benefits students by providing them with the opportunity to understand science through agricultural applications.

Future Plans

The Soil Science Teacher Reference Unit will need to be continually reviewed and updated as standards change, advancements in technology occurs, and improvements are revealed.

Costs/Resources Needed

Costs for the project included CD purchases, printing of CD labels, and CD covers. Resources included eight soil science chapters written by three soil science professors at the University of (State), the (State) Agricultural Teacher's Association's (AATA) lesson plans for formatting, the state soil science career development event materials, and E-moments.

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Supervised Agricultural Experience as part of the Premier Educational Delivery System

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Supervised Agricultural Experience as part of the Premier Educational Delivery System

Introduction

The Career and Technical Education Model, the premier educational delivery system, is the preferred technique in agricultural education's combination of classroom learning, hands on application, and real world experiences through supervised agricultural experiences (SAE). Part of the SAE model involves a deeper involvement in the student's achievements outside of the classroom, including getting to know each student's family through SAE visits. SAE visits are known to increase participation and achievement.

The problem is that many overwhelmed agricultural educators are passing over this key aspect of the premier education delivery system. For Career and Technical Education to continue to grow and help students reach their potential this aspect must be emphasized. Administrators often see the outside of the classroom work agricultural educators perform as justification for year round contracts and higher salaries. Therefore, many solutions are being developed to help educators continue taking full advantage of the premier education model for student growth as well as continued higher than average compensation by streamlining the SAE visit process.

Methods

During the 2007 Teacher Turn the Key (TTTK) professional development seminar at the National Association of Agricultural Educators conference top agricultural educators from around the United States were given electronic radio responders. With these responders participants were asked to answer a series of questions related to practices in their program. Data was collected and basic descriptive statistics were run to analyze the data.

Results

Analysis of the data collected during the TTTK workshop showed that 30% of the top agricultural educators with 3-5 years experience from around the country had not done any SAE visits during the first half of the 2007-2008 school year. While another 30% of participants had done 1-5 in the first semester. The remaining 40% had done greater than 5 SAE visits in fall term.

Advice to Others

Experiential learning has been referred to multiple times by various names within the No Child Left Behind (NCLB) legislation. Some call it skill building, adding relevance, developing psychomotor skills, and the classic favorite, hands-on learning. Within our discipline it has been and continues to be Supervised Agricultural Experience (SAE). The main keys to the proper utilization of SAE is the extended student/teacher interaction and teachable moments that occur during the SAE visit. SAE visits, when planned and executed properly, become an educational tool that can enhance both agriscience skills and enrich academic success within all students. The idea is to share amongst ourselves, the strategies that best make SAE visits a reality within agricultural education programs. Following the agricultural education model requires that SAE and SAE visits be a critical piece for future success.

Conclusions

The trend of 60% of the top agricultural educators completing less than 5 SAE visits a year implies a need for greater assistance in using the premier education delivery system. If these numbers continue to grow administrators facing tighter budgets will reconsider year round contracts and even the future of agricultural education programs. Therefore, systems and best practices need to be shared with educators and implemented.

Student involvement is often an excuse for the lack of SAE visits; this can be overcome by simply giving extra credit for students that sign up for early visits. To help manage the time required to complete SAE visits many educators have developed forms and systems that can be shared and tailored to individual needs. Proper record keeping and student will improve the quality and quantity of SAE visits completed by agricultural educators.

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Teach Ag Day: A Teacher Recruitment Effort Targeting Community College Students

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Teach Ag Day: A Teacher Recruitment Effort Targeting Community College Students

Introduction/Need for Innovation or Idea

The need for Agricultural Education teachers is well documented. Kantrovich (2007) reported that nationwide, there were 78 more teaching positions than available teachers in 2006. In response to the recognized shortage of agriculture teachers, the 10x15 – Long Range Goal for Agricultural Education established a priority initiative specific to the recruitment of agricultural educators. This initiative recommends,

> As a result of an annual supply and demand study, develop and implement agricultural education teacher recruitment strategies in grades 9-14. Make agricultural educator pride and participation a key component when identifying prospective future colleagues, advising them, providing growth experiences, connecting them with universities and providing a bridge through the college experience (Team Ag Ed, 2007, Highly Qualified Educator Supply Theme, ¶ 2).

Western State is not immune to the impact of the agriculture teacher shortage. Statewide, three teaching positions were lost due to the lack of available teachers (M. Spiess, personal communication, January 2, 2008). Additional programs were unable to expand as a result of the dearth of qualified agricultural teachers.

In order to attract potential agriculture teachers, recruiting efforts must be made to recruit prospective teachers at various points throughout secondary and post-secondary education. The 109 community colleges and more than 2.5 million community college students in *Western State* provides an excellent pool of potential transfer students at universities across the state (*Western State* Community Colleges System Office, 2007). University Agricultural Education programs have benefited from close collaboration with community colleges. Teach Ag Day was implemented in an effort to provide community college students with additional information about the agricultural teaching profession and the Agricultural Education and Communication Department at *University*.

How it Works/Methodology/Program Phases/Steps

The Teach Ag Day event was chaired by three students in the Agricultural Education and Communication Department with direction from one faculty coordinator and the support of other faculty members in the department. Four months prior to the event, the faculty coordinator sent email invitations to community college academic advisors with details about Teach Ag Day. Several advisors coordinated travel arrangements with interested students at their respective colleges and transported students to campus. Other students attended the event on their own.

Community college students who participated in the event had the chance to hear about the agricultural teaching profession from teachers with a variety of experience – student teachers, novice teachers, and experienced teachers. Students in the Agricultural Education and Communication Department provided their perspectives on the undergraduate and graduate programs. The program manager for *Western State* Agricultural Education and the president of the *Western State* Agricultural Teachers' Association were in attendance and shared a message about teaching opportunities in the state.

Results to Date/Implications

The first Teach Ag Day hosted 52 participants from approximately 10 community college campuses. Based on a brief survey that the participants completed at the conclusion of the event, 32 individuals expressed interest in the prospect of becoming an agriculture teacher and 36 individuals expressed interest in the possibility of transferring to *University*.

Future Plans/Advice to Others

A second Teach Ag Day event is being planned on the *University* campus in February 2008. Students who are interested in obtaining an agriculture teaching credential in *Western State* can select from five different teacher preparation programs – *University, University, University, University, and University*. Due to the regional nature of the state, location is often an important factor that students take into consideration when selecting an institution. As a result, regional recruitment efforts will be helpful in promoting teacher education programs across the state and increasing the pool of prospective agriculture teachers. Efforts will also be made to determine if community college participants have matriculated into any of the five teacher education programs across the state and have entered a teaching career in Agricultural Education.

Additionally, a continuous effort to maintain contacts with the community college participants is extremely important. The email addresses of all the participants were obtained through the event registration. Electronic communication is currently being used to send reminders of important dates, such as application deadlines and provide additional messages about the numerous job opportunities in Agricultural Education. This open communication between faculty members and community college participants generates a positive perspective of the department and promotes a promising future in the teaching profession.

Costs/Resources Needed

Teach Ag Day was accomplished with a limited budget. Transportation and lodging costs were the responsibility of community colleges or individual participants. Guest speakers generously donated their time and were willing to cover any travel costs. Participants received a free lunch and a briefcase at the conclusion of the day.

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The "CASE" for Rigorous and Relevant Curriculum in Agricultural Education

Introduction

The concern regarding low academic achievement among secondary students is widely documented and debated among political leaders in our country. Student academic performance, or lack of, is influencing the role of agricultural education in our public school system (Case, 2006). For agricultural education to survive in a climate of unprecedented accountability, a new direction is solely needed to assure higher levels of achievement by secondary agricultural education students.

In October of 2005, the National Council for Agricultural Education (NCAE) initiated a new vision for the future of agricultural education in the United States (Osborne, 2007, June). The "10x15 Long Range Goal for Agricultural Education" on the surface appears to be an aggressive, goal to increase the number of agricultural education programs in the country to 10,000 by the year 2015. However, 10x15 stresses our long term goal is to develop 10,000 <u>quality</u> programs. To facilitate the development of quality programs, the NCAE identified eight initiatives defining the National Program Standards for Agricultural Education (National FFA Organization, 2008). The third initiative calls for the creation of a curriculum model to establish a sequence of agricultural education courses to enhance the delivery of agricultural education.

The Curriculum for Agricultural Science Education (CASE) project was established to provide a structured sequence of courses, but CASE also serves as a model for elevating the level of rigor and relevance expected for the new vision of agricultural education. Rigor of CASE is validated by the alignment of lessons with national standards for agriculture, science, math, and English.

For connection of relevance with student learners, the CASE curriculum highlights the strengths of experiential learning, the heart and soul of agricultural education, by utilizing activity-, project-, and problem-based instructional strategies. To provide the technical guidance in curriculum development using this approach, the NCAE sought out a partnership with Project Lead the Way® (PLTW). A nationally recognized curriculum development organization, PLTW has successfully designed and implemented courses based on the rigor and relevance philosophy.

Project Attributes and Development Phases

CASE courses provide the teacher a comprehensive package of all teaching resources required to instruct lessons. Each lesson plan contains teacher notes, PowerPoints, activity instructions, and assessments. Lessons are designed to provide everything the teacher needs at a click of the mouse. The philosophy behind a CASE lesson is to empower the student by providing students an active role in their learning rather than learning being a product of teacher led instruction.

Another major innovation CASE has adopted is the intensive professional development component. In order for teachers to access CASE lessons, they must complete a mandatory professional development session to fully understand how to effectively use CASE lessons. This model for professional development has been adopted from PLTW, and has been proven to ensure the quality of instruction for which the curriculum was design to promote.

The first two courses in development are foundation courses for Animal Systems and Plant Systems. In order to establish content objectives for the composition of the courses, a team was assembled to brainstorm important concepts related to animal and plant science. Each team, called a "kernel" team, was composed of 30 individuals representing 12 states across the country. These people included a majority of practicing agricultural educators from the secondary level, but also included members from agricultural business, industry and post-secondary education.

The kernel team members provided the important concepts and themes required for the course development. In addition, team members wrote lesson ideas and provided curriculum directors some of the teacher's best teaching strategies for the related concepts. From those initial "kernels" representing lesson ideas the complete year-long course is designed.

Once the course is written, pilot testing is completed to ensure lesson components are valid in their design and content. Pilot testing is followed by professional development for kernel teachers who will conduct field testing. Field testing is the ultimate face and content validity check for a CASE course. This step will provide necessary information for changes required for ensuring the goals of the project are being fulfilled prior to full course implementation.

Once the curriculum packages are available, further assessments are designed to evaluate the effectiveness of the lessons. The evaluation step is an on-going process to provide the necessary feedback to keep CASE curriculum current. All CASE courses will be continuously revised to ensure the level of rigor and relevance is in pace with changes in technology and science.

Future of the Project

The CASE project will have a total of seven courses developed as part of the sequence for agricultural education. Besides foundation courses in animal and plant systems, CASE will be developing these following courses over the next six years:

- Animal and Plant Biotechnology
- Bio Systems Engineering and Technology
- Food Science and Safety
- Natural Resources Environmental Sciences
- Agricultural Sciences Research and Development (Capstone course)

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The Arizona Agriscience Program Review

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The Arizona Agriscience Program Review

Need for the Idea

The Arizona Agriscience Program Review is a set of guidelines that is utilized, through a review process, to ensure the existence of quality agriscience programs within Arizona for secondary level students interested in agriculture. The review process is designed to be community based and combines the expertise of community members, industry leaders, educators (including Agricultural Education Instructors, counselors or general education instructors, administrators and support service personnel), and state staff from the State Department of Education.

Methodology

The actual review process includes a comprehensive review of the agriscience program, by the community based evaluation committee, along with the development of an action plan based upon the findings/recommendations of the evaluation committee.

Specific review objectives within the review guide include:

- Providing information to local personnel for redirection of the program to meet the present and future needs of agriscience students.
- Serve as a model for reviewing all existing programs and a guide for new or expanding programs.
- Review the six major program components categorized as:
  - Community
  - Instructional Program
  - Instructional Staff
  - Facility
  - Accountability
  - Finance
- Provide direction for program enhancement.
- Provide direction for financial support.

Results

The results for the agriscience program review have directly benefited the programs within the state along with the students enrolled in the agriscience programs. The program was started in the spring of 2005 and since then a total of 63 programs have initiated the review process and of those eight programs have completed the entire process. Benefits realized while undergoing the process include: the development of a long range programmatic plan, increases in extended contracts, department vehicles and program continuity through administrative and instructional changes.

Future Plans

The action plan developed as the product of the review process will serve as the basis upon which future program evaluations will be based. The action plan and the steps taken to meet the items addressed within the action plan will serve as a baseline for future program assessment, improvement and ultimately program funding from various sources within the state's government.

Conclusion

Since its inception in 2005, the Arizona Agriscience Program Review has successfully established a standard upon which programs can be measured. The community based evaluation committee has enriched community ties to the local programs and has taken programs in Arizona back to their roots as a community based experiential learning program. The program review process is aiding in program planning and longevity and to this point has been a catalyst for the improvement of agriscience in Arizona.

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THE COMMON TEACHING UNIT: IMPROVING AGRICULTURAL TECHNOLOGY MANAGEMENT LABORATORY INSTRUCTION DURING STUDENT TEACHER PRESERVICE TRAINING

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THE COMMON TEACHING UNIT: IMPROVING AGRICULTURAL TECHNOLOGY MANAGEMENT LABORATORY INSTRUCTION DURING STUDENT-TEACHER PRESERVICE TRAINING

INTRODUCTION/NEED FOR INNOVATION OR IDEA

A challenge of preparing student-teachers to be successful instructors in the agricultural technology management laboratory is determining what instructional units student teachers need to prepare and deliver during their student teaching field experience. Johnson and Schumacher (1989) report that teacher educators need to provide prospective teachers with experiences to develop and enhance secondary agriculture mechanics laboratories. This leads to the challenge of providing student-teachers with the experience of creating an instructional unit composed of lesson plans that combine both informational lessons, operational lessons, job operation sheets (JOS), (McCormick, 1994) and provide the student-teacher with the opportunity to present effective hands-on demonstrations to their students.

How can university faculty teach the concept of curriculum development and effective demonstrations when each student-teacher has a different and unique curriculum need? A solution is the assignment of a common instructional unit for all student-teachers. The common unit must provide the student-teacher with experience in developing both informational and operational lesson plans, as well as the opportunity to experience and teach hands-on demonstrations. The common unit allows the university faculty to plan hands-on activities and lessons that are relevant to all student-teachers. As each student-teacher would be teaching the same concepts, the idea was conceived of having student-teachers work cooperatively to create one instructional unit which could be used by all student-teachers at their respective centers.

HOW IT WORKS/METHODOLOGY/STEPS

As a condition of serving as a cooperating center for hosting a student-teacher, each cooperating master teacher agrees that one of the instructional units their student-teacher will deliver during their 13-week field experience is a "common operational unit" selected by the faculty of the University of [State]. A characteristic of the common instructional unit is its application to a wide variety of high school agricultural education programs. The unit must have applications to urban as well as rural programs and ideally, cross several curriculum areas (i.e. Animal science, plant science, etc), and must have utility. The supplies must be readily available, and equipment costs needed to be reasonable.

The faculty at [University] selected a plumbing unit as the common instructional unit. Plumbing is a content area found to be offered by a majority of agricultural mechanics preparation programs (Burris, Robinson, & Terry, 2005). The plumbing unit will include several hands-on demonstrations, and culminate with the construction of a simple sprinkler project that combines several assembly skills. A sprinkler project has utility and value. Students can test their agricultural technology management skills in several areas including material identification, measuring, cutting, assembly preparation, flux application, propane soldering, priming, gluing, threading, etc. The unit could be taught with an emphasis in animal science, plant science, home improvement, or agricultural technology management. Student teachers were encouraged to take digital pictures of the step-by-step process of their sprinkler assembly. Photos are used for completion of their Job Operation Sheets (JOS), and to create powerpoint© presentations on tool and material identification. The use of digital photos over sketch drawings enhances the JOS, and creates a visually-appealing teaching tool for student use.

RESULTS TO DATE/IMPLICATION

The Department of Agricultural Education at the University of [State] has a prescribed method for student-teachers to develop their instructional units. The goal is to develop instructional units which will help student-teachers become effective classroom educators. Within each instructional unit is (1) a list of objectives (2) informational lesson plans, (3) bellwork activities, (4) operational lessons, (5) job operation sheets (6) rubrics, (7) unit assessments with keys. Additional items include powerpoints, and student skill sheets. The unit is collected, evaluated, and revised so it may be placed on a CD for easy use by educators.

FUTURE PLANS/ADVICE TO OTHERS

For teacher-educators charged with training secondary teachers to teach in agricultural systems technology management, the adoption and use of a common instructional unit serves as a successful method to teach specific instructional competencies. Student-teachers learn to work together to create curriculum units, learn to plan and conduct effective three-step demonstrations, produce individual JOS for skill activities, and adopt assessment rubrics to successfully evaluate student achievement. The use of the common instructional unit permits the university faculty to plan for a teaching experience that applies to all student teachers working in both the rural and urban agricultural education classroom. As an assignment, have the student-teachers “test drive” the unit at their respective school sites and report the results. Data from student tests could be collected to determine reliability of the exam.

COSTS/RESOURCES REQUIRED

Costs will be dependant upon the number of student-teachers and the type of material used. Our estimated cost/per student to produce a sprinkler is approximately $4.00. Variables to consider are kinds and number of tools available in the laboratory (such as propane torches, flux, brushes, solder, pvc primer & cement, and cutting & threading tools) for copper pipe, pvc, and steel pipe.

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Poster Abstracts

Research

An Exploratory Analysis of the Growing Ruralpolitan Population

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An Exploratory Analysis of the Growing Ruralpolitan Population

An outmigration from urban centers is occurring in this country as people are moving from to rural locations seeking a lifestyle that is characterized by a desire for more space and "peace & quiet." This group of rural residents, often referred to as ruralpolitans, "represents a relatively new area of study that researchers are just now examining the needs, wants, behaviors, and attitudes of this population segment" (Doerfert, Carr, Burris, Baker, 2007, p. 3). This study examined sought to describe these ruralpolitan residents with the intention that agricultural marketers will be better able to address their needs.

Conceptual Framework

Kim (1983) reported that since the early 1950s, the farm-to-city movement in the United States has grown continuously creating a heavy concentration of population and urban-based industries in most urbanized areas. Kim (1983) also speculated that a portion of this new migration stream is composed of individuals for whom employment is not a particularly compelling force, but who hope to achieve a higher quality of life in a rural area such as environmental and site characteristics or amenities. Rudzitis (1999) found "more people are moving to rural areas for reasons that have nothing to do with employment" (p.9). McGranahan and Sullivan (2005) believed that young adults with children or older adults will not flock to rural areas for higher income. Instead, they seek a higher quality of life which encompasses schools, community life, pleasant landscapes, and opportunities for outdoor recreation, all of which will contribute to the economic vitality of the area.

Methodology

This was an exploratory correlational study designed to describe ruralpolitan residents in West Texas. Three contiguous West Texas counties were chosen with ruralpolitan residents residing on five to 100 acres of land identified as the target population. A researcher-designed questionnaire was mailed to 464 residents selected through a stratified random sampling method to ensure that the proportion of the ruralpolitan residents within the three counties were sufficiently represented. A Likert-type scale (1 = not important, 5 = critical) was used with 22 rural amenity statements to determine which were perceived as important to the residents overall quality of life. One hundred fifty-one usable responses were received (32.5% response rate).

Results

An exploratory factor analysis was used to determine which factors or components among 22 amenity statements were regarded by ruralpolitans as important to their overall quality of life. The factor analysis identified four factors from the 22 statements, which helped the researcher identify subgroups within the sample data. The determinant was also selected in this matrix. This option was vital for testing for multicollinearity or singularity. The determinant value in this research was 3.78E-005 (which is 0.0000378), which is greater than necessary value of 0.00001. Therefore, multicollinearity was not a problem for this data. As a result, there was no need for the researcher to delete any statements. A rotation was performed to improve interpretability and maximize the loading of each variable on one of the extracted factors while minimizing the loading on all other factors (Field, 2002). The following results were determined by the factor analysis and represent the reasonably distinct factors of the lifestyle characteristics collected. The statements represented in the table below signify the dominating aspects ruralpolitans seek as related to the four factors: physical health, mental health, education, and outdoors. The numbers indicate the highest importance, desired by the ruralpolitans, within those stated factors.

Factor Analysis of Lifestyle Characteristics

Statement	Physical Health	Mental Health	Education	Outdoors
Rapid response by fire and rescue	.807			
Rapid response by police	.758			
Nearby access to medical services	.703			
Space (I don't feel crowded)		.815		
Slower pace		.797		
School is near to my home			.806	
High quality schools			.771	
Good quality of drinking water				.750
Clean air				.676

Implications

The results of the factor analysis indicate that there are potentially four distinct segments with the ruralpolitan population. While additional research is recommended to confirm these findings, the factors represent unique segment which may also require different education and communication methods to address identified needs effectively.

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Best Methods for Determining Web Site Usability

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Best Methods for Determining Web Site Usability

Introduction/Need for Research

In today's society more and more people are looking to the internet as a primary source of information. According to Madden (2006) approximately 147 million American adults use the Internet. In response to this phenomena most companies, interest groups, organizations, and businesses have created Web sites that serve as easily accessible information hubs for their prospective audiences. Web sites, when fashioned correctly, can be a great aid in effectively delivering the intended message. On the other hand, when they are poorly designed, they can do more harm than good. Nielsen (2000) points out that a user will not return to a poorly designed site. Usability testing and evaluating a Web site after creation will prove to be beneficial for many designers because it helps to determine how well the site is serving its intended purpose. The purpose of this research is to describe the different types of usability tests employed in studies and discuss which practice is the most successful.

Conceptual Framework

The idea of performing a usability test after creating a Web site is a step that is often overlooked. In reality it is one of the most important things to consider when developing a site. The techniques used to determine usability can include anything from task analysis, online surveys, focus groups, one-on-one usability testing, as well as individual, contextual and heuristic evaluations (U.S. Department of Health and Human Services, n.d.). Figure 1 explains the test and refine step of the usability guide starting with learning about different types of evaluation and concluding with implementation of the results found.

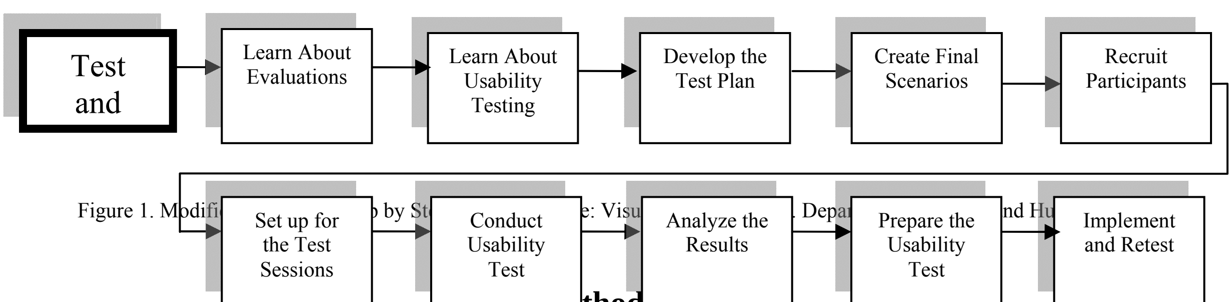

Figure 1. M[o]difi... by St... e: Visu... Depa... nd Hu...

Methodology

A literature review of research on several different usability methods including their strengths and weaknesses in certain contexts was conducted. Cooper (2007) and Yates (2007), unpublished research papers obtained from within the department of agricultural education and communications at Texas Tech University, both presented different types of online surveys used for their studies. An ERIC database search, using key words: Web site usability, was also conducted and rendered Goldman & Bendoly's (2003) and Markar's (2003) studies. Their research focused on the use of heuristic evaluation and focus groups, respectively. This review was used to establish a guide for usability testing for Web sites.

Results/Findings

Research has shown that a mixed methods approach is the best way to determine usability. The ideal approach would be qualitative and quantitative and include expert and user focused components (Goldman & Bendoly, 2003). The fact is there most often isn't enough time or money to conduct an all inclusive study. Therefore, when time is limited the best method would be an individual (one-on-one discussions with a user), contextual (observing users in their natural environment) or heuristic (inspection against a set of guidelines done by experts) evaluation. With limited funds one could consider online surveys (questionnaire or including a task analysis portion) and focus groups. Cooper (2007) used a task analysis element in her study which asked for participants to look at a specific portion of a site before returning to the survey. The Yates (2007) study simply provided a link to the Web site to be tested which the participants looked at prior to completing an online survey.

Conclusion

There are many different options when it comes to conducting usability tests. Depending on the sites intended audience, availability of funds, the type of site being tested, time constraints, as well as many other variables, the method of testing a site will change. A designer who prefers to have an expert's opinion on their site would conduct a heuristic evaluation. On the other hand, to collect information from a customer's standpoint a survey or focus group would better serve the purpose.

Implications/recommendations/impact on profession

The decision to conduct usability testing in some form is one that can hardly be overlooked. If the user of a Web site cannot figure out how to navigate throughout a page within a minute or so they will decide that it is not worth their time and leave the site (Nielson 2000). Therefore the impact Web site usability has on the success of a site is vast. Any group that develops a Web page should consider the different types of usability testing, determine what kind is best for them specifically, carry out a usability test and refine their site accordingly. It is recommended that a more in-depth research study be conducted in this area. By testing one Web site using several different methods, one could determine which delivers the most constructive results. This study could be done for different types of Web sites, as certain types would use different methods. This type of study would offer a better recommendation to Web developers who wish to test their site.

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COLLEGE ASPIRATIONS OF MONTANA 4-H YOUTH

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College Aspirations of Montana 4-H Youth

Introduction and Theoretical Framework

4-H has a history of striving to improve the lives of youth by developing leadership life skills and providing the support needed to allow youth to succeed. Leadership life skills were categorized in the 4-H program into seven categories: decision making, relationships, learning, management, understanding self, group processes and communications. (Bruce, Herring & Briers, 2004) By helping youth gain skills and confidence, they will aspire to become competent, contributing adults after high school. This may include attending a university, completing a technology school or joining the military.

The majority of youth in the Montana 4-H program come from rural areas. Studies done on the aspirations of rural youth have found that the rural experience can be very rewarding (Howley, 2005) and almost all of rural students aspire to continue their education after high school (Bajema, Miller & Williams, 2002). However, students in rural communities felt that financial resources were the largest barrier to attaining a post-secondary education. (Ferry, 2006)

The objective of this study was to determine the post-secondary aspirations of Montana 4-H members and the factors influencing or predicting theses aspirations. The study also analyzed the youth's perception of their school and community.

Methodology

Youth selected for the study were those attending Montana 4-H Congress, a summer teen conference, during 2007. Participants in Montana 4-H Congress represent youth from all across the state. A total of 265 youth were surveyed for a response rate of 66.8% of participants.

The survey instrument was modeled after a study done by Bajema, et al. (2002) and consisted of 27 questions. The first section included questions about the youth's plans following high school. The second section included demographic questions. The third section inquired about the youth's perception of their community and where they see themselves in the future. The final section included questions on academic, family and community background of the youth.

Findings

The survey respondents were 63.8% female and 36.2% male. Ethnicity revealed 93.3% white, 2.76% Native American, 1.97% other, 1.57% Hispanic and less than a whole percent were Asian, Pacific Islander or African-American. The mean age was 16 and the average grade level respondents were entering the following fall was grade 11. The average number of siblings was 2.08, and respondents were split relating to birth order; 35.7% indicated they were the eldest, 35.0% were the youngest, 24.3% were a middle child and 4.9% were an only child. Sixty-one percent lived on a farm or ranch of more than 5 acres and 20% in a house in town.

When queried about education plans after high school, 69.7% indicated they planned to attend a 4 year college or university; only 1.2% indicated they did not plan any additional education. On a scale of 1 (unlikely) to 7 (certainly), the respondents mean was 6.07 showing that youth showed a strong predilection for attending college.

Forty-nine percent felt their community was a good place to live and 38.7% thought is was a great place to live. When asked about their high school education 40.6% thought is was good in academic quality and 34.6% thought it was great. Over 35% thought they would be living over 200 miles away from their current location by age 30, and 34.4% thought they would be living within 75 miles at the same age.

TABLE 1: Frequency of Responses Related to Background and Education.

	YES	NO
I am the son or daughter of a farmer or rancher	65.9%	34.1%
One or more of my grandparents were farmers or ranchers	84.9%	15.1%
I have taken agriculture courses in school in high school	48.6%	51.4%
I have taken a technical drawing or shop class in high school	66.2%	33.8%
I have taken chemistry or physics or both	54.1%	45.9%
I have taken calculus or geometry or trigonometry	73.3%	23.7%
I have taken one or more foreign language classes.	69.8%	30.2%
I participated in a drama production or an academic team competition	64.7%	35.3%
I have been an officer in a school, church, or community group	89.5%	10.5%
I have been in choir or band in school, church, or community	81.8%	18.2%
I have been on a sports team at school, church, or community	89.5%	10.5%
I have been on a school sponsored trip over 100 miles from my home	81.0%	19.0%
I drive to school (or car pool) most of the time	77.2%	22.8%

Implications

The study revealed that Montana 4-H youth had strong future college aspirations; 95.4% planned to pursue some type of post secondary education. The findings provide 4-H youth educators a tool for creating more effective youth programs. This study also can be used as a tool for college and university faculty and staff to actively recruit 4-H youth.

There were no statistically significant correlations to show factors influencing or predicting future aspirations of youth. There were weak and moderate correlations found that may indicate predictors. These should be investigated further to ensure state and county 4-H professionals are meeting the need of their clients.

Research should be done to directly compare 4-H youth with non-4-H youth. It would also be beneficial to repeat this survey longitudinally to monitor aspiration changes with program or population changes.

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FFA Diversity – Establishing Benchmarks and Tracking Developing Trends

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FFA Diversity – Establishing Benchmarks and Tracking Developing Trends

Introduction

California's agricultural programs serve over 65,000 students and are arguably the most active of the career and technical education programs in the state. The state's political leadership has repeatedly expressed concern that the state's public schools are not addressing the non-white population, most notably the Hispanic population. In this political environment it is important to know and understand the diversity of FFA programs. Statistics are plentiful but rarely meaningful in understanding the actual diversity of FFA programs. California is a very diverse state with large geographic population variations. For example, Los Angeles County is 49% White while Sierra County is 94% White as reported by the 2000 Census. This study develops meaningful statistics that can be used as benchmarks for future studies. Short-term trend analysis was developed to track changes in program diversity.

Conceptual Framework

Much has been discussed about FFA diversity. Croom and Flowers (2001) determined that in North Carolina a sense of belonging was a motivating factor in joining FFA and that gender and ethnicity were not factors in FFA participation. Given this finding the expectation would be that FFA would reflect the school diversity. Statistics are available from many sources but typically all schools are lumped together. A typical example reports Hispanics as comprising some percentage of the student population (Frey, 2005, and Snyder, 2006) in the state. However this masks the true diversity in the state which has large variations between schools. By many states' measures California FFA is very diverse with Whites comprising only 46% of FFA in 2005, however in the schools in which these programs reside Whites comprise only 41% of the population.

Methodology

Data for this study was extracted from the on-line data reporting system developed by the author to capture FFA roster and agricultural program data (R-2, 2007). This system has been used to collect program data since 2000 and FFA roster data since 2002. Additional school data was extracted from the California Department of Education CBEDS system from the School Information Form (SIF) (CBEDS, 2007). All data is self-reported by the agriculture program or school district. Agriculture program and student data was extracted from a SQL database into MS-Access. CBEDS data was downloaded from the CBEDS website and imported into MS-Access. Data sets were combined and processed for analysis in MS-Access then extracted for analysis in MS-Excel and SPSS (version 15.0). Available data was examined from 2001-2002 through 2007-2008 school years, but not all data is available for all years. To make meaningful comparisons of agriculture program diversity to the populations they serve, metrics were developed for each school with an agriculture program. The approximately 330 agriculture programs were then compared to their schools. The actual number of schools with agriculture programs compared varies by year.

Results Summary

Both student gender and ethnicity were examined. Ethnicity analysis concentrated on White and Hispanic populations since these typically account for 80% or more of the students. Analysis of gender showed that school populations were almost evenly split (49% female). Analysis of agriculture programs shows that females made up only 42% of this group. Most of this difference can be explained by programmatic gender imbalance. For example only 10% of the agricultural mechanics students were female while 73% of the ornamental horticulture (O.H.) students were female. However agricultural mechanics students and O.H, students made up 27% and 9% respectively of the total FFA members. Diversity trends were examined for the period 2002-2007. During this period grades 9-12 agriculture programs grew from 54,974 to 63,938 a 16% increase in students. During this same time agricultural mechanics students grew by 32%, however agriculture program gender was not found to be significantly different for this period (41.81% to 42.76% female). Most of this lack of overall change can be attributed to a 3% increase of female students in agriscience programs.

The ethnicity of students during this period changed for high school and for agriculture programs. From 2001 to 2006 White student populations shrank from 44% of the school population (with agriculture programs) to 38%, and Hispanics increased from 41% to 47% during the same period. During this same period White agriculture students decreased from 59% to 48% and Hispanic agriculture students increased from 34% to 43%. Only 3% of the states agricultural programs have Hispanic representation more than 10% higher than the school population, while 22% have Hispanic representation 10% lower than their school population. The remaining 75% of the agriculture programs have Hispanic representation within 10% of the population the programs serve. Significant differences in ethnicity were also seen between programs/career paths. For example O.H. programs averaged 53% Hispanic students and Animal Science only 32% Hispanic students in 2005-2006.

Conclusions/Implications

Conventional wisdom would suggest that FFA is more gender balanced or even more female, but the data reveals this is not the case. This perception is likely caused by the more active participation by female students in FFA leadership activities. Programmatic gender differences are not surprising for agricultural mechanics and O.H. programs. Ethnic differences are harder to explain. The vast majority of programs in California are within 10% of the same ethnic mix as the schools they serve. A few agriculture programs are very successful in attracting Hispanic students while others are attracting few Hispanics. An analysis of the programs on both ends of the spectrum is needed to determine the causes. Overall the Hispanic growth rate in agriculture programs is exceeding their school by over 40%. This suggests that in time parity will be reached.

Luft (1996) recommended that agricultural educators spend more time recruiting minority students. Given the ethnicity differences in programs (e.g. O.H) developing key programs that are attracting non-white students would affect program diversity. Likewise Bowen (2002) recommends a pro-active approach. These are certainly part of the solution. Another important aspect that requires additional research is the opportunity minority students have to take classes in agriculture. Anecdotal evidence suggests that increased emphasis on testing including the state high school exit exam may be limiting underperforming student’s ability to enroll in agriculture classes. Hispanic students have a higher percentage of English Language Learners (ELL) which may be “tracked” differently. This has been offset somewhat by the increase in courses such as Ag Biology which is taught for science credit. While the statistics are indicators of diversity they do not tell a complete story. Additional research needs to be done to isolate factors contributing to the lack of parity.

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Media and Information Channel Preferences of College Freshmen in Agricultural Sciences and Natural Resources

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Media and Information Channel Preferences of College Freshmen in Agricultural Sciences and Natural Resources

Introduction

According to the Spectator News (2005), college students' buying power has reached billions, and advertisers are now searching for ways to connect to the high-spending age group. Be it through television, magazines, billboards, radio, or Internet, advertisements targeting college students are everywhere. College students use different forms of media every day, but because they use such a variety of media, they can be a difficult audience to reach. However, college students are an audience worth reaching with almost $200 billion in spending power each year (Spectator News, 2005).

The purpose of this study was to assess current media preferences of college freshmen enrolled in agricultural sciences and/or natural resource classes to more effectively target this market.

Methodology

The survey population was first year agricultural science and natural resources students at a Texas university. The population at the time of the study was 236 students.

An Internet survey was used and followed a modified version of Dillman's Tailored Designed Method (2000). Zoomerang.com, an online survey administrator, hosted the instrument. A pilot test was administered to help minimize instrumentation error by determining if questions were easy to understand. Non-freshman undergraduate and graduate agricultural students who were not part of the sample participated in the pilot test; 35 surveys were e-mailed to the pilot test group, and 25 students completed the test. Adjustments to enhance the clarity of questions were made based on feedback from the pilot subjects.

Survey links were then e-mailed to all the freshman agricultural sciences and natural resources students. Students' names and university e-mail addresses were obtained through the agricultural sciences and natural resources dean's office. Generalizations will not be made to populations outside the studied population; however, assumptions can be made that these students can identify with other college students on preferred media.

Findings

The response rate for this survey was 34% ($n = 81$). The researchers found students prefer the Internet for information, yet results show that they are also a television-savvy audience. Students were asked about their viewing habits of 10 television networks: ABC, CBS, NBC, FOX, CW, CMT, ESPN, MTV, TBS, and VH-1. They reported a minimum weekly viewing of all but one network (VH1). ABC and FOX were the preferred networks; however, CBS showed some very loyal viewers.

Respondents read the newspaper more than expected, with 43% reading weekly and nearly 20% reading daily. The most convincing media data came from students' listening patterns. More than 50% of survey respondents said they listen to country music radio daily. Sports radio was not as popular with the sample, with 50% saying they rarely listen.

Students were given the opportunity, in a fill-in-the-blank format, to list other television networks that were not mentioned in the survey. Students named 24 different networks. Comedy Central, FX, and TNT were the most frequently mentioned followed by Discovery, HBO, and Disney. The other named networks only had one or two mentions.

Respondents were also asked to name any magazines they frequently read; 22 students reported a total of 27 different magazines. Cosmopolitan had the most readers (13) followed by Sports Illustrated (7), and Seventeen (4).

Internet was the preferred medium for information. Students could list any favorite Web sites; 37 students listed 22 Web sites, with www.facebook.com being the overwhelming majority with 23 listings. MySpace was next in popularity with 12 respondents followed by Google (6), and Yahoo! (5).

Conclusions

Based on the data, we can assume that advertisements on Facebook and MySpace would efficiently reach these college students. Country radio stations and the ABC, FOX, and CBS television networks are also very effective mediums to reach the target audience.

Implications/ Future Plans

The findings show that college students have diverse preferences for media. It is necessary to further examine student media preferences. An additional study is needed with specific questions to determine exactly which television programs and networks are the most popular among college students and which time of day students listen to radio. Future research should also study the types of Internet advertisements that attract college students. A broader sample of college students should be used in future research.

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Solving the Communication Puzzle between Consumers and the Beef Industry: Understanding Consumer Motivation when Purchasing Retail Beef

Poster Abstract

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Solving the Communication Puzzle between Consumers and the Beef Industry:
Understanding Consumer Motivation when Purchasing Retail Beef

Introduction

For decades the beef industry has been faced with the challenge of demand decline. The beef industry not being able to meet the consumer's need has made the challenge one that cannot be ignored. The lack of marketers being able to respond to the dynamic market place is shown by the decrease in consumption (Felderhoff, 2007). It is evident that beef producers need to better understand consumer needs and attitudes toward purchasing retail beef. Producers cannot ignore the need for a sustainable marketing system to be implemented into the industry. The purpose of this study is to develop a better understanding of the factors that influence consumers when purchasing retail beef. The following are objectives that were established to serve as the foundation for the study:

1) Indentify the American beef consumer's reasons for consuming beef.
2) Determine the meat characteristics that consumers look for when making beef purchasing decisions.

Conceptual Framework

The reasoned action theory created by Ajzen & Fishbein (1980) suggests that an individual's behavior is influenced by their intention to execute the behavior. This intention is comprised of three aspects: their attitude toward the behavior, their subjective norms (their beliefs of how people they are close to view the behavior at task), and their perceived behavioral control (Ajzen and Fishbein, 1980). A researcher identified attitude toward the behavior of purchasing beef to include: the individual's time allotted for preparing a meal, their confidence in their ability to cook a piece of meat, and their own tastes and preferences of a particular protein source. The researcher recognized the following as subjective norms: would others believe the beef is safe to consume, offer a nutritious benefit, and would provide an enjoyable eating experience. Finally, the researcher noted that the perceived behavior control would be the consumer's ability to abstain from purchase if the price was not affordable.

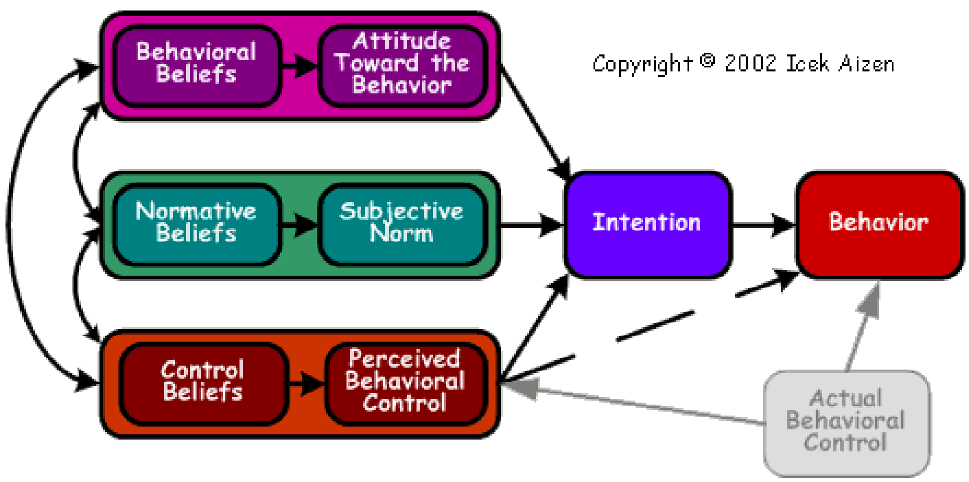

Figure 1: Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes,* 50, p. 179-211.

Methodology

This study was a literature review to assemble the findings of previous consumer studies. These collaborated results will serve a foundational knowledge base for further consumer studies. The means of conducting the literature review consisted of searching key words through the Google Scholar Web site. A search for keywords such as consumer tastes and preferences, retail beef, and attitudes was completed and the results yielded 12 articles useful for the literature review.

Findings

Recent research has found several factors that influence consumer's decisions when purchasing retail beef. The consumer research trend for determining the factors that motivate consumers include tenderness, flavor, and juiciness of the cooked product (Reicks, 2007), price, region of origin (Mennecke et al., 2007), nutritional value, and ease of preparation. With the research found, the researcher believes there is a factor being over looked, that could better indentify the need of the consumer, and this factor could include: gender, income, or other demographics.

Conclusions

From the information and knowledge gained from the completion of this study, there is no denying the fact that more consumer research needs to be done. The consumer is vastly changing and unpredictable. The knowledge gained each time research is performed on consumers, the closer research is to indentifying the need of the consumer.

Recommendations

It is suggested that there needs to more studies done in order to obtain more accurate data. Researchers should construct another nationwide survey to distribute to beef consumers. I purpose a study should be done that divides the nation into three regions: West, Central, and East. A convenience population should be taken from multiple major cities in each of these regions. This will allow for a broader population, instead of one that comes from a concentrated area of the United States. While this will continue to be a convenience sample, it will broaden the area from which the population is sampled creating the opportunity for more diversity among participants. Any information that can be obtained about the consumer will help marketers understand beef consumer's motivation for purchasing beef.

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Teacher Perceptions of California Agricultural Mechanics Teacher Preparation

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Teacher Perceptions of California Agricultural Mechanics Teacher Preparation

Introduction

Teacher preparation for agricultural mechanics instruction is an increasing concern in California. Of the states 670 agricultural teachers 39% teach at least one course in this area. FFA student numbers have grown by 17% over the last 8 years while at the same time agricultural mechanics students have increased by 37% (California Department of Education, 2007). Since 1990 agricultural mechanics course offerings at the university level have been noticeably reduced. Of the five universities offering agricultural credentials only two offer more than the basic coursework in agricultural mechanics. Teachers and state staff have expressed concerns as to preparation of teachers in agricultural mechanics instruction. The objectives of this study were to determine 1) how well teachers felt prepared to teach in specific areas of agricultural mechanics, 2) if there were differences in gender, 3) if there were differences in outside experience between the specific areas, and 4) if teachers had experiences outside their college preparation and in what areas as well as where did they gain their experience.

Conceptual Framework

Burris, et.al. (2005) found that "the need exists to structure teacher education programs to more adequately prepare graduates in agriculture mechanics." These findings coincided with McLean and Camp (2000), who concluded that "Increasing credit requirements in other areas and limited availability of courses may force agricultural education programs to develop creative and innovative solutions to ensure that program graduates, as well as practicing teachers, are given the opportunity to develop technical competencies in the field of agricultural mechanics. To meet this charge, institutions will have to look beyond traditional outlets for preparation.". On average 43.3 credits in technical agricultural training are required by U.S. universities with an average of 9.1 credits dedicated to agriculture mechanics (Connors and Mundt, 2001). In California the minimum requirement at CSU Fresno, Cal Poly San Luis Obispo and CSU Chico are 9, 5 (qtr.), and 9 credits respectively for credential candidates.

Methodology

A survey instrument was developed using the nine areas established by Burris, et.al. (2005) of electrical, metal fabrication, tools, ag power, building construction, project planning, plumbing, concrete, machinery and small engines (a specific area of instruction in California). For each area the survey asked if they had college instruction in the subject, how well the college had prepared them to teach the area, if they taught the subject, and if they had outside (non-college) experience. For the preparation questions a four-point Likert scale was used ranging from "very well prepared" to "not prepared". Demographic data was also collected. The instrument was tested for content validity by teachers outside the survey area. The survey was placed in an online form which stored responses in a database. A solicitation was emailed to teachers of agricultural mechanics in the Superior and Central regions of the state. These two regions were chosen because of their strong agricultural mechanics programs and because they represented both small and large programs. The original solicitation was sent to 125 teachers. The email to two teachers was undeliverable. Three solicitations were sent approximately two weeks apart. The first solicitation was emailed to all teachers in the group; the second and third were sent to non-respondents.

Results Summary

Seventy-one teachers (58%) responded to the survey. The responses were found to be representative of the population by gender and region using a Chi square analysis. The mean years of teaching for the respondents was 12.93 years compared to the population mean of 12.74 years. 20% of the respondents were female. Teacher's preparation results are summarized in Table 1 indicating that teachers felt most prepared in the tool area and least in the electrical area. Plumbing ($r=.396$, $p=.01$) was the only area where a significant correlation was found between preparation and teaching. A correlation analysis showed that more experienced teachers reported being more prepared in electrical ($r=.285$, $p<.05$), ag power ($r=.289$, $p<.05$), project planning ($r=.318$, $p<.05$), and concrete ($r=368$, $p<.05$). A T test showed no significant differences were found in university preparation between female and male teachers. The majority of teachers reported having experience outside their university preparation. 96.9% of teachers reported that they thought outside experience was important. No significant correlation was found between teaching experience (years) and outside experience in any of the areas. A T test found that female teachers had significantly less outside experience in all areas ($p<.05$ for all areas).

Table 1 – Preparation, Teaching, and Outside Experience

	No Preparation	Well/Very Well Prepared	Teach in the Area	Outside Experience
Electrical	23%	18.6%	75.7%	68.6%
Metal Fabrication	34%	20.0%	70.0%	78.6%
Tools	18%	50.0%	95.3%	73.9%
Ag Power	21%	35.7%	47.7%	77.1%
Building Construction	34%	27.1%	61.2%	78.3%
Project Planning	38%	25.7%	84.1%	62.7%
Plumbing	39%	20.0%	62.7%	73.5%
Concrete	38%	27.1%	48.5%	83.3%
Machinery	45%	28.6%	33.3%	77.9%
Small Engines	52%	20.0%	46.0%	64.7%

When asked where they received outside experience teachers commonly cited a wide variety of work experiences including summer jobs and working on the "university farm" as well as industry classes (e.g. Briggs and Stratton, Miller, and Lincoln).

Conclusions/Implications

The lack of significant gender differences in perceived preparation is a positive result since the percentages of women entering the profession continues climb and the number of women teaching agricultural mechanics is also climbing. However, given the importance teachers place on outside experience female teachers reported having significantly less experience than their male peers. The number of teachers reporting that their university experience did not prepare them to teach the subject is disturbing and should be investigated further. In some areas more experienced teachers reported that they were better prepared. This finding is consistent with a decline in agricultural mechanics instruction at the university level. The outside experiences should also be examined to better determine if these experiences occurred prior to entering teaching or have been obtained after the teacher entered the profession. Given the general perception of their preparation, and the importance that teachers place on outside experience a strong in-service program in agricultural mechanics may be indicated.

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Undergraduate Education As Preparation For Employment: A Survey of 2005 Graduates

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Undergraduate Education As Preparation For Employment: A Survey of 2005 Graduates

Introduction

It is the aim of the College of Agriculture and Life Sciences (CALS) at the University of Arizona to provide an educational experience which will best prepare graduates for employment in their determined field. Colleges of agriculture have historically had a significant role in preparing their graduates for entry and advancement in agricultural professions and careers. In order to continue to improve the focus and direction of the courses offered in CALS, continuous reviewing by graduates becomes necessary. As a result of the CALS undergraduate experience, it is desired that graduates have a sense of readiness as they enter the job market. In an effort to continually meet the needs of their respective clientele, departments must make decisions regarding the curriculum of their respective programs, such as the format in which to deliver courses (Roberts and Dyers, 2005). Graduates are in a unique position to judge the strengths and weaknesses of programs in which they have participated. Student contentment with their undergraduate experience is essential to an institution's vitality. It is widely believed that higher education could and should be more responsive to the needs of the industries that employ graduates. An outcomes assessment of undergraduate programs was desired to determine (but not limited to) student perceptions of the CALS undergraduate experience. The idea was to put a system in place which could be operated by staff in CALS on a continuing basis. It was hoped that information could be then used for analysis of trends over time.

Methods and Procedures

The study used descriptive survey research design. It was designed to assess the undergraduate experience of CALS alumni from the University of Arizona as related to career preparation. The target population for this study was all domestic CALS graduates for the calendar year of 2005 (N=466). All foreign students were excluded. The population was comprised of 10 academic departments, with 19 respective majors. The survey frame was obtained from the office of Enrollment Management at the University of Arizona.

The study aimed to use the same methods as used in the original study. The 2005 study used a bimodal method of data collection. A total of four letters were developed to be mailed to the population. Each letter encouraged the population to respond electronically. The population sample was directed to www.surveymonkey.com, an online questionnaire host. The cover letter indicated that participants would need to access the questionnaire host, and enter the password "cals05" and the provided 5-digit code number. The 5-digit code number was an indicator of the participant's unique response, department, and major. If graduates had not responded electronically, an additional hard copy was sent to encourage students to respond by direct mail.

Results/Findings

Results were obtained from 178 of the 466 graduates in the year 2005 for a 38% response rate. Responses from early and late respondents were compared and the findings showed no significant difference which allows the study to be reasonably reflective of the 2005 CALS graduating class. Graduates were surveyed on the level of their satisfaction with the CALS program overall, their preparation for the workforce or Graduate/Professional school, and their current employment status. In each category, results were based on a Likert scale of 1 to 5, 1= "Strongly Disagree" and 5= "Strongly Agree". 92% of respondents (*N*=163) agreed or strongly agreed that the University of Arizona helped them grow in knowledge and understanding of their academic field (M=4.26, SD=.74). 76.3% of respondents (*N*=55) agreed or strongly agreed with the following statement: "I am pleased with the quality of my UA College of Agriculture and Life Sciences undergraduate preparation for my graduate or professional education" (M=3.93, SD=1.069). There was also a high level of agreement regarding efficient preparation for employment in respondents (N=125, M=3.67, SD=1.098). Of those graduates who responded, more than 75% were employed and over 50% of those employed were in a field closely related to their undergraduate program of study.

Conclusions/Recommendations

Overall, CALS graduates had a favorable perception of their undergraduate education at the University of Arizona. Students felt they had sufficient growth both personally and professionally during their time at The University of Arizona. There was a majority of positive perceptions regarding preparation for employment or graduate/professional school. In addition, nearly all respondents were employed, in a graduate program, or both. The CALS graduates of 2005, when compared to the previous 2004 graduates did not differ widely in their responses and satisfaction with their undergraduate education and experience.

There was a large piece of missing information, due to non-response or validity of responses, which made it difficult to assess the entire CALS 2005 graduate class. Some recommendations to make this follow-up survey more successful would be to design a database of permanent email addresses for each graduate or at least the creation of a database with related information which will make it easier for researchers to contact former students personally. Another recommendation would be to conduct this survey at the exit interviews of students. Not only will this make students more accessible to reach, it will also provide researchers with opinions and feelings that students currently feel instead of waiting until they have been out of school for months. Follow-up studies such as this help to provide the College of Agriculture and Life Sciences at the University of Arizona with the tools to improve their programs to better fit the changing needs of its students. Assessment of student perceptions helps to improve teaching strategies, department resources, and course information focus.

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WHERE DO WE GO FROM HERE?
RESEARCH FOCI DEFINED BY AN EXPERT PANEL

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WHERE DO WE GO FROM HERE? RESEARCH FOCI DEFINED BY AN EXPERT PANEL

Introduction

Research in any field tends to reflect the nature of what are perceived to be important issues facing that field (Pucel, 1995). Career and Technical Education (CTE), formerly known as Vocational Education, has evolved in role, function, and practice throughout history. The Association of Career and Technical Education (ACTE), in the United States, and the International Vocational Education and Training Association (IVETA), internationally, both strive to create a competitive workforce by supporting the advancement of vocational training. Research and contributions to the literature related to vocational education and career and technical education is often divided by the context divisions from the ACTE and limited in scope to the educational context interests of the authors.

Over the years, the face of career and technical education has changed through policy and practice. The need to revise or eliminate outdated curriculum and develop new programs to meet the emerging work of family trends is a seemingly endless occurrence (Rojewski, 2002). The use of new technologies on the production line and in the office and influence of the workplace and markets that are so pervasive that one can argue that there is a qualitatively different occupational structure than a decade earlier (Rosenfeld, 1987). Increasing complexity in all facets of work, family, and community life coupled with the persistent calls for educational reform over the past several decade's present challenges to professionals in career and technical education (Rojewski, 2002). Based on the changing needs of education and research related to career and technical education, a formal research agenda is needed for the profession, which is not divided but unified and specific. Vocational education badly needs new models and new visions of how it can adapt to the new economy (Rosenfeld, 1987). In a recent study, Gemici and Rojewski (2007) contend that the recent emphasis from the federal government on scientifically-based research (SBR) as the research paradigm for federal funding, has direct implications for career and technical education research.

Conceptual Framework

Few descriptive frameworks for career and technical education exist (Rojewski, 2002). The conceptual framework for this investigation has been developed from studies conducted by Buriak and Shinn (1989, 1991), Silva-Guerrero and Sutphin (1990), and Radhadkrishna and Xu (1997).

Methods

A qualitative methodology was utilized in the study through the implementation of the Delphi Technique. The initial instrument was an open-ended question that solicited responses about critical research topics for CTE from the expert panel. Panelists for this investigation were drawn from the Association for Career and Technical Education membership divisions, business, industry, government, policy makers, and international vocational education stakeholders. The Delphi process for this investigation consisted of five rounds. Rounds one through three focused on developing a CTE research agenda, and rounds four and five focused on developing the research agenda topics into a logic model. The subsequent instruments used during the study included Likert-type scales and rankings designed to collect data on issues relating to research in career and technical education and international vocational education.

Findings/Conclusions

The data collected yielded a listing of the critical research topics as defined by the panel of experts. The findings from the study will be presented in graphic form for dissemination to the profession. The preliminary findings suggest a great need for developing research programs with high impact and previous studies have also expressed a need for relevant, timely and focused research for the profession.

Implications/Importance of the Study

The educational importance of this study is grounded in the fact that focused research in career and technical education and international vocational education will allow future planning and funding of research that is relevant across the profession. New technologies have produced a broad dissemination of cultural and economic information and have had a profound impact on human culture in all areas as we approach the realization of an interconnected global village (Shim, 1998). A need for a relevant and forward research agenda exists for the field of Career and Technical Education (CTE).

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Appendixes

Chairperson's Responsibilities

1. The Session Chair acts as the "Master of Ceremonies" for each session

2. Arrive at the meeting room 15 minutes prior to the starting time of the session

3. Secure biographical information for each speaker in order to make appropriate introductions.

4. Introduce yourself and the facilitator.

5. Introduce each presenter before they begin their presentation. Introductions should be kept short in order to allow the maximum amount of time for the presentations.

6. Start the meeting on time and adhere to the schedule of presentations. The facilitator will keep time for the presentations. Each paper presentation is allotted 15 minutes with 20 minutes of discussion time to begin after the final presentation.

7. Consult with the Facilitator prior to the start of the session to coordinate time keeping. Time cards will be available for use by the Facilitator.

8. After the final presentation, invite all of the presenters to take a seat in the front of the room. It will be your responsibility lead the discussion. You are not expected to prepare a written critique and comment on each paper, but you may need to get the discussion going.

9. Keep the discussion on schedule and allow time for an appropriate closing of the session.

10. Conclude the session by thanking the Presenters and Facilitator.

Facilitator's Responsibilities

1. Report to room 15 minutes before your session begins.

2. Introduce yourself to the Session Chairperson when you arrive. Check to be sure there is a laptop computer, screen and projector in your room. If not, be sure to contact Brian Warnick (435-760-5391) immediately.

3. You are responsible for keeping track of time for the presenter. You will be provided with a stopwatch and time cards to alert the presenter as to how much time they have to complete their presentation. Paper presenters have 15 minutes to present.

4. Stand at the door to the room. When the session is about to begin, close the door. The session chair will introduce him/herself and the facilitator.

5. You are to turn down the lights as requested by the presenter. Most of the presentations will be by PowerPoint®.

6. Start the stopwatch when the presenter begins her/his presentation. When there is five minutes left, hold up the "5 min." card to the presenter. Wait until he/she acknowledges seeing it. Repeat at "3 min." and "1 min." mark. Hold up the "Stop" sign when time is up. If the presenter stops before time has expired, you do not need to hold up the signs.

7. After the final presentation, the presenters will be invited to take a seat in the front of the room. Please assist in having chairs set up (wait until the final presentation is completed). Set the watch for 20 minutes for questions. At the end of 20 minutes, call "Time."

8. Turn the lights back up in the room.

9. Be sure to hold on to the watch and cards until the end of the session and place back in the Facilitator Folder.

10. Each room will be used twice. Make sure all equipment and Facilitator Folder are in the room before you leave.

11. At the completion of the second round of presentations, please stay in the room to assist with the removal of the AV equipment. Be sure to check with Brian Warnick before turning off or disconnecting the equipment.